FINAL DECISION
SA Power Networks determination 2015−16 to 2019−20

Attachment 3 − Rate of return

October 2015

Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 520
Melbourne Vic 3001

Tel: (03) 9290 1444
Fax: (03) 9290 1457

Email: AERInquiry@aer.gov.au

Note

This attachment forms part of the AER's final decision on SA Power Networks' 2015–20 distribution determination. It should be read with all other parts of the final decision.

The final decision includes the following documents:

Overview

Attachment 1 – Annual revenue requirement

Attachment 2 – Regulatory asset base

Attachment 3 – Rate of return

Attachment 4 – Value of imputation credits

Attachment 5 – Regulatory depreciation

Attachment 6 – Capital expenditure

Attachment 7 – Operating expenditure

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Attachment 10 – Capital expenditure sharing scheme

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Attachment 17 – Negotiated services framework and criteria

Attachment 18 – Connection policy

Contents

Shortened forms

Shortened form	Extended form
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
AGN	Australian Gas Networks
APTNT	APT Pipelines (NT) Pty Ltd
capex	capital expenditure
CAPM	capital asset pricing model
CCP	Consumer Challenge Panel
CGS	Commonwealth Government securities, also called Australian Government securities (AGS)
CPI	consumer price index
DGM	dividend growth model
DRP	debt risk premium
distributor	distribution network service provider
ERP	equity risk premium
FFM	Fama-French three-factor model
JEN	Jemena Electricity Networks
JGN	Jemena Gas Networks
MRP	market risk premium
NEL	national electricity law
NEO	national electricity objective
NER	national electricity rules
NGL	national gas law
NGO	national gas objective
NGR	national gas rules
NSP	network service provider
opex	operating expenditure
PTRM	post-tax revenue model

Shortened form	Extended form
RAB	regulatory asset base
RBA	Reserve Bank of Australia
RPP	revenue and pricing principles
SAPN	SA Power Networks
SLCAPM	Sharpe-Lintner capital asset pricing model
WACC	weighted average cost of capital

3 Rate of return

The allowed rate of return provides a network service provider (NSP) a return on capital to service the interest on its loans and give a return on equity to investors.[1] The return on capital building block is calculated as a product of the rate of return and the value of the regulatory asset base (RAB). The rate of return is discussed in this attachment.

3.1 Final decision

We are satisfied that the allowed rate of return of 6.17 per cent (nominal vanilla) we determined achieves the allowed rate of return objective.[2] That is, we are satisfied that this allowed rate of return is commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to SA Power Networks in providing standard control services.[3]

This rate of return will apply to SA Power Networks for the 2015–16 regulatory year. A different rate of return will apply to SA Power Networks for the remaining regulatory years of the 2015–20 regulatory control period. This is because we will update the return on debt component of the rate of return each year to partially reflect prevailing debt market conditions in each year. We discuss this annual update further below.

We are not satisfied that SA Power Networks' proposed (indicative) 7.09 per cent rate of return for the 2015-16 regulatory year has been determined such that it achieves the allowed rate of return objective.[4]

Our allowed rate of return is a weighted average of our return on equity and return on debt estimates (WACC) determined on a nominal vanilla basis that is consistent with our estimate of the value of imputation credits.[5] Also, in arriving at our decision we have taken into account the revenue and pricing principles (RPP) and are also satisfied that our decision will or is likely to contribute to the achievement of the National Electricity Objective (NEO).[6] Our rate of return and SA Power Networks' proposed rate of return is set out in the following Table 3-1.

[1] The term network service provider relates to service providers that provide gas and electricity transmission and distribution services.

[2] NER, cl. 6.5.2(b).

[3] NER, cl. 6.5.2(c).

[4] SA Power Networks, Revised *regulatory proposal 2015-20, July 2015*, p. 331.

[5] NER, cl. 6.5.2(d)(1) and (2).

[6] NEL, s.16.

Table 3-1 AER's final decision on SA Power Networks' rate of return (nominal)

	AER previous decision (2010–15)	SAPN revised proposal (2015–20)[(a)]	AER final decision (2015–16)	Return over 2015–20 regulatory proposal period
Return on equity (nominal post–tax)	11.09%	9.8%	7.5%	Remains constant (7.5%)
Return on debt (nominal pre–tax)	8.87%	5.29%	5.28%	Updated annually
Gearing	60%	60%	60%	Remains constant (60%)
Nominal vanilla WACC	9.76%	7.09%	6.17%	Updated annually as return on debt is updated
Forecast inflation	2.52%	2.06%	2.50%	Remains constant (2.50%)

Source: AER analysis; SA Power Networks, *Revised regulatory proposal 2015-20*, July 2015; AER, *Final decision: South Australia distribution determination 2010–11 to 2014–15*, May 2010.

(a) SA Power Networks' revised proposal uses values derived from the placeholder averaging periods for risk free rate and rate on debt.

Our return on equity estimate is 7.5 per cent. This rate will apply to SA Power Networks in each regulatory year. Our return on debt estimate for the 2015–16 regulatory year is 5.28 per cent. This estimate will change each year as we partially update the return on debt to reflect prevailing interest rates over SA Power Networks' debt averaging period in each year. Our return on debt estimate for future regulatory years will be determined in accordance with the methodology and formulae we have specified in this decision. As a result of updating the return on debt each year, the overall rate of return and SA Power Networks' revenue will also be updated.

We agree with the following aspects of SA Power Networks' revised rate of return proposal:

- adopting a weighted average of the return on equity and return on debt (WACC) determined on a nominal vanilla basis (as required by the rules)
- adopting a 60 per cent gearing ratio
- adopting a 10 year term for the return on debt
- estimating the return on debt by reference to a third party data series.

Consistent with our preliminary decision, we also agree with SA Power Networks' proposed approach, in its (initial) regulatory proposal. That is, to transition from the on-the-day approach to the trailing averaging approach to estimating the return on debt as set out in the rate of return guideline. This approach involves applying a transition to both the base rate and debt risk premium components of the return on debt. We disagree with SA Power Networks' decision in its revised regulatory proposal to depart from this approach.[7]

We disagree with SA Power Networks on a number of other components of the rate of return.

Our return on equity estimate is 7.5 per cent.[8] We derived this estimate by applying the same approach we applied to determine the allowed return on equity in our most recent final decision.[9] We continue to apply the rate of return guideline (the Guideline) approach referred to as the foundation model approach.[10] This is also the same approach we applied for the preliminary decision.[11] This is an iterative six step process which has regard to a considerable amount of relevant information, including various equity models. At different stages of our approach we have used this material to inform the return on equity estimate. Our return on equity point estimate and the parameter inputs are set out in the Table 3-2. SA Power Networks proposed departing from the approach in the Guideline. We are not satisfied doing so would result in an outcome that better achieves the allowed rate of return objective.[12] We do not agree with SA Power Networks that our method applied in the preliminary decision will result in a return on equity which is inconsistent with the allowed rate of return objective.[13] Our return on equity preliminary decision and this final decision is largely consistent with the views in the Guideline.

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7 In the preliminary decision we accepted SA Power Networks' initial proposal to adopt a transition applied to both the base rate and debt risk premium components of the return on debt. Under the normal decision making process, this means SA Power Networks could not change its position in the revised proposal. However, it appears the drafting of the transitional arrangements in the NER leads to an outcome which makes it possible for service providers to depart from their proposal after the AER has accepted it, and allows them to introduce a new position after the preliminary decision stage. Such an outcome raises concern on the relevance of the preliminary decision process. We discuss this matter in more detail below.

8 NER, cl. 6.5.2(c), (f) and (g).

9 AER, Jemena Gas Networks (JGN) *Approved Access Arrangement, JGN's NSW distribution networks 1 July 2015 - 30 June 2020*, June 2015.

10 AER, *Better regulation: Rate of Return Guideline,* December 2013.

11 AER, *Preliminary decision, SA Power Networks distribution determination 2015–16 to 2019–20, Attachment 3–Rate of return*, April 2015.

12 NER, cl. 6.2.8(c)

13 SA Power Networks, *Revised regulatory proposal 2015-20*, July 2015, p. 333.

Table 3-2 AER's final decision on SA Power Networks' return on equity (nominal)

	AER previous decision (2010–15)	SAPN revised proposal (2015-20)[(a)]	AER final decision (2015–20)
Nominal risk free rate (return on equity only)	5.89%	2.55%	2.96%
Equity risk premium	5.20%	7.25%	4.55%
MRP	6.50%	8.23%	6.50%
Equity beta	0.8	0.88	0.7
Nominal post–tax return on equity	11.09%	9.80%	7.5%

Source: AER analysis; SA Power Networks, *Revised regulatory proposal 2015-20*, July 2015; AER, *Final decision: South Australia distribution determination 2010–11 to 2014–15*, May 2010; SFG Consulting, *Report for SA Power Networks updated estimate of the required return on equity*, 19 May 2015.

(a) SA Power Networks used a multi-model approach to estimate return on equity. In applying this approach, SA Power Networks use the same market return in all four models. The MRP shown in this table is the market return less the risk free rate used in SA Power Networks' estimated SLCAPM. The equity beta is an 'implied beta' calculated as the proposed equity risk premium divided by MRP. SA Power Networks, *Revised regulatory proposal 2015-20*, July 2015; SFG Consulting, *Report for SA Power Networks updated estimate of the required return on equity*, 19 May 2015.

Our final decision on the return on debt approach is to:

- estimate an on-the-day rate (that is, based on prevailing market conditions) in the first regulatory year (2015–16) of the 2015–20 period, and
- gradually transition this rate into a trailing average approach (that is, a moving historical average) over 10 years.[14]

This gradual transition will occur through updating 10 per cent of the return on debt each year to reflect prevailing market conditions in that year. This approach is consistent with the approached we proposed in the Guideline and adopted in the preliminary decision. Our final decision is to estimate the return on debt in each regulatory year by reference to:

- a benchmark credit rating of BBB+
- a benchmark term of debt of 10 years

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[14] This final decision determines the return on debt methodology for the 2015-20 regulatory proposal period. This period covers the first five years of the 10 year transition period. This decision also sets out our intended return on debt methodology for the remaining five years. However, we do not have the power to determine in this decision the return on debt methodology for those years. Under the NER, the return on debt methodology must be determined in future decisions that relate to that period.

- independent third party data series—specifically, a simple average of the broad BBB rated debt data series published by the RBA and Bloomberg, adjusted to reflect a 10 year estimate and other adjustments[15]
- an averaging period for each regulatory year of between 10 business days and 12 months (nominated by the service provider), with that period being consistent with certain conditions that we proposed in the Guideline.[16]

In the Guideline, we proposed to use one or more third party data series to estimate the return on debt.[17] At that time, however, we had not formed a view on which data series to use. Our April 2014 issues paper outlined how we would make this choice and sought submissions from service providers.[18] In the preliminary decision, we formed a view on this issue and adopted a simple average of the RBA and Bloomberg data series. We maintain our preliminary decision position in this final decision.

Our formula for automatically updating the return on debt annually is set out in the revisions to SA Power Networks' proposal that we have published with this decision.

3.2 SA Power Networks' revised proposal

Return on equity

SA Power Networks proposed a return on equity estimate of 9.83 per cent by using a multiple model approach.[19] Specifically, SA Power Networks' proposed return on equity estimate is an equally weighted average of the return on equity estimates produced from four financial models—the SLCAPM, Black CAPM, Fama–French three factor model, and SFG's construction of the DGM.[20]

The material SA Power Networks submitted with its revised regulatory proposal is listed in Appendix F.

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15 For the RBA curve, our final decision is to interpolate the monthly data points to produce daily estimates, to extrapolate the curve to an effective term of 10 years, and to convert it to an effective annual rate. For the Bloomberg curve, our final decision is to extrapolate it to 10 years using the spread between the extrapolated RBA seven and 10 year curves (where Bloomberg has not published a 10 year estimate), and to convert it to an effective annual rate.

16 AER, *Rate of return guideline*, December 2013, pp. 21–2; AER, *Explanatory statement—Rate of return guideline*, December 2013, p. 126.

17 AER, *Explanatory statement—Rate of return guideline*, December 2013, pp. 23–4.

18 AER, *Issues Paper - Return on debt: Choice of third party data service provider*, April 2014.

19 SA Power Networks, *Revised regulatory proposal 2015-20*, July 2015, pp. 328-331. In SA Power Network's revised regulatory proposal the use of the multi-model had equal weights and as such the return on equity estimate proposed is 9.83 per cent. In SA Power Network's initial proposal, different weights were used and the return on equity estimate proposed was 10.45 per cent.

20 In SA Power Networks' initial regulatory proposal, the SLCAPM, Black CAPM, Fama–French three factor model and DGM were weighted 12.5%, 25%, 37.5% and 25% respectively. SA Power Networks, R*egulatory proposal 2015-20*, October 2014, p. 319.

Return on debt

In its revised regulatory proposal, SA Power Networks has proposed to further amend its proposal and depart from the position in its (initial) regulatory proposal in relation to how to transition from the on-the-day approach to trailing average approach. SA Power Networks now proposes to amend its proposal to calculate its return on debt using a hybrid transition which combines a gradual transition of the base rate to a trailing average and a backwards looking debt risk premium. Based on this hybrid transition, SA Power Networks proposed a return on debt estimate of 5.29 per cent for regulatory year 2015–16.[21]

In implementing the return on debt, SA Power Networks proposed:

- a 10 year term and BBB credit rating be used which is different to the BBB+ rating we proposed in the Guideline, [22] and
- a simple average of the RBA and BVAL cures. However, SA Power Networks proposed a different extrapolation adjustment method to the method applied by the AER in recent decisions.

3.3 AER's assessment approach

Our approach to determining the rate of return is set out in this section. This approach is based on the rate of return framework in the National Electricity Rules (NER). Under this framework, our key task is to determine an overall rate of return that we are satisfied achieves the allowed rate of return objective.[23] As required by the rate of return framework, we published the Guideline.

Our most recent rate of return final decision is the Jemena Gas Networks (NSW) Ltd (JGN) decision, published in June 2015. Simultaneously, we considered a number of rate of return proposals and revised proposals from different service providers and our decisions on those were released on 30 April 2015.[24] [25] TasNetworks' original proposal did not propose any departures from the Guideline. TasNetworks and Directlink adopted our return on equity draft decisions. At that time, the other service providers proposed varying reasons, material and propositions to justify their proposed departures from the Guideline and their proposals to not accept our draft decisions. Further, the service providers submitted a large volume of material in support of their proposals. Much of this material was not new to us and was considered by us during the development of the Guideline and again in making our decisions. All of this material was comprehensively reviewed by us. We also referred this

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[21] SA Power Networks, *Revised regulatory proposal 2015-20*, July 2015, p. 331.

[22] SA Power Networks, *Revised regulatory proposal 2015-20, July 2015, p. 388-389.*

[23] NGR, r. 87(2); NER, cl. 6.2.8(c).

[24] Revised proposals from Ausgrid, Endeavour Energy, Essential Energy, TasNetworks (adopted the Guideline), ActewAGL, TransGrid, Directlink and Jemena Gas Networks (NSW) and original proposals from Energex, Ergon Energy and SA Power Networks proposed departures from the Guideline.

[25] We note that the Australian Competition Tribunal is currently considering rate of return decisions of the AER released in April 2015 for Ausgrid, Endeavour Energy, Essential Energy and ActewAGL and released in June 2015 for Jemena Gas Networks. A number of key areas of disagreement between the AER and the service providers are being considered as part of this review process. The AER will consider the decisions of the Tribunal when they are handed down.

material to our consultants for their consideration prior to making our November 2014 draft decisions and April-June 2015 final and preliminary decisions.

Our final decision for JGN comprehensively set out our allowed rate of return analysis and reasoning. For this SA Power Networks final decision, unless stated otherwise, we adopt the return on equity analysis and reasoning as set out in the JGN final decision.

The service providers that submitted regulatory proposals and revised regulatory proposals currently under consideration by us have submitted a large volume of material in support of their proposals.[26] Much of this material is the same material we considered in making our April and June 2015 decisions noted above. We again reviewed this material to identify what is new. We reviewed the new material submitted to us and considered its implications for addressing the allowed rate of return objective and whether we should depart from the Guideline. We also referred this material to our consultants for their consideration prior to making our preliminary and final decisions.

Where new material was submitted in regulatory proposals currently under consideration by us, we had regard to the material in all of the different proposals and revised proposals in determining the return that meets the allowed rate of return objective. Our considerations are throughout this rate of return attachment and relevant appendices.

The service providers that submitted regulatory proposals and revised regulatory proposals currently under consideration by us have challenged most aspects of the Guideline approach (and methods) to estimating the return on equity and debt. SA Power Networks also did not adopt our preliminary decisions. We have reviewed the material submitted since our preliminary decision, and considered the reasons for the proposed departures from the Guideline. We have taken into account stakeholder submissions on our preliminary decisions, and on service providers' revised and initial proposals. In doing so, we have undertaken two interdependent tasks as required by the rules:

- consider whether the proposed departures would better achieve the allowed rate of return objective such that we should depart from the Guideline
- determine a rate of return that we are satisfied achieves the allowed rate of return objective.

An important feature of the rate of return framework is the recognition that there may be several plausible answers that may achieve the allowed rate of return objective. The Australian Energy Market Commission (AEMC) in its final rule determination considered that the estimation of the required rate of return could be improved by permitting us to take account of a broad range of information.[27] The AEMC specifically did not include in the new

[26] The service providers are: SA Power Networks, Energex, Ergon Energy (revised regulatory proposals), United Energy, Jemena Electricity Networks, AusNet Services, CitiPower, Powercor (initial regulatory proposals), ActewAGL Gas Distribution, Australian Gas Networks and APTNT (access arrangement revisions).

[27] AEMC, Rule determination: National electricity amendment (Economic regulation of network service providers) Rule 2012: National gas amendment (Price and revenue regulation of gas services) Rule 2012, 29 November 2012, p. 67 (AEMC, *Final rule change determination*, November 2012).

rules any preferred methods for determining the rate of return.[28] Instead it provided for us to exercise judgement as to what we are satisfied is the best approach.[29]

During the AEMC's rule development, the Energy Networks Association (ENA) submitted that the Guideline should provide a high level of certainty that enables stakeholders to calculate proxy estimates of the rate of return.[30] During the development of the Guideline, a group of investors and ENA again raised the importance of certainty.[31] In particular, the ENA submitted that certainty and stability of outcomes in rate of return issues could materially benefit the long term interest of consumers.[32] We have provided certainty and predictability of approach in the Guideline in a manner that it is consistent with achieving the allowed rate of return objective.

We are cognisant that our task is not to determine a rate of return that merely applies the Guideline. That is, we do not consider the Guideline to be the determinative instrument for calculating the rate of return. Rather, the allowed rate of return objective has primacy in our estimation of the rate of return. Nevertheless, the Guideline has a significant role at the time of each regulatory proposal or access arrangement proposal because any decision to depart from the Guideline must be a reasoned decision.[33] In practice, we have considered submissions on the rate of return made during this determination process anew so that we are satisfied that our estimate of the rate of return achieves the allowed rate of return objective. Where no new material was submitted we maintain our view as expressed in the Guideline for reasons stated therein. Whilst the legislative framework allows us to depart from the Guideline, we would not do so lightly. Departing from it may undermine the certainty and predictability that stakeholders have said they value. We would depart from the Guideline if we are satisfied that doing so would result in an outcome that better achieves the allowed rate of return objective. Our approach is consistent with the AEMC's view that, 'the regulator would, in practice, be expected to follow the guidelines unless there had been some genuine change in the evidence'.[34] In its Rule determination, in relation to the Guideline the AEMC stated:[35]

> …the Commission would expect service providers, consumers, the AER, the ERA, and the appeal body to have significant regard to them as a starting point for each regulatory determination or access arrangement.

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28 See, for example, AEMC, *Final rule change determination*, 29 November 2012, p. iv.

29 AEMC, *Final rule determination*, 29 November 2012, p. 38; The High Court of NZ stated: "In determining WACC, precision is therefore an elusive and perhaps non-existent quality. Setting WACC is, we suggest, more of an art than a science. The use of WACC, in conjunction with RAB values, to set prices and revenue in price-quality regulation gives significance to WACC estimates that may not exist outside this context." *Wellington International Airport Ltd & Others v Commerce Commission [2013] NZHC 3289, para. 1189*.

30 AEMC, *Final rule determination*, 29 November 2012, p. 50.

31 Financial Investors Group*, Submission on AER's equity beta issues paper*, 29 October 2013.

32 ENA, *Response to the Draft Rate of Return Guideline of the AER*, 11 October 2013, p. 1.

33 NGR r. 87(18); NER, r. 6.2.8(c).

34 AEMC, *Final Position Paper, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*,15 November 2012, p. 28.

35 AEMC, *Final rule determination*, 29 November 2012, p. 71.

The rate of return framework provides for us to take into account a wide range of relevant estimation methods, financial models, market data and other evidence as well as considering inter-relationships between parameter values.[36] This enables us to determine the estimate of the required rate of return at the time of each regulatory determination or access arrangement commensurate with prevailing conditions in the market for funds at that time.[37] The rate of return framework incorporates a greater degree of regulatory judgement than did the previous framework. This framework does not include any preferred methods for estimating components of the rate of return. Instead, the AEMC in formulating the framework provided high-level principles to guide the estimation of the rate of return consistent with achieving the allowed rate of return objective.[38]

The Guideline was designed through extensive consultation. This process provided transparency and the Guideline provides predictability for service providers, users and investors as to how we consider changes in market circumstances and make decisions. At the same time, it allows sufficient flexibility for us to account for changing market conditions at the time of each regulatory determination or access arrangement. The process included effective and inclusive consumer participation which we consider an important feature of our approach.

The remainder of our assessment approach is separated into the following subsections:

- Requirements of the law and rules.
- Rate of return guideline.
- Interrelationships within the rate of return.
- Expert advice and stakeholder submission.

3.3.1 Requirements of the law and rules

This section summarises the key aspects of the law and rules that underpin the rate of return framework.

Overall rate of return (weighted average cost of capital)

The allowed rate of return for a regulatory year must be a weighted average of the return on equity for the regulatory period[39] in which that regulatory year occurs and the return on debt for that regulatory year and must be determined on a nominal vanilla basis that is consistent with the estimate of the value of imputation credits (WACC).[40] The WACC formulae is:

1. $WACC_{vanilla} = E(k_e)\frac{E}{V} + E(k_d)\frac{D}{V}$

where:

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36 NGR, r. 87(5)(a) and NER clause 6.5.2(e).

37 NGR, r. 87(7); NER clause 6A.6.2(g) and 6.5.2(g).

38 NGR r. 87; NER clauses 6.5.2 and 6A.6.2.

39 Being a regulatory control period or an access arrangement period.

40 NER, cl. 6.5.2(d)

- $E(k_e)$ is the expected required return on equity
- $E(k_d)$ is the expected required return on debt
- $\frac{E}{V}$ is the proportion of equity in total financing (comprising equity and debt)
- $\frac{D}{V}$ is the proportion of debt in total financing, and is equal to the benchmark efficient entity gearing ratio of 0.6.

In determining the allowed rate of return, we must have regard to:[41]

- relevant estimation methods, financial models, market data and other evidence;
- the desirability of using an approach that leads to the consistent application of any estimates of financial parameters that are relevant to the estimates of, and that are common to, the return on equity and the return on debt; and
- any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.

Allowed rate of return objective

The allowed rate of return we determine is to be determined such that achieves the allowed rate of return objective. The objective is[42]

> …that the rate of return for a distribution network service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the distribution network service provider in respect of the provision of standard control services.

National electricity objective and the revenue and pricing principles

In performing or exercising an economic regulatory function or power, we must do so in a manner that will or is likely to contribute to the national electricity objective.[43] A distribution determination, of which the rate of return is a constituent decision, is an AER economic regulatory function or power. The national electricity objective states:

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to —
>
> (a) price, quality, safety, reliability and security of supply of electricity;
>
> (b) and the reliability, safety and security of the national electricity system.

41 NER, cl. 6.5.2(e)

42 NER, cl. 6.5.2(c).

43 NEL, s. 16(1)(a).

In addition, we take into account the revenue and pricing principles when exercising discretion in making our decision relating to direct control network services.[44] In the context of the rate of return decision, we take particular account of the following revenue and pricing principles:

- A service provider should have a reasonable opportunity to recover at least the efficient costs that the operator (benchmark efficient entity) incurs in providing direct control network services.[45]
- A service provider should have effective incentives to promote economic efficiency in the direct control network services that it provides. That economic efficiency should include efficient investment in the electricity system, efficient provision of electricity network services, and the efficient use of the electricity system.[46]
- A price or charge should allow for a return that matches the regulatory and commercial risks from providing the regulated service that charge relates.[47]
- The economic costs and risks of the potential for under or over investment by a service provider in a distribution or transmission system that the service provider uses to provide regulated network services.[48]
- The economic costs and risks of the potential for under or over utilisation of a distribution or transmission system that the service provider uses to provide regulated network services.[49]

Return on equity

Our return on equity for a regulatory control period must be estimated such that it contributes to the achievement of the allowed rate of return objective. In estimating the return on equity, we have regard to the prevailing conditions in the market for equity funds.[50]

Return on debt

Our return on debt for a regulatory year must be estimated such that that it contributes to the achievement of the allowed rate of return objective.[51]

We estimate the return on debt using a methodology which results in the return on debt (and consequently the allowed rate of return) being or potentially being, different for different regulatory years in the regulatory control period.[52]

In estimating the return on debt we have regard to the following factors:

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44 NEL, s. 16(2).
45 NEL, s. 7A(2).
46 NEL, s. 7A(3).
47 NEL, s. 7A(5).
48 NEL, s. 7A(6).
49 NEL, s. 7A(7).
50 NER, cl 6.5.2(f) and (g).
51 NER, cl. 6.5.2 (h).
52 NER, cl. 6.5.2 (i).

- the desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the allowed rate of return objective
- the interrelationship between the return on equity and the return on debt
- the incentive that the return on debt may provide in relation to capital expenditure over the regulatory control period, including as to the timing of capital expenditure
- any impacts (including in relation to the costs of servicing debt across regulatory control periods) on a benchmark efficient entity referred to in the allowed rate of return objective that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory control period to the next.[53]

Make and publish the rate of return guideline

On 17 December 2013,[54] as required under the rules, we published the Guideline which is available on our website.[55] Within it we specified:[56]

- The methodologies we propose to use to estimate the allowed rate of return (derived from the expected return on equity and the return on debt) for electricity and gas network businesses.
- The method we propose to use to estimate the value of imputation tax credits used to establish a benchmark corporate income tax allowance (see attachment on the value of imputation credits).
- How these methods will result in an allowed return on equity and return on debt which we are satisfied achieves the allowed rate of return objective.

In the Guideline we also set out the estimation methods, financial models, market data and other evidence that we propose to take into account in estimating the expected return on equity, return on debt and the value of imputation tax credits.[57] Network businesses must provide reasons in their revenue proposals for any proposed departures from the Guideline.[58] Should we decide to depart from the Guideline in a distribution determination then we must provide reasons for any such departures.[59]

3.3.2 Rate of return guideline

This section sets out the key elements of the Guideline. The explanatory statement (and appendices) to the Guideline explain our proposed approach in detail which we adopt for this section.[60] Where we have received proposals/submissions to depart and/or departed from

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53 NER, cl. 6.5.2 (k).

54 http://www.aer.gov.au/node/18859

55 NER, cl. 6.5.2(m).

56 NER, cl. 6.5.2 (n).

57 NER, cl. 6..5.2 (n) (2).

58 NER, cl. S6.1.3(9),(9A),(9B).

59 NER, cl. 6.2.8(c).

60 The full suite of documents associated with the guideline including the explanatory statements, relevant appendices and expert reports are available at http://www.aer.gov.au/node/18859.

the Guideline, any such proposals/submissions and/or departures are explained and reasons for doing so are set out in section 3.4 and the appendices.

Consultative approach to designing the guideline

In developing the Guideline we undertook an extensive consultation process to provide stakeholders with opportunities to raise and discuss matters. We are satisfied that this comprehensive consultation process resulted in the Guideline addressing the relevant issues. One of the key benefits of this extensive consultative and inclusive process is that it provided stakeholders with greater certainty and predictability as to how we will assess proposals and determine the rate of return at each determination.

All the material including submissions received are available on our website, at the *Better Regulation Reform* page. A summary of submissions is set out in appendix I of the rate of return Guideline explanatory statement.

An outline of the consultative process is set out below:[61]

- On 18 December 2012, we released an issues paper. This paper raised and sought comment on a broad range of issues at a high level with no firm positions taken by us. We received 20 submissions on the issues paper.
- On 5 February 2013, we hosted a forum on the development of the guideline. A range of stakeholders including representatives of regulated energy businesses, energy users, state regulatory authorities, government statutory authorities and investors in regulated utilities participated in this forum. At the forum we sought high level views from participants on key matters. Forum participants discussed issues set out in our issues paper. Stakeholders sought clarification on how we would apply the principles set out in the issues paper and explain how these principles related to the objectives and the revenue and pricing principles.
- On 25 and 26 February 2013 we held two sub-group workshops on: i) the overall rate of return and cost of equity ii) the cost of debt. Again, a range of stakeholders attended these workshops and discussed the key issues relating to development of guideline including the role of the principles, the nature of the benchmark efficient entity, the use of financial models and approaches for estimating the cost of equity and cost of debt.
- In May 2013 we released a consultation paper. This paper sought comments on our preliminary positions on some elements of the rate of return. We received 41 submissions on the consultation paper.
- On 3 and 4 June 2013 we held two sub-group workshops on: i) approach to return on debt benchmark and ii) return on equity—models assessment. A large number of stakeholders attended these workshops. The debt workshop discussed the key issues relating to approach to return on debt- benchmark (‘on-the day’ and portfolio), trailing average, annual updating of a trailing average, weighting, and transitional arrangements. The equity workshop discussed various models used for assessing the return on equity.

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[61] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, pp. 19–20.

- On 18 June 2013 we held another workshop on relationship between risk and the rate of return, and implications for the definition of the benchmark efficient entity. Again a large number of stakeholders and the consultants attended this workshop. Frontier Economics made presentations on: i) characteristics and exposures of energy networks in general and ii) differences in risk exposures of different types of energy networks. Associate Professor Graham Partington made a presentation on accounting for risk within the regulatory framework. The consultants also responded to the stakeholders questions.
- On 30 August 2013 we published our draft guideline and explanatory statement. In response to the draft guideline and accompanying explanatory statement we received 46 submissions. A key theme in submissions was requests for additional specification to be included in the guideline. This request came from a range of stakeholders, but most prominently from investors. Investors told us that it was important for them to be able to forecast our decision outcomes with a fair degree of precision to avoid surprises. These responses led us to include more details in the final guideline included the parameter estimates we proposed to use when applying our foundation model.[62]
- On 30 August 2013, following the release of the draft rate of return guideline we held an information session presented by the previous AER Chairman, Andrew Reeves outlining the details of our draft guideline. We published a copy of the presentation and answers to all questions raised during the session.
- On 1 October 2013 we held a stakeholder forum to discuss our draft rate of return guideline. The forum provided interested stakeholders with an opportunity to clarify aspects of the draft guideline and to present their views on the draft guideline.
- On 11 October 2013, we released an issues paper on equity beta as part of our consultation for developing the rate of return guideline. This issues paper set out our proposed approach to estimating the equity beta. We received 14 submissions on this issues paper.
- We held a number of bilateral meetings during the process with the QTC, TCorp, ERA, IPART, APIA, EUAA, ENA, PIAC, Merrill Lynch, Moody's, Standard and Poor's, Goldman Sachs, Westpac.
- Throughout the process we held a series of meetings with the Consumer Reference Group to receive feedback from on key issues from a consumer perspective. Our past experience was that consumers struggled to participate in our regulatory processes. They found it difficult to engage with the complexity of the regulatory framework and then to provide written material that fits within the framework that governs our decision. Our objective in running the consumer reference group was to educate consumers, identify the key issues and gather their comments without the need for comprehensive written submissions. At the conclusion of the Better Regulation program we undertook an evaluation of the consumer reference group. A copy of this evaluation is on our website.[63]

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[62] See AER, *Better regulation: Explanatory statement rate of return guideline, Appendices,* December 2013, Table I.4, pp. 185–186.

[63] Available at: http://www.aer.gov.au/node/19166.

Application of criteria for assessing information

We developed a number of criteria and applied these to inform our regulatory judgement when evaluating material put before us. The criteria are subordinate to the law, the rules and especially the allowed rate of return objective. We developed them to provide stakeholders greater certainty, and a framework, as to how we intend to exercise our regulatory judgement whilst keeping sufficient flexibility to make decisions consistent with changing market conditions.[64]

We proposed to apply assessment criteria to guide our selection and use of estimation methods, models, market data and other evidence which inform our assessment of the overall rate of return. Not all the various estimation methods, financial models, market data and other evidence (information) will be of equal value in determining the rate of return by reference to a benchmark efficient entity. For example, some information may be more relevant, more feasible to construct, or more reliable than others. We considered that our decisions on the rate of return are more likely to contribute to the achievement of the allowed rate of return objective because we use estimation methods, financial models, market data and other evidence that are:

(1) where applicable, reflective of economic and finance principles and market information

 (a) estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data

(2) fit for purpose

 (a) the use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose

 (b) promote simple over complex approaches where appropriate

(3) implemented in accordance with good practice

 (a) supported by robust, transparent and replicable analysis that is derived from available credible datasets

(4) where models of the return on equity and debt are used these are

 (a) based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation

 (b) based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale

(5) where market data and other information is used, this information is

[64] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.2.

(a) credible and verifiable

(b) comparable and timely

(c) clearly sourced

(6) sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.

These criteria are applied in this decision to guide us in deciding on the merits of the material before us and the best place to employ the material (if at all).

Benchmark efficient entity

Our definition of a benchmark efficient entity, as set out in the Guideline and applied in this decision, is to:

- adopt a single benchmark across gas and electricity, transmission and distribution
- adopt a conceptual definition of a benchmark efficient entity that is 'a pure play, regulated energy network business operating within Australia'.

Our benchmark efficient entity is defined to give effect to the allowed rate of return objective which requires it to have a similar degree of risk as that which applies to the distribution or transmission network service provider in respect of the provision of regulated services.[65] Our benchmark efficient entity includes the following sub components as defined below:[66]

Pure play

A pure play business is one which offers services focused in one industry or product area. In this context, it means that the benchmark efficient entity provides only regulated energy network services.

Regulated

A regulated entity for the purposes of our benchmark is one which is subject to economic regulation (that is, revenue price cap regulation) under the National Electricity Rules and/or the National Gas Rules.

Energy network business

Energy network refers to a gas distribution, gas transmission, electricity distribution or electricity transmission business.

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[65] NER, cl. 6.5.2(c).

[66] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013,ch.3; AER, *Better regulation: Rate of Return Guideline,* December 2013, section 3.

Operating within Australia

A benchmark efficient entity should be operating within Australia as the location of a business determines the conditions under which the business operates. This includes the regulatory regime, tax laws, industry structure and broader economic environment.

Gearing

The weight we proposed give to the point estimates of the return on equity and the return on debt to derive the overall rate of return using the above WACC formula is based on our gearing ratio point estimate of 60 per cent. We give 60 per cent weight to debt and 40 per cent to equity.[67]

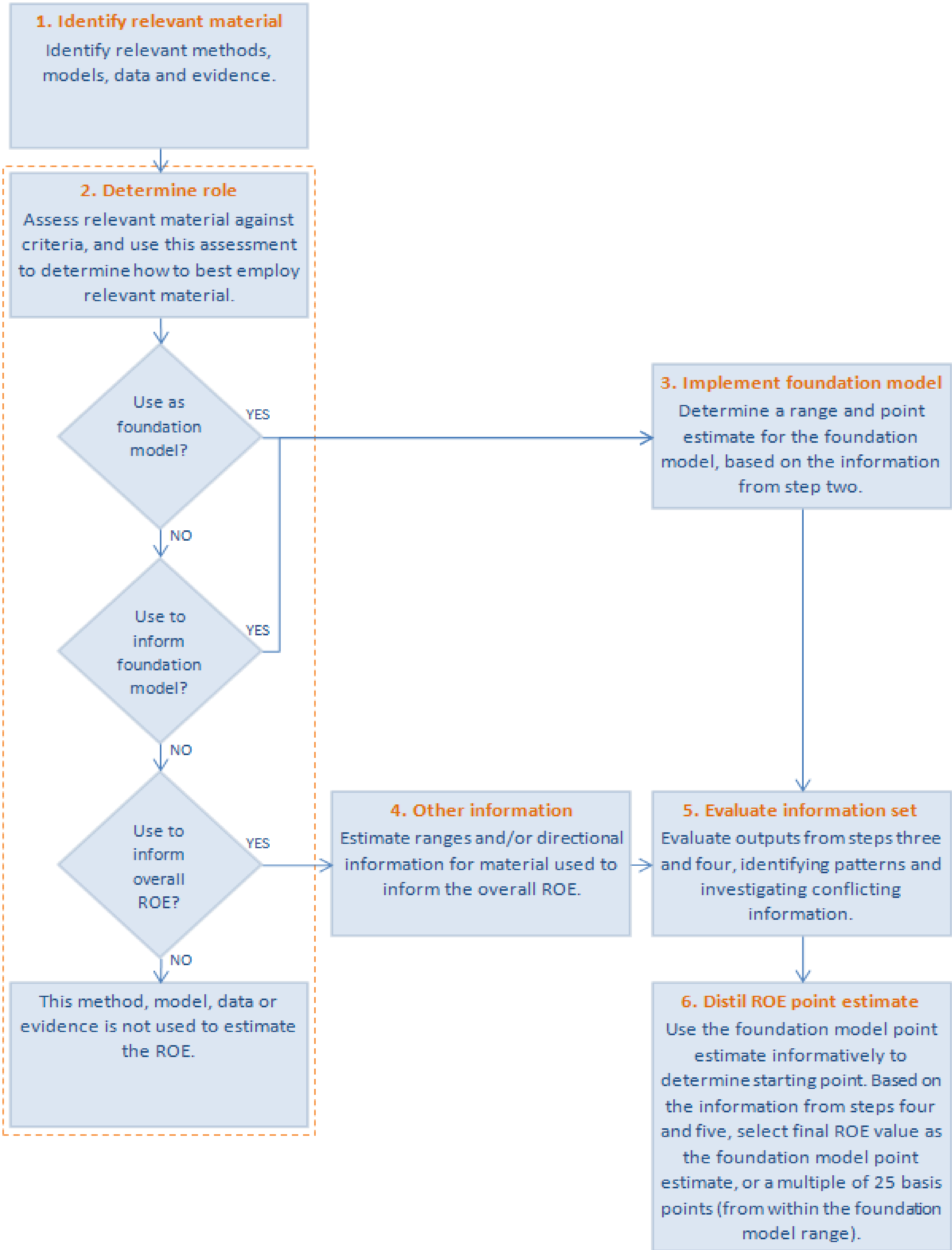
Return on equity

We proposed to estimate the expected return on equity using the six steps set out in the flow chart in Figure 3-1. The reasons for adopting a process that consists of these six steps are discussed in detail in the documents and submissions that make up the material considered during the different stages of developing the Guideline. These include our issues and consultation papers and draft and final explanatory statements.[68]

[67] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, Appendix F.

[68] Available at, http://www.aer.gov.au/node/18859.

Figure 3-1 Flowchart of the AER's proposed approach to estimating the expected return on equity



Return on debt

We proposed to:

- estimate an on-the-day rate (that is, based on prevailing market conditions) in the first regulatory year (2015–16) of the 2015–20 period, and
- gradually transition this rate into a trailing average approach (that is, a moving historical average) over 10 years.[69]

This gradual transition will occur through updating 10 per cent of the return on debt each year to reflect prevailing market conditions in that year.

We also proposed to estimate the return on debt in each regulatory year by reference to:

- a benchmark credit rating of BBB+
- a benchmark term of debt of 10 years
- independent third party data series—specifically, a simple average of the broad BBB rated debt data series published by the RBA and Bloomberg, adjusted to reflect a 10 year estimate and other adjustments[70]
- an averaging period for each regulatory year of between 10 business days and 12 months (nominated by the service provider), with that period being as close as practical to the start of each regulatory year and also consistent with other conditions that we proposed in the rate of return guideline.[71]

Mid period WACC adjustment

We proposed that our overall rate of return estimate will be updated annually because the return on debt is updated annually.[72] Hence, while the return on equity we determine at the start of the regulatory control is fixed for the relevant regulatory period, the return on debt is updated annually to apply our trailing average approach over the regulatory control period.[73] We recently published amendments to the transmission and distribution post tax revenue model (PTRM) to enable the application of the guideline changes.[74]

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69 This final decision determines the return on debt methodology for the 2015–20 period. This period covers the first five years of the 10 year transition period. This decision also sets out our intended return on debt methodology for the remaining six years. However, we do not have the power to determine in this decision the return on debt methodology for those years. Under the NER, the return on debt methodology must be determined in future decisions that relate to that period.

70 In the Guideline, we proposed to use one or more third party data series to estimate of the return on debt. However, at that time we had not formed a view on which data series to use. We form our view following a separate consultative process. This consultative process started with the release of an issues paper in April 2014.

71 AER, *Rate of return guideline*, December 2013, pp. 21–2; AER, *Explanatory statement—Rate of return guideline*, December 2013, p. 126.

72 NER, cl. 6.5.2(i).

73 See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013,ch.4.3.2.

74 Available at http://www.aer.gov.au/node/27616.

3.3.3 Interrelationships

This section notes the key interrelationships in the rate of return decision in the context of the rule requirements to apply a rate of return. Where we have had regard to these in developing our approach, they are more fully described in the Guideline. The manner in which these are taken into account in making this decision is set out as part of our reasoning and analysis in section 3.4 and the rate of return appendices.

We estimate a rate of return for a benchmark efficient entity which is then applied to a specific service provider, rather than determining the returns of a specific service provider based on its specific circumstances.[75] This is the same whether estimating the return on equity or return on debt as separate components. We set a rate of return that is commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as the service provider in respect of the provision of standard control services. This provides a reasonable opportunity to recover at least efficient costs.[76] The service providers' actual returns could be higher or lower compared to the benchmark depending on how efficiently it operates its business. This is consistent with incentive regulation. That is, our rate of return approach drives efficient outcomes by creating the correct incentive by allowing service providers to retain (fund) any additional income (costs) by outperforming (underperforming) the efficient benchmark.[77]

We apply a benchmark approach and an incentive regulatory framework. Any one component or relevant parameter adopted for estimating the rate of return should not be solely viewed in isolation. In developing our approach and implementing it to derive the overall rate of return we are cognisant of a number of interrelationships relating to the estimation of the return on equity and debt and underlying input parameters.

Single benchmark

We adopt a single benchmark efficient entity across all service providers. In deciding on a single benchmark we considered different types of risks and different risk drivers that may have the potential to lead to different risk exposures. We also noted that the rate of return compensates investors only for non–diversifiable risks (systematic risks) and other types of risks are compensated via cash flows and some may not be compensated at all.[78] These interrelationships between the types of risk and the required compensation via the rate of return are an important factor.[79] Our view is that the benchmark efficient entity would face a similar degree of risk irrespective of the:

- energy type (gas or electricity)
- network type (distribution or transmission)
- ownership type (government or private)

75 See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.3.
76 NEL, s. 7A(2).
77 NEL, s. 7A(3).
78 See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, p.33.
79 See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.3.3

- size of the service provider (big or small).

Domestic market

We adopt the Australian market as the market within which the benchmark efficient entity operates. This recognises that the location of a business determines the conditions under which the business operates and these include the regulatory regime, tax laws, industry structure and broader economic environment. As most of these conditions will be different from those prevailing for overseas entities, the risk profile of overseas entities is likely to differ from those within Australia. Consequently, the returns required are also likely to differ. This is an important factor in estimating the rate of return and we therefore adopt a domestic approach. Hence, when estimating input parameters for the Sharpe–Lintner capital asset pricing model (SLCAPM) we place most reliance on Australian market data whilst using overseas data informatively.

Benchmark gearing

We apply a benchmark efficient level of gearing of 60 per cent, as noted above. This benchmark gearing level is used:

- to weight the expected required return on debt and equity to derive the overall rate of return using the WACC formula
- to re-lever asset betas for the purposes of comparing the levels of systematic risk across businesses which is relevant for the equity beta estimate.

We adopt a benchmark credit rating which is BBB+ or its equivalent for the purposes of estimating the return on debt. To derive this benchmark rating and the gearing ratio, we reviewed a sample of regulated networks. Amongst a number of other factors, a regulated service provider's actual gearing levels have a direct relationship to its credit ratings. Hence, our findings on the benchmark gearing ratio of 60 per cent and the benchmark credit rating are interrelated given that the underlying evidence is derived from a sample of regulated network service providers.[80]

Term of the rate of return

We adopt a 10 year term for our overall rate of return.[81] This results in the following economic interdependencies that impact on the implementation of our return on equity and debt estimation methods:

- The risk free rate used for estimating the return on equity is a 10 year forward looking rate
- The market risk premium (MRP) estimate is for a 10 year forward looking period
- We adopt a 10 year debt term for estimating the return on debt.

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[80] See AER, *Better Regulation, Draft Rate of Return Guideline, Explanatory statement*, August 2013, ch.8.34 and appendix C.

[81] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.4.3.4.

3.3.4 Expert reports and stakeholder submissions

Expert reports

We commissioned expert advice from the following finance experts to assist us in making our decisions:

- Professor Michael McKenzie, University of Liverpool.[82]
- Professor Stephen Satchell, Trinity College, Cambridge University[83]
- Associate professor Graham Partington, University of Sydney.[84]
- Associate professor John Handley, University of Melbourne.[85]
- Dr Martin Lally, Capital Financial Consultants.[86]
- Chairmont, a financial market practitioner[87]

We received advice from Professor Olan Henry, University of Liverpool, on estimating beta. This was commissioned during the Guideline development process and the final report was published in April 2014.[88] We also received advice on return on debt estimation from the ACCC Regulatory Economic Unit (REU).[89] Additionally, we sought and received a substantial amount of expert advice during the Guideline development process including from the REU. These reports have also assisted us in making our decision.

Stakeholder submissions

Stakeholders made submissions specific to SA Power Networks which we have considered. Material that was submitted for the recent decisions published in April and June 2015 has also been considered in making this decision. Overall, in making these recent decisions we

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82 Michael McKenzie and Graham Partington on behalf of the Securities Industry Research Centre of Asia Pacific (SIRCA) Limited, *Report to the AER Part A: Return on Equity*, October 2014.

83 Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015; Partington and Satchell, *Report to the AER: Analysis of criticisms of 2015 determination,* October 2015.

84 Michael McKenzie and Graham Partington on behalf of the Securities Industry Research Centre of Asia Pacific (SIRCA) Limited, *Report to the AER Part A: Return on Equity*, October 2014; Graham Partington, *Report to the AER: Return on equity (Updated) April 2015*; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015; and Partington and Satchell, *Report to the AER: Analysis of criticisms of 2015 determination,* October 2015.

85 John Handley, *Advice on return on equity, Report prepared for the AER*, 16 October 2014; John Handley, *Report prepared for the Australian Energy Regulator: Advice on the value of imputation credits*, 29 September 2014; John Handley, Further *advice on return on equity, April* 2015

86 Martin Lally, *Transitional arrangements for the cost of debt*, November 2014; Martin Lally, *Implementation issues with the cost of debt*, November 2014.;Martin Lally, Review of submissions on the cost of debt, April 2015; Martin Lally, *Review of submissions on implementation issues for the cost of debt*, October 2015; Martin Lally, *Review of submissions on transition issues for the cost of debt*, October 2015.

87 Chairmont, Cost of debt: Transitional analysis, April 2015; Chairmont, *Financial practices under regulation: past and transitional*, October 2015.

88 Olan Henry, *Estimating β: An update*, April 2014.

89 REU, *Return on debt estimation: a review of the alternative third party data series*, August 2014.

received a large number of submissions on the original proposals, preliminary decisions and revised rate of return proposals.[90] [91] Most of these submissions, including those on SA Power Networks' revised proposal and our preliminary decision, had commentary relating to the rate of return.

3.4 Reasons for final decision

Our allowed rate of return is a weighted average of the return on equity and debt determined on a nominal vanilla basis (that is, a vanilla WACC). It has been estimated consistently with the estimation of the value of imputation credits.[92]

In deriving the WACC, and the estimated efficient debt and equity financing costs, we have applied the benchmark efficient entity gearing ratio of 0.6 (debt):0.4 (equity) that we proposed in the Guideline. We have no reason to depart from this gearing ratio.[93]

In making this decision we have considered issues that have been raised by SA Power Networks as well as those raised by different service providers and stakeholders in our recently published electricity regulatory determinations. While, we have addressed matters specifically raised by SA Power Networks and/or stakeholders in this decision process, much of our analysis and reasoning also addresses maters raised by service providers (and stakeholders) in their regulatory determination processes. All of this material informs our view on the SA Power Networks proposal and also underpins our decision on the return on equity that contributes to the achievement of the allowed rate of return objective.[94] That is, a return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to SA Power Networks in respect of the provision of standard control services.[95]

We discuss our reasons for the return on equity and return on debt under the separate subheadings, 3.4.1 and 3.4.2, respectively.

Subsections 3.4.3 and 3.4.4 set out the gearing ratio and our expected inflation rate for the 2015–20 period.

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90 Recent regulatory determinations are for the following ten service providers: final decisions for ActewAGL, Ausgrid, Endeavour Energy, Essential Energy, DirectLink (accepted our draft decision on return on equity), TasNetworks (accepted our draft decision on return on equity), TransGrid, JGN; and preliminary decisions for Ergon Energy, Energex and SA Power Networks.

91 Submissions received on SA Power Networks' initial regulatory proposal are listed in the appendices to the preliminary decision overview for SA Power Networks (Appendix A Constitute decisions and Appendix B List of submissions at the end of the overview attachment appendix). Submissions relating to SA Power Networks' revised regulatory proposal and our preliminary decision are listed in Appendix F.

92 NER, cl. 6.5.2(d); NGR, r. 87(4).

93 All the NSPs whose original and revised proposals we are currently assessing have proposed a gearing ratio consistent with the Guideline.

94 NER, cl. 6.5.2(f–g); NER, cl. 6A.6.2(f–g); NGR, r. 87(2).

95 NER, cl. 6.5.2(c); NGR, r. 87(3).

3.4.1 Return on equity

Our reasons in this attachment should be considered in conjunction with the detailed discussions and response to submissions more fully set out in the relevant appendices. We had regard to the material submitted by service providers with their proposals.[96] Additional material was submitted with the revised proposals which we have considered.[97] However, while we had regard to all of this material, given the volume, we have necessarily had to focus our reasons more judiciously. As a result, these reasons may not include detailed discussion on material and issues that we have addressed previously. Also, unless we have explicitly moved away from the Guideline reasoning and findings and/or our preliminary decision on a particular issue, our considerations in the Guideline and preliminary decision are relevant to this decision.[98]

The remainder of this sub section is in two parts. The first is a high level summary and thereafter we set out our reasons following the six step process to estimating the return on equity.

Summary

This summary follows the structure of this attachment, which in turn follows the six steps set out in the Guideline to determine the return on equity.

Step one and two: identify relevant material and role

We had regard to a large amount of material including estimation methods, financial models, market data and other evidence and determined the role we consider that each piece of material should play in estimating the return on equity. This section sets out the way in which the information is used either as the foundation model, to inform our foundation model input parameters or as other information—other than as the foundation model, to inform our return on equity estimate.[99]

Equity models

We are satisfied that the SLCAPM model is the current standard asset pricing model of modern finance, both in theory and in practice. It has been in use for a long period to estimate expected equity returns and transparently presents the key risk and reward trade-off (systematic risk priced via expected returns on equity) that is at the heart of our task. It has wide acceptance and is consistent with the approach employed by financial market practitioners. We consider that applying the SLCAPM as the foundation model in our foundation model approach would lead to an expected return on equity that contributes to the achievement of the allowed rate of return objective. At present, we consider it is superior

96 Rate of return draft and final decisions, Appendix F, sets out more details about the volume of information.

97 Appendix F, Return on equity material.

98 The full suite of documents associated with the guideline including the explanatory statements, relevant appendices and expert reports are available at http://www.aer.gov.au/node/18859.

99 Reasons for why we do not give some information any role are discussed throughout this attachment and relevant appendices.

to all other models that service providers suggested for estimating the expected return on equity by reference to the benchmark efficient entity. We therefore employ the SLCAPM as our foundation model.

We are not satisfied that other equity models submitted to us and the proposed methods for weighting these models better contribute to the achievement of the allowed rate of return objective.[100] SA Power Networks proposed an equally weighted average of four models — SLCAPM, Black CAPM, Fama French three factor model (FFM) and dividend growth model (DGM). Our view is that the returns on equity ranges derived from these models do not necessarily assist us to perform our task. Our task is to estimate an expected return on equity commensurate with the risks of a benchmark efficient entity in providing regulated network services. A number of the other models proposed appear to be more focussed on the tasks of identifying relationships that may explain past stock outcomes, rather than estimating an expected return on equity commensurate with the risks of a benchmark efficient entity in providing standard control services and achieving the allowed rate of return objective.[101]

We use the theory behind the Black CAPM for informing the equity beta to be used in the foundation model. The DGM is used for informing the MRP. We also use the Wright approach for informing the overall return on equity. We do not rely on the FFM to determine the return on equity.

Foundation model input parameters

We are satisfied that yields on Commonwealth government securities (CGS) with a 10 year term are a widely accepted proxy for the risk free rate and their use will contribute to the achievement of the allowed rate of return objective. We therefore use this information to estimate the risk free rate.

The market risk premium (MRP) cannot be directly observed. Therefore, considering a range of conceptual and empirical evidence allows us to determine a point estimate which has regard to prevailing conditions in the market for equity funds and contributes to the achievement of the allowed rate of return objective.[102] The following evidence plays a role in estimating the MRP: historical excess returns, DGM estimates (from our preferred construction of the DGM), survey evidence, conditioning variables and recent decisions by Australian regulators. There is no consensus amongst experts on which method produces

100 We are concurrently assessing revised regulatory proposals from eight different service providers and initial regulatory proposals from three service providers. These different adaptations are also taken into account.

101 See: John C Handley, *Advice on return on equity, Report prepared for the AER*, 16 October 2014, p. 5. Handley also reviewed relevant submissions made after his October 2014 report, and considered they do not change the findings of his report (see: John C Handley, *Further advice on the return on equity*, 16 April 2015; and John C Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28).

102 NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

the best estimate of the MRP.[103] Estimates of the MRP are diverse and can vary over time.[104]

We estimate the equity beta for our benchmark efficient entity by reviewing a broad range of information. We have defined a benchmark efficient entity as a pure play regulated energy network business operating within Australia. Therefore, we rely mostly on empirical equity beta estimates based on Australian energy network firms. We also give a role to international empirical estimates, the theory of the Black CAPM and conceptual analysis of a benchmark efficient entity's systematic risk relative to the market average. However, we consider these sources of information are less suited to our task.

Other information

There are a number of other information classes that can inform our return on equity point estimate, either as a directional or relative indicator. We consider return on equity estimates derived from the Wright approach and other sources (independent valuation reports, brokers and other regulators), as well as return on debt, as directional information.

Step three: implementing the foundation model

We are satisfied, based on the material considered and evaluated by us under steps one and two, that the SLCAPM should be our foundation model. We implement this model using input parameter point estimates which are determined after considering the merits of a broad range of material.

Risk free rate

We adopt a risk free rate of 2.96 per cent in this decision. This risk free rate is based on a 20 business day averaging period, from 1 July 2015 to 28 July 2015. We are satisfied the risk free rate we apply provides for a return on equity that contributes to the achievement of the allowed rate of return objective.[105] That is, it is a forward looking risk free rate commensurate with prevailing conditions in the market for funds at the commencement of the regulatory control period.[106] As such, this risk free rate also has regard to the prevailing conditions in the market for equity funds, as the rules require.[107]

Market risk premium (MRP)

Our point estimate of the MRP for this decision is 6.5 per cent. We consider a range of 5.0 to 8.6 per cent for the MRP under current market conditions, based on the material before us,

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103 See Damodaran, *Equity risk premiums: Determinants, estimation and implications— the 2012 edition*, March 2012, p. 93. He also noted: 'No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate'.

104 McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, p. 20; Lally, *Review of the AER's methodology for the risk free rate and the market risk premium*, March 2013, pp. 14–15, 27–34.

105 NER, cll. 6.5.2(f); NER, cll. 6A.6.2(f); NGR, rr. 87(6).

106 AER, *Explanatory statement rate of return guideline*, 17 December 2013, p. 74.

107 NER, cll. 6.5.2(g); NER, cll. 6A.6.2(g); NGR, rr. 87(7).

to inform our decision.[108] The geometric average of historical excess returns currently provides the lowest estimate of the MRP with a range of 3.9 to 4.9 per cent. We consider a reasonable estimate of the lower bound will be above the geometric average.[109] Therefore, our lower bound is above this range. The highest estimate of the MRP is 8.6 per cent.[110] This is an estimate based on our construction of the DGM, using the upper bound of our long term dividend growth rate scenarios. We apply this as the upper bound for the range. We note that the upper bound of the MRP range has not changed from our preliminary decisions published in April 2015.[111]

We derive our point estimate from within this range by considering all of the information that we determine should play a role. The application of our approach can be set out as follows:

- Historical excess returns provide our baseline estimate and indicate an MRP of approximately 6.0 per cent from a range of 5.0 to 6.5 per cent.
- DGM estimates indicate an MRP estimate above this baseline with a range of 7.5 to 8.6 per cent.
- Survey evidence and conditioning variables generally support an MRP estimate at the baseline of 6.0 per cent. Other regulators' estimates are used as a cross check and indicate an MRP estimate of around 6.5 per cent is reasonable.

Based on our assessment of this information, we are satisfied that an MRP point estimate of 6.5 per cent reasonably reflects prevailing conditions in the market for equity funds and contributes to the achievement of the allowed rate of return objective.[112] This point estimate is at the top of the range implied by historical excess returns. It also provides a balanced outcome given the submissions by service providers and other stakeholders.[113] While DGM estimates of the MRP are above our baseline estimate of 6.0 per cent, other information before us indicates no change from the baseline estimate. We have carefully reviewed this conflicting evidence in the context of contributing to the achievement of the allowed rate of return objective and reflecting prevailing conditions in the market for equity funds. We maintain our view that, at this time, evidence from DGM estimates warrants the use of an MRP estimate towards the top of the range implied by historical excess returns estimates.

Figure 3-2 shows the estimates of the MRP using historical excess returns, DGMs, surveys, other regulators' decisions and submissions by service providers and other stakeholders.

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[108] We use information up to the end of July 2015, and use a two month averaging period of July–August 2015 for our DGM estimates of the MRP. This is reasonably consistent with the SA Power Networks' risk free rate averaging period (1 July 2015 to 28 July 2015).

[109] AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 83; AER, *Draft decision: SPI Networks access arrangemen*t, September 2012, Appendix B.2.1.

[110] The averaging period for this estimate is July–August 2015.

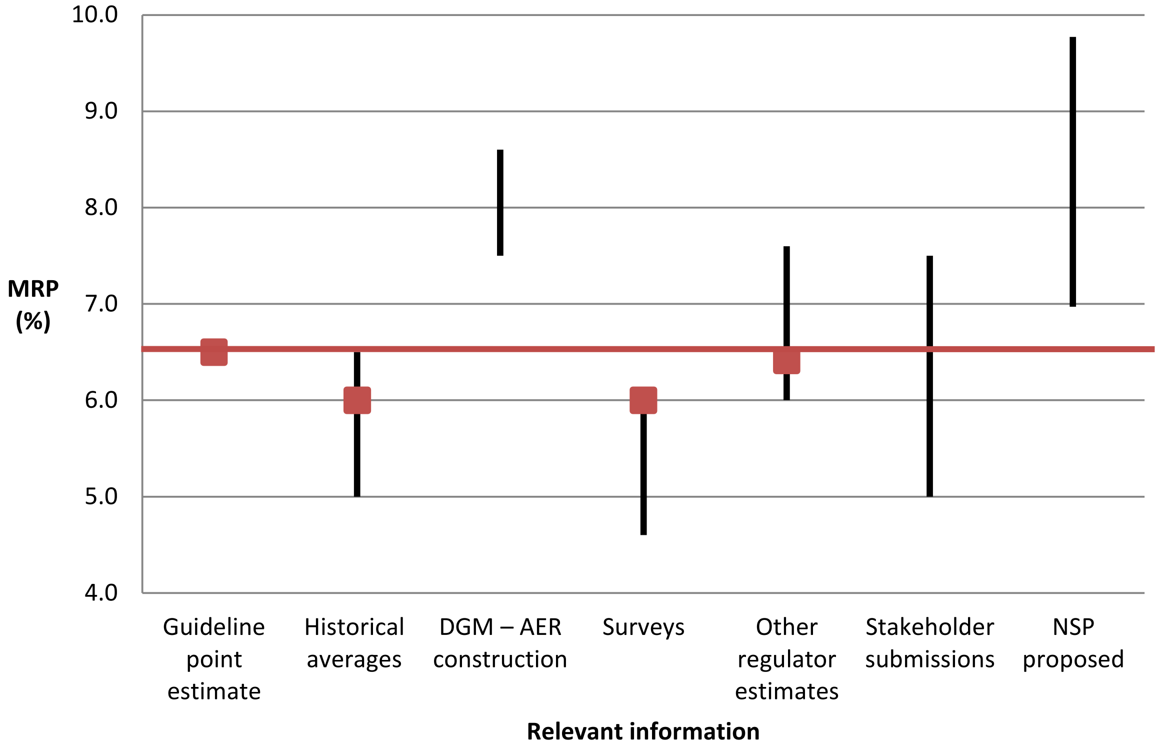
[111] See, for example, AER, *Preliminary decision: SA Power Networks distribution determination 2015–16 to 2019–20: Attachment 3—Rate of return*, April 2015, p. 33.

[112] NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7). This view is reinforced by the analysis of other information under step five of our foundation model approach.

[113] As shown in Figure 3-2.

The squares represent point estimates, the vertical lines represent ranges and the red horizontal line represents our point estimate of 6.5 per cent.[114]

Figure 3-2 Empirical estimates of the MRP (per cent)



Source: AER analysis

Note: The average of each state regulator's most recent decision/update on the MRP forms the point estimate (6.4 per cent) for other regulator estimates. The top of this range is 7.6 per cent—the latest estimate of the MRP applied by the ERA. The bottom of this range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC, TER and the ACCC.[115] The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network (or pipeline), and as such it does not include submissions from NSPs. The bottom and top of the stakeholder range comes from the CCP and Chamber of Commerce and Industry Queensland (CCIQ) respectively.[116] The bottom and top of the service provider proposed range comes from APTNT's (Amadeus gas pipeline) proposal.[117]

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[114] See appendix C–MRP for more information on these sources of information, and the ranges and point estimates we consider are consistent with these sources of information.

[115] See section C.5 of appendix C—MRP for full reference list.

[116] The CCP (subpanel 2) submitted we should use an MRP of 5.0 per cent and the CCIQ submitted that we should select an MRP point estimate from a range of 5.0–7.5 per cent. See CCP2 (Hugh Grant), *AER preliminary 2015-20 revenue determinations Energex and Ergon Energy revised revenue proposals*, 3 September 2015, p. 14; CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16.

[117] APTNT proposed an MRP range of 6.97 to 9.77 per cent based on the Wright approach. See APTNT, *Amadeus gas pipeline: Access arrangement proposal (information)*, August 2015, p, 21.

Equity beta

Our point estimate of the equity beta for this decision is 0.7. We estimate the range for the equity beta based on empirical analysis of Australian energy network firms. We consider a number of empirical studies including Professor Olan Henry’s (Henry's) 2014 report. The empirical estimates from this analysis are consistent with a range of 0.4 to 0.7.[118] We consider the latest empirical study by Professor Henry to be robust. The consistency of Henry's latest report with previous studies gives us confidence in placing more reliance on this empirical evidence.

In informing the equity beta point estimate (from within the empirical range), we consider evidence from other relevant material. This includes international empirical estimates (set out in section D.3 of appendix D–equity beta) and the theoretical underpinnings of the Black CAPM. This other information does not specifically indicate which equity beta estimate we should choose from within our range. However, for reasons discussed in section D.5.2 of appendix D–equity beta, we consider a point estimate of 0.7 is reasonably consistent with these sources of information and is a modest step down from previous regulatory determinations.[119] Choosing a point estimate at the upper end of our range also recognises the uncertainty inherent in estimating unobservable parameters, such as the equity beta. Many stakeholders have submitted that we should choose an equity beta lower than 0.7, while service providers have submitted we should choose a higher value.[120] At this time, we do not consider the evidence is indicating a case for choosing a value other than 0.7. In addition, the importance that all stakeholders place on certainty and predictability suggest to us that a departure from the Guideline is unlikely to better contribute to the achievement of the allowed rate of return objective at this time.[121] Figure 3-3 shows our equity beta point estimate and range for the benchmark efficient entity compared to other submissions.

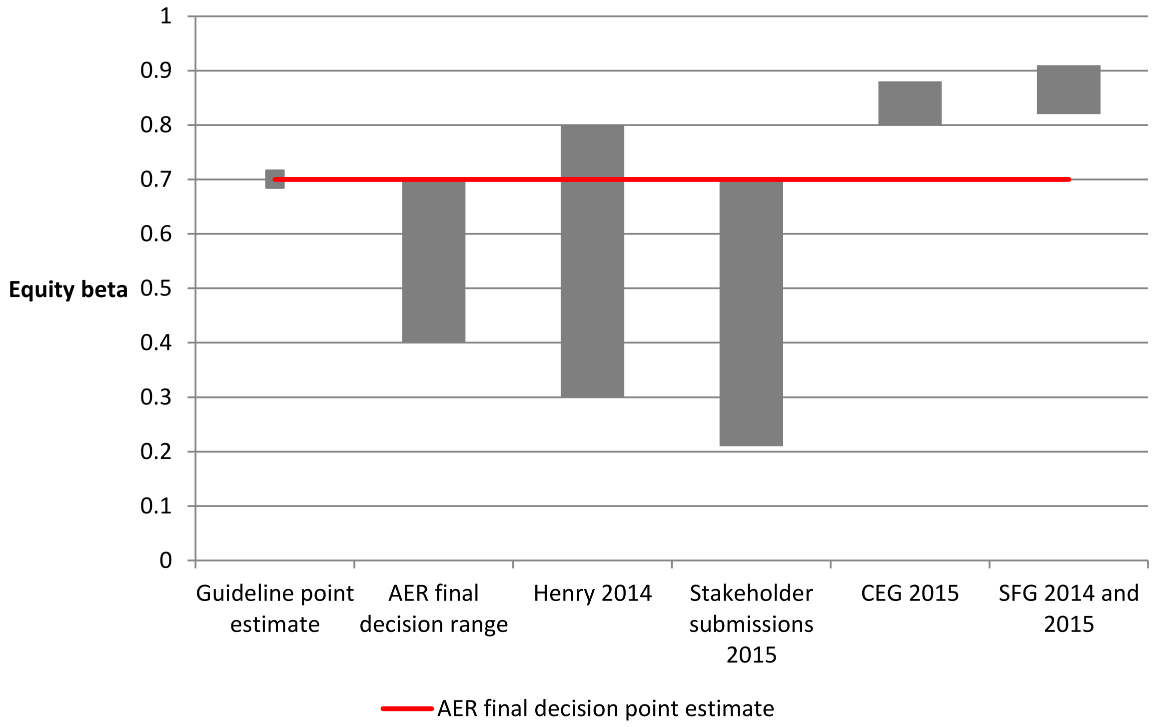
[118] Henry, *Estimating β: An update*, April 2014. We also consider Australian empirical estimates from other studies by Henry, the ERA, ACG, SFG and Grant Samuel and Associates Ltd.

[119] From 2010 to early 2014, all our regulatory determinations have applied an equity beta of 0.8. See: AER, *Review of the WACC parameters: final decision*, May 2009, p. v.

[120] As shown in Figure 3-3.

[121] See discussion under step three in this section. NER, cll. 6.5.2(f); NER, cll. 6A.6.2(f); NGR, rr. 87(6).

Figure 3-3 Submissions on the value of the equity beta



Source: AER analysis[122]

Note: Henry 2014 presents the range specified in Henry's 2014 report (0.3 to 0.8). The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network (or pipeline), and as such it does not include submissions from network (or pipeline) service providers. The lower bound of this range is based on the CCP's submission and the upper bound is based on Origin's submission. The CEG 2015 range is based on adjustments to SFG's regression based estimates for the mining boom. The SFG 2014 and 2015 range lower bound is based on SFG's regression analysis of Australian and US firms (submitted under a multiple model approach for the return on equity) and the upper bound is based on SFG's multiple model based equity beta estimates (under its alternative 'foundation model' approaches for the return on equity).

122 Based on our decision and the following reports: AER, *Rate of return guideline*, 17 December 2013, p. 15; Henry, *Estimating β: An update*, April 2014, p. 63; CCP2 (Bruce Mountain), *Submission on the AER's preliminary decisions for the Qld/SA distribution network service providers (2015-20),* 29 July 2015, pp. 10-11; Origin, *Submission to the AER's preliminary decision for the Qld distribution network service providers (2015-20)*, 3 July 2015, p. 12; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 57–58. SFG submitted 0.82 (under multiple model approach for return on equity) in SFG, *Equity beta*, May 2014, p. 41; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 28; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, p. 85; SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 20; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 4. SFG submitted 0.91 (under alternative 'foundation model' approaches for return on equity) in SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, p. 96; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 88; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35.

Step four: other information

Under steps one and two we considered the available information and determined its role. Under step four we estimate the values we derive from this other information. We consider that, on the whole, this other information broadly supports our foundation model estimate of the return on equity. The critical allowance for an equity investor in a benchmark efficient entity is the allowed equity risk premium over and above the estimated risk free rate at a given time.[123] Under the standard application of the SLCAPM, this equals the MRP multiplied by the equity beta. Hence, we have compared equity risk premium estimates where appropriate. Our analysis shows that:

- The Wright approach to specifying the CAPM results in an equity risk premium range of 2.8 to 6.8 per cent. This equates to a return on equity range of 5.8 to 9.8 per cent with a prevailing risk free rate.
- Equity risk premium estimates from other market participants (independent valuers, brokers, and other regulators) for comparable firms range from 3.3 to 12.3 per cent. This equates to a return on equity range of 6.3 to 15.3 per cent with the prevailing risk free rate.
- Our foundation model return on equity estimate is about 219 basis points above the prevailing return on debt. This reflects the difference between our equity risk premium of 4.55 per cent and the debt risk premium on 10 year BBB bonds of approximately 236 basis points.[124]

Step 5: Evaluation of information set

Adopting our input parameter point estimates results in an allowed equity risk premium of 4.55 per cent. This falls within the range of most other indicators available to inform the return on equity. The comparison of other information with our SLCAPM estimate is shown in Figure 3-4.

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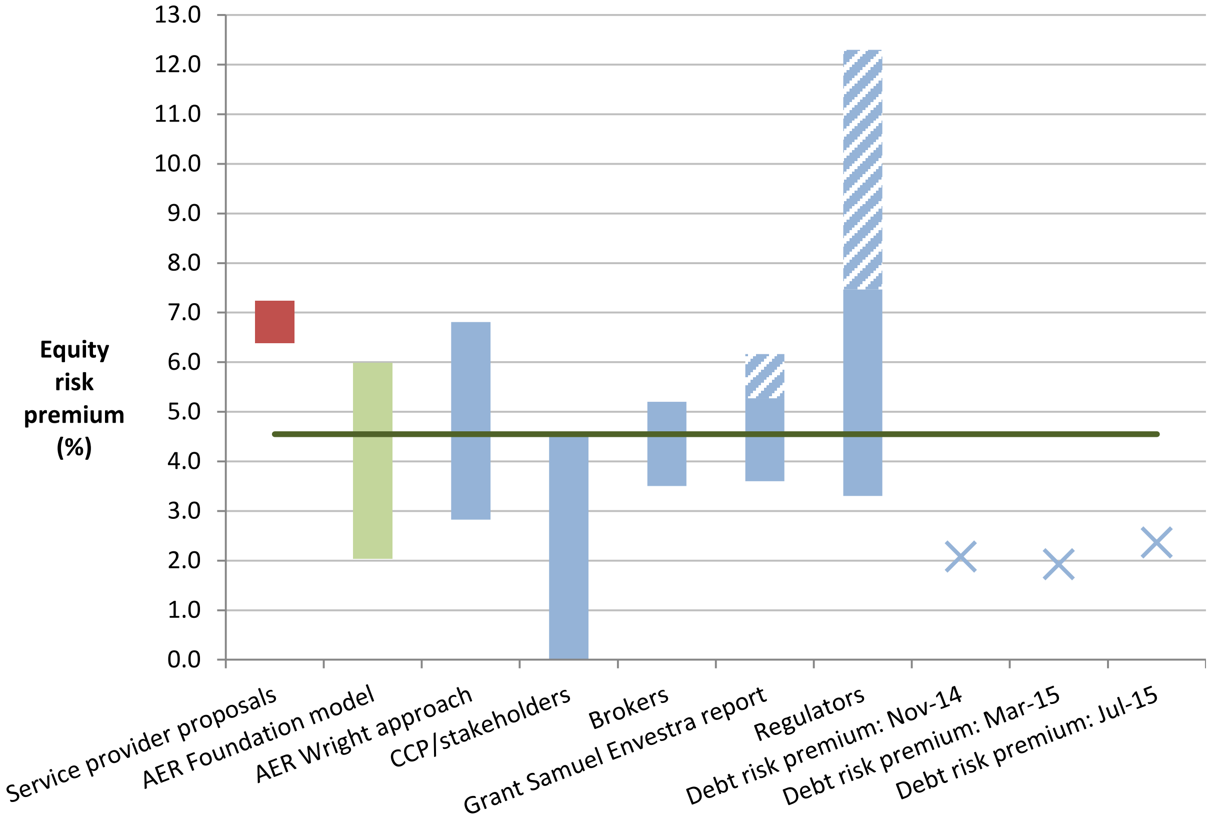
[123] Our task is to determine the efficient financing costs commensurate with the risk of providing regulated network service by an efficient benchmark entity (allowed rate of return objective). Risks in this context are those which are compensated via the return on equity (systematic risks).

[124] To calculate this, we use the RBA's published spread to CGS on 10 year BBB non-financial corporate bonds (as at the end of July 2015). This is not reflective of our final decision return on debt estimate which is calculated as an average of the RBA and Bloomberg (BVAL) data series. In our final decision we also make an extrapolation adjustment to the RBA data series.

Figure 3-4 Other information comparisons with the AER allowed equity risk premium



Source: AER analysis and various submissions and reports.

Notes: The AER foundation model equity risk premium (ERP) range uses the range and point estimate for MRP and equity beta as set out in step three. The calculation of the Wright approach, debt premium, brokers, and other regulators ranges is outlined in Appendices E.1, E.2, E.4, and E.5 respectively.

Grant Samuel's final WACC range included an uplift above an initial SLCAPM range. The lower bound of the Grant Samuel range shown above excludes the uplift while the upper bound includes the uplift and is on the basis that it is an uplift to return on equity. Grant Samuel made no explicit allowance for the impact of Australia's dividend imputation system. We are uncertain as to the extent of any dividend imputation adjustment that should be applied to estimates from other market practitioners. Accordingly, the upper bound of the range shown above includes an adjustment for dividend imputation, while the lower bound does not. The upper shaded portion of the range includes the entirety of the uplift on return on equity and a full dividend imputation adjustment.[125]

The service provider proposals range is based on the proposals from businesses for which we are making final or preliminary decisions in October-November 2015.[126] Equity risk premiums were calculated as the proposed return on equity less the risk free rate utilised in the service provider's proposed estimation approach.

The CCP/stakeholder range is based on submissions made (not including service providers) in relation to our final or preliminary decisions in October-November 2015. The lower bound is based on the Alliance of Electricity

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[125] Grant Samuel, *Envestra: Financial services guide and independent expert's report*, March 2014, Appendix 3.

[126] ActewAGL, Ausgrid, Directlink, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Jemena Gas Networks, SA Power Networks, TasNetworks, and TransGrid. Jemena Gas Networks' revised proposal contained an indicative return on equity based on an indicative risk free rate averaging period. On 27 March 2015 JGN provided submissions that updated its approach using values derived from its proposed averaging periods. We have shown the 27 March 2015 updates.

Consumers submission on Energex and Ergon Energy revised proposals. The upper bound is based on Origin Energy's submission on the preliminary decision for SA Power Networks.[127]

In coming to our decision on the allowed return on equity, the key influential factors are:

- The other information we examined does not support a move away from our foundation model estimate. Having considered the overall information and material before us, at this time we are not satisfied that this new information indicates a departure from the Guideline would contribute to the achievement of the allowed rate of return objective. We think the importance placed by all stakeholders on predictability and certainty of the Guideline is important to contribute to the achievement of the allowed rate of return objective.[128]
- Our foundation model return on equity estimate is about 219 basis points above the prevailing return on debt. The return on debt is a relative indicator and we expect that most of the time investors' expected return on equity will exceed the expected return on debt. For our benchmark efficient entity with a similar degree of risk as SA Power Networks, we would not expect the return on equity to be a large margin above the prevailing return on debt. This is because of the low risk profile of the benchmark efficient entity.[129] The return on debt material does not support any change to our foundation model return on equity estimate.
- The regulatory regime to date has been supportive of investment. The service providers we regulate have been able to raise capital to undertake extensive investment programs.[130] This suggests the allowances set in the past were at least adequate to recover efficient costs. The return on equity we have determined in this decision is broadly in line with past decisions (prior to publishing the Guideline in 2013), albeit lower. We also note, broker reports suggest that the AER's recent determinations have not removed the ability for listed networks to maintain payment of dividends.[131] This provides confidence that our estimate for this final decision, while taking account of more recent information on the equity beta and current market conditions, is likely to provide SA Power Networks with a reasonable opportunity to recover at least efficient costs.[132]

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127 Alliance of Electricity Consumers, *Submission to the Australian Energy Regulator's Preliminary Decision (Queensland)*, July 2015, p. 29; Origin Energy, *Submission to AER Preliminary Decision SA Power Networks*, July 2015, p. 9.

128 See Section 3.4.1–Step Five for more detail.

129 Due to the regulatory regime and the businesses' monopoly positions shielding them from systematic risk; as well as the measured debt yields likely understating the expected return due to default risk. For more information, see our discussion under step two.

130 Since 2008, the transmission and distribution NSPs across the national electricity market have invested in the order of $6 billion per year in capital expenditure (capex).This is a high level conservative estimate that does not include the gas networks that we regulate.

131 For details, see section L.1 of Confidential Appendix L.

132 Our previous decision for SA Power Networks in June 2010 adopted an equity risk premium of 6.0 per cent [AER, *Final Decision: South Australian distribution determination 2010–11 to 2014–15*, May 2010]. Our previous Rate of Return Guideline, released in May 2009, adopted an equity risk premium of 5.2 per cent [AER, *Final Decision*, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters, 1 May 2009]. Our last decisions prior to the 2013 Rate of Return Guideline (excluding transitional decisions) were in 2013 and adopted an equity risk premium of 5.2 per cent for ElectraNet and 4.8 per cent for Victorian gas network service providers [AER, *Final Decision: ElectraNet Transmission Determination 2013–14 to 2017–18*, 30 April 2013, p. 24;

Step six: distil point estimate

We are satisfied that an expected return on equity derived from the SLCAPM should be the starting point for estimating the return on equity. We are also satisfied that the other information does not indicate that our equity risk premium estimate should be uplifted or downshifted to contribute to the achievement of the allowed rate of return objective.

Following our estimation approach and having considered and given the relevant material due weight on their merits, we are satisfied that an expected return on equity estimate of 7.5 per cent derived from our implementation of the SLCAPM will contribute to the achievement of the allowed rate of return objective. We are also satisfied that this estimate is consistent with prevailing market conditions.

Reasons

Step one: identify relevant material

Our identification and assessment of relevant material is discussed under the following sub headings:

- equity models
- risk free rate
- MRP
- equity beta
- other information.

Equity models

We considered all models that have been proposed. In this sense, all of the models are relevant. Detailed consideration of all proposed models is in appendix A—Equity models. While we have considered all proposed models, we are not satisfied that they are all of equal value. In fact, we consider that the value of the FFM in setting the regulated return on equity is limited to the extent that we decided not to give it a role. As a result of the role we give each model, it has not been necessary to estimate the return on equity derived from each of these models. In some cases, we consider it could be misleading to derive quantitative estimates in view of the limitations of the models and their estimation.

We reviewed all models submitted to us for consideration. This is consistent with our approach at the time of publication of the Guideline, where we had regard to the information on the different models before us. We also have regard to information on these models submitted after we published the Guideline.

AER, *Access Arrangement Final Decision*, Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd, 2013–17, Part 2: Attachments, 15 March 2013, p. 143.]. Our most recent final decisions in April and June 2015, and this decision adopt an equity risk premium of 4.55 per cent, which is consistent with our 2013 Rate of Return Guideline.

We have therefore had regard to the following models:

- the standard Sharpe Lintner Capital Asset Pricing Model (SLCAPM)
- the Fama French Three Factor Model (FFM)
- the Black Capital Asset Pricing Model (Black CAPM)
- the Dividend Growth Model (DGM)
- the non-standard (Wright and historically based) specifications of the SLCAPM.

Under step two, we discuss our assessment of the models against our assessment criteria as part of assessing the role of this information.

Risk free rate

We estimate the risk free rate using yields on Commonwealth government securities (CGS)[133] with a 10 year term. Our assessment of this information against our criteria shows yields on CGS are a reasonable proxy for the risk free rate (Table 3-3). As such, we consider this information produces an estimate of the risk free rate that will contribute to achieving the allowed rate of return objective.[134]

Table 3-3 Assessment of Commonwealth government securities against criteria

Criteria[135]	Commonwealth Government securities
Where applicable, consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	The risk free rate measures the return an investor would expect from an asset with no default risk. CGS are low default risk securities issued by the Australian Government, and are an appropriate proxy.[136]
Fit for purpose: The use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. We should also promote simple over complex approaches where appropriate.	Prevailing 10 year CGS yields reflect expectations of the risk free rate over the appropriate forward looking investment horizon (10 years). The yield on CGS is the best proxy for the risk free rate in Australia, as supported by the Reserve Bank of Australia (RBA).[137]
Implemented in accordance with good practice: Supported by robust, transparent and replicable analysis that is derived from available, credible	Yields on CGS are robust. The RBA, Commonwealth Treasury and Australian Office of Financial Management advised the CGS market

133 Also called Australian government securities (AGS).

134 NER, cll. 6.5.2(f); NER, cll. 6A.6.2(f); NGR, rr. 87(6).

135 We have not included the criterion on quantitative modelling because this does not apply to CGS.

136 See, for example, Lally, *The present value principle*, March 2013, p. 13, and Wright, *Review of risk free rate and Cost of equity estimates: A comparison of UK approaches with the AER*, October 2012, p. 3.

137 RBA, *Letter to the ACCC: The Commonwealth Government Securities Market*, 16 July 2012, p. 1.

Criteria[135]	Commonwealth Government securities
datasets.	is liquid and functioning well.
Where market data and other information is used, this information is credible and verifiable, comparable and timely, and clearly sourced.	The RBA publishes CGS yields, and is a credible institution. This information is also updated daily.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	This information is forward looking, set by the market and updated daily.

Source: AER analysis.

Market risk premium (MRP)

Recognising the MRP cannot be directly observed, we have regard to prevailing conditions in the market for equity funds by considering a range of conceptual and empirical evidence.[138] The material we have reviewed includes:

- historical excess returns
- our preferred construction of the DGM[139]
- survey evidence
- conditioning variables (dividend yields, credit spreads, implied volatility)
- other Australian regulators' MRP estimates
- SFG's preferred construction of the DGM
- independent valuation reports
- the Wright approach
- our preferred imputation credit adjustment (Brailsford et al.)
- SFG's preferred imputation credit adjustment (Officer).

We have assessed the relevant material against the rate of return criteria set out in the Guideline. Table 3-4 summarises our assessment of information we use to estimate the MRP. In Table 3-11, Table 3-17, Table 3-40 and Table 3-52 we assess the information before us that we do not rely on to inform the MRP.

We consider it is important to have regard to a range of evidence when estimating the MRP. This recognises:

- There is no consensus among experts on which method produces the best estimate of the MRP.[140] This reflects differences in opinion regarding the relative strengths and

138 NER, cl. 6.5.2(g); NER, cl. 6A.6.2(g); NGR, r. 87(7).

139 We use a DGM that is adjusted for the value of imputation credits to inform the MRP.

limitations of different estimation methods, and how different estimates should be brought together. We consider these relative strengths and limitations in the Guideline and in our assessment against our criteria (see Table 3-4).[141]

- We must assess a range of evidence and apply judgement to determine a point estimate because estimates of the MRP are diverse and can vary over time.[142] We note there is no consensus among experts on how a point estimate of the MRP should be determined.
- Given the importance of avoiding bias in regulatory outcomes over time, it is important to apply different sources of evidence symmetrically through time.
- Unlike the risk free rate, the evidence on the MRP is comparatively imprecise and subject to varied interpretation. In addition, different methods can produce widely different results at the same point in time.[143]
- Considering a range of information is consistent with the approach used by finance market practitioners.[144]

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140 See Damodaran, *Equity risk premiums: Determinants, estimation and implications—the 2012 edition*, March 2012, p. 93. He also noted: 'No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate'.

141 AER, *Explanatory statement: Rate of return guideline*, 17 December 2013, pp. 90–91.

142 McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, p. 20; Lally, *Review of the AER's methodology for the risk free rate and the market risk premium*, March 2013, pp. 14–15, 27–34.

143 Damodaran, *Equity risk premiums: Determinants, estimation and implications—the 2012 edition*, March 2012, p. 93. He also noted: 'No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate'.

144 For example, Grant Samuel initially estimates the return on equity with a Sharpe–Lintner CAPM, using an MRP based on historical excess returns. It then considers a broad range of evidence. This includes market sentiment (including volatility), other risk premiums measures (such as bond premiums), differences between current and historical bond rates, analysts' rate of return estimates and DGMs. See: Grant Samuel, *Cost of equity capital*, 22 May 2014, p. 5.

Table 3-4 Assessment of information on the market risk premium against criteria

Criteria	Historical excess returns	Dividend growth models	Survey evidence	Conditioning variables	Regulatory decisions
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	Based on empirical analysis. Some experts observe there is no better forecast of expected excess returns than the historical average.[145] There are challenges when selecting the averaging period and a measure of central tendency (arithmetic or geometric averages).	DGMs reflect economic and finance principles. Based on the finance principle that markets are efficient and the present value (that is, market price) of a share reflects the discounted (present) value of its expected future dividends. DGMs make no assumptions on the risk factors that explain the required return on equity.	Lally has supported using survey evidence, but has warned some surveys warrant little consideration.[146]	Academic literature offers some conceptual basis for conditioning variables informing excess returns.[147] Some empirical evidence supports this too.[148] However, there is also scepticism in the academic literature about conditioning variables' ability to predict returns	Rules governing regulatory decisions typically require estimates to be based on well accepted economic and financial principles.
Fit for purpose. The use	Fit for purpose because	While DGMs are used	The MRP is a metric of	There is a body of work	Derived for similar

[145] Dimson, Marsh and Staunton, *Credit Suisse Global Investment Returns Sourcebook 2012*, February 2012, p. 37.

[146] Lally, *Review of the AER's methodology*, March 2013, p. 32.

[147] SFG, *Market risk premium: An updated assessment and the derivation of conditional and unconditional estimates*, February 2012, p. 10; NERA, *Market risk premium for the ENA*, October 2013, pp. 35–36.

[148] SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, p. 9; Fama and French, Dividend Yields and Expected Stock Returns, 1988, *Journal of Financial Economics*, 25, pp. 23-49.

Criteria	Historical excess returns	Dividend growth models	Survey evidence	Conditioning variables	Regulatory decisions
of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex approaches where appropriate.	this is considered the benchmark method for estimating the MRP in Australia.[149] Historical excess returns can estimate a forward looking MRP on the view that investors base their forward looking expectations on past experience.[150]	to price shares, they can also estimate the MRP. While DGMs are used in the Australian context, their use appears limited compared to the SLCAPM.[151] DGMs can be simple or complex, depending on how they are constructed. Our DGM is relatively simple.	investor expectations. Therefore, it is fit for purpose to estimate the MRP by asking investors what they expect.	which casts doubt on the accuracy of dividend yields as a predictor of excess returns, suggesting this is not fit for purpose.[152] Implied volatility may not provide any new information to what is already contained in DGM estimates.[153]	purposes. However, other regulators may operate under a different framework.
Implemented in accordance with good practice. That is,	Estimation methods and results are transparent, replicable,	DGMs rely on market data. Therefore, if the methodology is	Surveys can have significant limitations that can reduce the	Some evidence suggests the use of credit spreads is not	Laws typically require regulatory decisions to be well reasoned and

149 McKenzie, Partington, *Report to Corrs Chambers Westgarth: Equity market risk premium*, 21 December 2011, pp. 5–6; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 42.

150 Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraph 153.

151 See Table 3-10.

152 See, for example, AER, *Draft decision: Access arrangement draft decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, September 2012, p. 47.

153 NERA, *Market risk premium for the ENA*, October 2013, pp. 35–36.

Criteria	Historical excess returns	Dividend growth models	Survey evidence	Conditioning variables	Regulatory decisions
supported by robust, transparent and replicable analysis that is derived from available credible datasets.	extensively studied and well understood.[154] While there is a large sample of robust data, there are issues with earlier data. Also, the 'equity premium puzzle' suggests this data may overstate expected returns.	transparent, it is possible to replicate results. The simplicity of our DGM enables it to be estimated in a robust, transparent and replicable manner.	value of this information.[155] However, these limitations can be mitigated through the triangulation of survey evidence.[156]	robust for informing the MRP.[157] It is difficult to convert dividend yields and credit spread into an MRP estimate.[158] It is also difficult to apply implied volatility.[159]	transparent.
Where models of the return on equity and debt are used these are based on quantitative	Not applicable.	DGMs are highly sensitive to assumptions.[160] Results are also sensitive to	Not applicable.	Not applicable.	Not applicable

154 McKenzie, Partington, *Report to Corrs Chambers Westgarth: Equity market risk premium*, 21 December 2011, pp. 5–6.

155 The Australian Competition Tribunal has identified limitations of this evidence, which we take into account. See Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3,* 11 January 2012, paragraphs 159–163.

156 A specific survey might be subject to an unknown bias that is less likely to be consistent across surveys using different methods and different target populations McKenzie and Partington, *Supplementary report on the MRP*, February 2012, p. 19; McKenzie and Partington, *MRP: regime switching framework and survey evidence*, August 2012, p. 28.

157 See, for example, AER, *Final decision: Access arrangement final decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, March 2013, Part 3, p. 49.

158 SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, p. 9; McKenzie and Partington, *Supplementary report on the MRP*, February 2012, p. 23.

159 We considered implementation issues in AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 103–105.

160 This includes assumptions about the long and short term dividend growth rates and the length of transition to long term growth. McKenzie, Partington, *Equity market risk premium*, December 2011, p. 25; AER, *Final decision: APA GasNet*, March 2013, p. 101.

Criteria	Historical excess returns	Dividend growth models	Survey evidence	Conditioning variables	Regulatory decisions
modelling which a) is sufficiently robust as to not be unduly sensitive to errors in inputs estimation, b) avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.		errors in analyst forecasts. McKenzie and Partington consider our DGM is likely to produce upward biased estimates.[161]			
Where market data and other information is used, this information is credible and verifiable, comparable and timely and clearly sourced.	Credible and verifiable as historical excess returns can be directly measured. Timely, as this can be updated daily. This information is publicly available. Studies on historical excess returns are clearly sourced.[162]	Uses market data that are timely, well sourced and verifiable. However, evidence suggests analyst forecasts are sluggish and overly optimistic.[163]	Survey design and the representativeness of respondents are important and may be unknown.	Conditioning variables all rely on market data that is credible, verifiable, comparable, timely and clearly sourced.	We can only consider market data indirectly through this information.

161 They consider this is due to factors such as optimistic analyst dividend forecasts, stickiness with dividends and the practice of financing dividends. They also consider our estimate of the long term dividend growth rate is 'on the high side'. See: McKenzie, Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26, 28–30, 34; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50, 53, 59; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 43–44.

162 See, for example, Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008.

Criteria	Historical excess returns	Dividend growth models	Survey evidence	Conditioning variables	Regulatory decisions
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	Responds slowly to changes in market conditions.	Theoretically, readily reflects changes in the market data as it reflects changes in dividend forecasts and share prices. However, in practice, DGMs may not track these changes accurately.[164] DGMs can also generate volatile and conflicting results.[165]	While results vary little across time, this likely reflects investor expectations as surveys are forward looking. However, survey results may not be timely.	Conditioning variables change daily, are readily observable and may offer information about changes in the MRP.	May not reflect prevailing market conditions, given delays from when decisions are made.

Source: AER analysis.

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163 McKenzie, Partington, *The DGM*, December 2013, p. 8; McKenzie, Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26, 31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46, 51; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 43–44.

164 This is due to factors such as sluggish (and optimistic) analyst dividend forecasts, stickiness with dividends and the practice of financing dividends. See: McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26–31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–51; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 43–44.

165 Different consultants have produced widely different DGM estimates over short periods, From March 2012–2013, we received DGM estimates of the MRP ranging from 5.90–9.56 per cent. See AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 101–103, Part 3, 50–56.

Equity beta

Recognising that the equity beta cannot be directly observed, we consider a range of relevant material. The material we reviewed includes:

- conceptual assessment of the overall systematic risk of the benchmark efficient entity relative to the market average firm (conceptual analysis)
- empirical equity beta estimates based on a comparator set of Australian energy network firms (Australian empirical estimates)
- empirical equity beta estimates based on a comparator set of international energy network firms (international empirical estimates)
- evidence from the Black CAPM:
  - empirical results
  - theoretical principles
- empirical evidence from SFG's DGM construction
- empirical evidence from the Fama French three factor model (FFM).

We have assessed the relevant material against the rate of return criteria set out in the Guideline. Table 3-5 summarises our assessment of conceptual analysis, Australian empirical estimates, international empirical estimates and evidence from the Black CAPM. Table 3-8 and Table 3-40 set out our assessment of the FFM and SFG's DGM construction, respectively.

Table 3-5 Assessment of information on the equity beta against criteria

Criteria	Conceptual analysis	Australian empirical estimates	International empirical estimates	Evidence from the Black CAPM[(a)]
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	Conceptual analysis is grounded in economic and finance theory.	Australian empirical estimates are based on the available market data. Sound econometric techniques were used to derive these estimates.	Like domestic empirical estimates, international estimates are based on the available market data and employ sound econometric techniques. They may be more statistically precise than domestic estimates if they are generated from larger datasets.	Theoretical principles underpinning the Black CAPM are grounded in economic theory. However, the empirical analysis is not sound, since there is an unresolved inconsistency between the zero beta return estimate and the model restrictions.
Fit for purpose. The use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex	Conceptual analysis assesses the differences between the benchmark efficient entity and the market average. It is reasonable to use conceptual analysis to inform the equity beta of a benchmark efficient entity.	There are no businesses which precisely meet our definition of the benchmark efficient entity.[166] Therefore, it is reasonable to use market data for domestic businesses that are considered to be close comparators to the benchmark efficient entity to	International equity beta estimates do not meet our benchmark efficient entity definition. The use of a foreign proxy is a suboptimal outcome that can only be justified where there is evidence that this will produce superior estimates of the domestic equity beta	We are estimating the equity beta for the SLCAPM. Given the limitations that we have identified for the Black CAPM, it is unreasonable to estimate the Black CAPM equity beta equivalent. We only use its theoretical principles to help guide our

166 AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 8, 33–36, 44–45.

Criteria	Conceptual analysis	Australian empirical estimates	International empirical estimates	Evidence from the Black CAPM[(a)]
approaches where appropriate.		inform the equity beta estimate.	than the Australian estimates.	selection.
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets.	We commissioned Frontier Economics to review the risks faced by regulated energy networks in Australia and McKenzie and Partington to undertake the conceptual assessment.	Australian empirical estimates are derived from robust, transparent and replicable regression analysis performed by an expert in econometrics, Professor Olan Henry. Different studies with different econometric techniques and different sampling periods provide consistent results.	Countries differ along a number of dimensions. If foreign comparators were to be used to determine the equity beta estimate for the benchmark efficient entity, it would be reasonable to quantify the impacts of these differences and to make necessary adjustments. However, it is difficult to make such adjustments in a robust and transparent manner.	There is no generally accepted method to generate a reliable estimate of the zero beta return. The theory of the Black CAPM can only provide limited information in informing the equity beta, and cannot be used (in accordance with good practice) to apply a specific adjustment to the equity beta.[167]
Where models of the return on equity and debt are used these are based on quantitative modelling which a) is sufficiently robust as to not be unduly sensitive to	Not applicable	Not applicable	Not applicable	The Black CAPM is sensitive to errors in the estimation of the zero beta return. Not applicable for theoretical principles.

[167] McKenzie and Partington, *Report to the AER Part A: Return on Equity*, October 2014, pp. 24-25; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 44–45.

Criteria	Conceptual analysis	Australian empirical estimates	International empirical estimates	Evidence from the Black CAPM[(a)]
errors in inputs estimation, b) avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.				
Where market data and other information is used, this information is credible and verifiable; comparable and timely; and clearly sourced.	Not applicable	Market data used for Australian empirical estimation meets this criterion.	Market data used for international empirical estimation meets this criterion.	Not applicable
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	Not applicable	We can update the empirical estimates to take into account the latest available market data.	We can update the empirical estimates to take into account the latest available market data	While the theory of the Black CAPM should allow the model to accommodate changing market conditions, the difficulties in estimating the zero beta return are magnified when attempting to match current market conditions (instead of an average figure over many years).

Source: AER analysis.

(a) See Table 3-9 for a more detailed assessment of the empirical implementation of the Black CAPM against the criteria set out in the Guideline. Also see step two of our foundation model approach and appendix A–equity models for detailed discussion of the limitations associated with the empirical implementation of the Black CAPM.

Other information

In addition to equity models and their parameters, we have had regard to the other information that the Guideline stated would be relevant material. We also have had regard to additional material that stakeholders submit should be treated as relevant. A number of stakeholders submitted that we should consider material on realised returns to equity from asset sales and service providers' financial statements.[168] We have had regard to the following other information:

- return on debt relative to the return on equity
- return on equity estimates from:
  - independent valuation (expert) reports
  - broker reports
  - other regulators' decisions
- realised return on equity estimates calculated from:
  - asset sales (transaction multiples)
  - service providers' financial statements.

In the case of this other information, we discuss the assessment of the material against our criteria in step two.

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[168] CCP, *Smelling the roses and escaping the rabbit holes: The value of looking at actual outcomes in deciding WACC—Prepared for the Board of the Australian Energy Regulator*, July 2014. CCP, *Response to AER Draft Determination Re: ActewAGL Regulatory Proposal 2014–19*, February 2015, p. 24. Major Energy Users, *Australian Energy Regulator - Tasmanian Electricity Transmission Revenue Reset - AER Draft Decision and TasNetworks Revised Proposal - A response by Major Energy Users Inc.*, February 2015, pp. 55–56. Energy Markets Reform Forum*, Australian Energy Regulator - NSW Electricity Distribution Revenue Reset - AER Draft Decision and Revised Proposals from Ausgrid, Endeavour Energy, and Essential Energy, A response by EMRF*, February 2015, pp. 34–35. Energy Users Association of Australia, *Submission to NSW DNSP revised revenue proposal to AER draft determination (2014 to 2019)*, February 2015, pp. 11, 14. Public Interest Advocacy Centre, *A Missed Opportunity?* Submission to the Australian Energy Regulator's Draft Determination for Ausgrid, Endeavour Energy, and Essential Energy, February 2015, p. 36. Energy Users Association of Australia, *Submission to SA Power Networks Revenue Proposal (2015 to 2020)*, January 2015, p. 14. Energy Users Association of Australia, *Submission to Energex Revenue Proposal (2015/16 to 2019/20)*, January 2015, p. 13. Energy Users Association of Australia, *Submission to Ergon Energy (Ergon) Revenue Proposal (2015/16 to 2019/20)*, January 2015, p. 13. Queensland Resources Council, *Ergon Energy Determination 2015–2020*, January 2015, p. 7. Tasmanian Minerals and Energy Council, *TasNetworks Transmission Revenue Proposal 1 July 2014 - 30 June 2019*, February 2015, p. 2. CCP, *Submission on the AER's Preliminary Decisions for Energex, Ergon and South Australia Power Networks*, July 2015, pp. 3–6. CCP2, *Consumer Challenge Panel (CCP2 Panel) Submission AER Preliminary 2015-20 Revenue Determinations Energex and Ergon Energy Revised Revenue Proposals*, September 2015, pp. 11–13.Queenslan Council of Social Services, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, July 2015, p. 20. Queensland Farmers' Federation, *Submission to Australian Energy Regulator (AER) on the Preliminary Determination for the Ergon Energy and Energex Regulatory Proposals for 2015-2020*, July 2015, pp. 2–3. Total Environment Centre, *Submission to the AER on the Preliminary Decisions on the QLD DBs' Regulatory Proposals 2015-20*, July 2015, pp. 8–9. Victorian Energy Consumer and User Alliance, *Submission to the AER: Victorian Distribution Networks' 2016-20 Revenue Proposals*, July 2015, p. 9.

Step two: determine role

The role allocated to each piece of relevant material is discussed under the following sub headings:

- equity models
- risk free rate
- MRP
- equity beta
- other information.

After assessing the relative merits of each piece of relevant material, we have decided to use the foundation model approach. Under this approach we have given the SLCAPM the role of foundation model, and other information is used to inform the selection of parameters to the SLCAPM or to inform the overall return on equity relative to the foundation model estimate.

Service providers, through several reports by Gray and Hall (formerly SFG, now Frontier), also submitted that, 'a range of models should be employed – to meet the allowed rate of return objective and to ensure that the estimate best meets the NGO, NEO and RPP'.[169] Gray and Hall submitted that it is impossible to identify one superior model.[170] We consider that the allowed rate of return objective, NGO, NEO, and revenue and pricing principles are better achieved by having regard to the relative merits of the models to achieve the allowed rate of return objective, rather than a starting assumption that all models should be employed.

We have regard to the relative merits of the equity models proposed to us in the subsection below. We find that the SLCAPM, compared to the other equity models before us, is superior for estimating the return on equity for regulatory purposes. We do not consider that using the other models submitted by the service providers (independently or as part of a multi-model approach) would better contribute to the achievement of the allowed rate of return objective.

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169 SFG, *The required return on equity for regulated gas and electricity network businesses: Report for JGN, ActewAGL Distribution, Ergon, Transend and SAPN*, May 2014, p. 15; SFG, *The required return on equity: Initial review of the AER draft decisions: Report for Energex*, January 2015, p. 7; SFG, *Using the Fama–French model to estimate the required return on equity: Report for JGN, JEN, ActewAGL, Ausgrid, AusNet services, AGN, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SAPN, United Energy*, February 2015, p. 5; Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, Report prepared for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon, Energex, Jemena Electricity Networks, Powercor, SA Power Networks, and United Energy, June 2015, p. 8.

170 SFG, *The required return on equity for gas and electricity network businesses*, May 2014, p. 89.

Several service providers, including SA Power Networks, submitted reports by Gray and Hall that commented on how the foundation model binds the effects that other evidence can have. For instance, Gray and Hall submitted that:[171]

> Evidence that is assigned to the primary subset [the foundation model] defines the range for the parameter, bounding the effect that any other evidence can have. Thus, the weight that is applied to each piece of evidence is determined by the subset to which it is (somewhat arbitrarily) allocated, rather than by a side-by-side assessment of the relative strengths and weaknesses.

This is a mischaracterisation. Our approach involves the determination of a return on equity estimate in step six after considering all the relevant material (and their relative merits) in step five. For the avoidance of doubt, we note that:

- Categorising material as:
    - material considered at step three (material with a role of informing foundation model parameters), or
    - material considered at step four (material with a role of informing overall return on equity);

  does not imply that one category of material is afforded more weight than the other in informing our final return on equity estimate. Rather, categorising material into step three or step four simply reflects our consideration of the role for the material that would best contribute to the achievement of the allowed rate of return objective given the relative merits of the material.
- Sequential consideration of material does not imply the relative weight afforded to the material. In any process there must be a first step. The consideration of material at step three does not, simply by occurring earlier, limit the weight that can be placed on material subsequently considered at step four. Similarly, this does not bind the manner in which material can be considered at step four.

Equity models

In determining the role of the different equity models, we have regard to the information before us during the Guideline process and the new material submitted after this process. The latter includes information submitted in service providers' initial and revised proposals, as well as submissions in relation to these proposals.[172] We also

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171 SFG, *Estimating the required return on equity: Report for ENERGEX*, August 2014, p. 15. SFG made similar arguments in SFG, *The required return on equity: Initial review of the AER draft decisions: Note for ActewAGL, Ausgrid, Essential Energy and Endeavour Energy*, January 2015, pp. 27–40, SFG, *The required return on equity for the benchmark efficient entity: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, February 2015, p. 2.

172 We are concurrently assessing revised regulatory proposals from three different service providers. We are also assessing regulatory proposals and gas access arrangements from eight different service providers. We take these businesses' different adaptations into account.

received advice from our consultants on the roles for the various models.[173] Table 3-6 sets out the roles of the equity models we have regard to in this determination.

In the Guideline, we proposed to use several different models to inform our return on equity estimate. We then evaluated each model on its merits and determined the role that they should play in estimating the return on equity. This role would be one of the following: as the foundation model, to inform parameter estimates for the foundation model, to inform our final return on equity point estimate, or not relied upon to estimate the return on equity. The models we considered included the SLCAPM, Black CAPM, DGM and FFM.[174] Thereafter, the Guideline approach (also referred to as the foundation model approach) adopts one model as our foundation model. This is the SLCAPM.

Service providers, in submitting their initial and revised proposals, submitted a large number of deviations from our foundation model approach with respect to the use of these models. The service providers largely submitted the same reasons for and uses of the various models they proposed in the Guideline process. In the material submitted with its revised regulatory proposal, SA Power Networks submitted similar positions to those in its initial regulatory proposal. It also responded to the positions in our preliminary decision.

Service providers also submitted the following material:

- A short response by Grant Samuel.[175]
- Consultant reports from SFG Consulting on the FFM, Black CAPM, DGM and required return on equity.[176]
- A consultant report from NERA on the empirical performance of the SLCAPM and Black CAPM.[177]
- Several new consultant reports[178]

173 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014; Handley, *Advice on the return on equity*, 16 October 2014; Partington, *Report to the AER: Return on equity (updated)*, April 2015; Handley, *Further advice on the return on equity*, 16 April 2015; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015; Partington & Satchell, *Report to the AER: Analysis of criticisms of 2015 determinations*, October 2015.

174 AER, *Rate of return guideline*, December 2013, p. 13.

175 Grant Samuel & Associates, *AER − Draft decision*, 12 January 2015.

176 SFG, *Using the Fama–French model to estimate the required return on equity*, 13 February 2015; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015; SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, 13 February 2015; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015.

177 NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

178 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015; NERA, *The Cost of Equity: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015; Ronald L. Knecht, *Witness Statement: Ronald L. Knecht*, June 2015; Frontier Economics, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015.

In submissions responding to the use of return on equity models in our preliminary decision and in SA Power Networks' revised regulatory proposal, we received the following:

- Submissions from service providers and associated industry groups. Several service providers individually lodged submissions containing the same material in relation to return on equity models.[179] Other service providers lodged different submissions—although, in essence, these supported similar positions.[180]
- Several consultant reports that services providers already submitted to support their revised proposals.[181]
- A consultant report by SFG on our foundation model approach.[182]
- A consultant report by NERA reviewing the literature on several equity models.[183]

We respond to this material in appendix A of this attachment.

Table 3-6 sets out the role we have assigned to each of the return on equity models and our reasons for assigning these roles.

Table 3-6 Role assigned to equity models in estimating the return on equity

Equity model	Role	Reason for chosen role[184]
Sharpe Lintner CAPM	Foundation model	When used as the foundation model in our foundation model approach, we expect this to result in a return on equity that contributes to the achievement of the allowed rate of return objective. We consider it is a superior equity model to use as our foundation model relative to alternative models and methods submitted

179 AGN, AusNet Services, CitiPower/Powercor, JGN, SAPN and United Energy each submitted a submission titled, *Submission in relation to the first round of regulatory determination under the new rules* in 13 February 2015. CitiPower/Powercor, Jemena Electricity Networks, United Energy, Multinet each put forward a submission titled *Submission in relation to the current regulatory determination processes for SAPN, Energex, Ergon Energy, AGN in July 2015.*

180 AusNet Services, *JGN (NSW) access arrangement 2015–20: Attachment 1—Rate of return draft decision*, 27 March 2015; Ergon Energy, *Supplementary Submission on the draft decisions: Proposed gas access arrangements NSW 2015–20*, 27 March 2015;

181 NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015; SFG, *Using the Fama–French model to estimate the required return on equity*, 13 February 2015; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015; SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, 13 February 2015; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015.

182 SFG, *The foundation model approach of the AER to estimating the cost of equity: Report for JGN, JEN, AusNet Services, AGN, CitiPower, Ergon Energy, Powercor, SAPN and United Energy*, March 2015.

183 NERA, *Review of the literature in support of the SLCAPM, the Black CAPM and the FFM: A report for JGN, JEN, AusNet Services, AGN, CitiPower, Ergon Energy, Powercor, SAPN, and United Energy*, March 2015.

184 The reason is a high level summary. Full reasons are provided in the following sections, the equity models appendix and in the consultant reports by McKenzie and Partington and Handley.

Equity model	Role	Reason for chosen role[184]
		to us. It also best meets our selection criteria.
Fama French Three Factor Model	No role	We do not expect estimates from the model to contribute to the achievement of the allowed rate of return objective. The model is not sufficiently robust or expected to calculate an unbiased return on equity estimate for the benchmark entity facing a similar degree of risk as SA Power Networks.
Black CAPM: (a) Empirical results (b) Theoretical principles	(a) No role (b) Inform equity beta point estimate	(a) We do not expect estimates to contribute to the achievement of the allowed rate of return objective. The model is not sufficiently robust or expected to calculate an unbiased return on equity estimate for the benchmark entity facing a similar degree of risk as SA Power Networks. (b) We consider the theory behind the model supports a potentially warranted adjustment to the SLCAPM return on equity estimate in relation to the equity beta to account for market imperfections.
Dividend Growth Models	Limited to using AER two stage and three stage DGMs published at the time of the Guideline to inform the MRP.[185] No role in directly estimating the return on equity of the benchmark efficient entity.	The models and required data are sufficiently robust to estimate a forward looking MRP to inform our choice of MRP. The estimates may be upwards biased and need to be considered in light of this. We do not consider the models and required data are sufficiently robust to directly estimate the return on equity on the benchmark entity. Direct benchmark efficient entity return on equity estimates from the models should not be used as they are not expected to lead to an unbiased estimate of the return on equity or contribute to the achievement of the allowed rate of return objective.
Wright CAPM	Limited to estimating a range to be used to informing the overall return on equity	This model has a limited role in informing the return on equity of the benchmark efficient entity. The model shows a range where the return on equity could fall varying the SLCAPM input parameters under the assumption that the return on equity is stable. In the event the return on equity was outside this range, further investigation could be warranted. There is a lack of theoretical, academic, econometric and applied support for the model's central thesis of a

185 See Appendix C and AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 116–117.

Equity model	Role	Reason for chosen role[184]
		stable return on equity through time (and therefore an inverse relationship between the risk free rate and the MRP). Therefore, we do not expect this will lead to an unbiased estimate of the return on equity, or contribute to the achievement of the allowed rate of return objective.
Long term CAPM specifications	No role	There is a lack of theoretical, academic, econometric and applied support for the model's central thesis of a stable return on equity through time (and therefore an inverse relationship between the risk free rate and the MRP). Therefore, we do not expect this will lead to an unbiased estimate of the return on equity, or contribute to the achievement of the allowed rate of return objective.

Source: AER analysis.

The remainder of this section discusses the reasons for the role (if any) we assign to the different models in estimating the expected return on equity for this final decision.

SLCAPM

We use the SLCAPM as the foundation model. Consistent with our views expressed in our December 2013 Guideline and in our draft decision, we consider this model best meets our assessment criteria.[186] At present, we consider it is superior to all other models that service providers suggested for estimating the expected return on equity by reference to the benchmark efficient entity.[187]

The new material submitted, that was not available at the time of the Guideline, has not changed our view on this. Our preliminary decision had regard to material in SA Power Networks' (initial) regulatory proposal and this analysis still holds for our final decision.[188] We consider SA Power Networks' revised regulatory proposal contains similar material to that already submitted. Nevertheless, we had regard to this material, which is discussed in appendix A—equity models.

We consider using the SLCAPM as the foundation model will provide an unbiased estimate of the cost of equity capital. We consider the SLCAPM is the most appropriate model to use for reasons including:

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186 AER, *Explanatory Statement rate of return guideline*, 17 December 2013, p. 64; AER, *Draft decision JGN Access arrangement 2015–20, Attachment 3*, November 2014, pp. 163–193.

187 That is, the FFM, Black CAPM and SFG's construction of the DGM.

188 AER, *Preliminary decision SA Power Networks Distribution Determination 2015–20, Attachment 3*, April 2015.

- It is widely used for estimating the expected return on equity for regulated companies. This includes use by academics, market practitioners and other regulators.[189]
- The SLCAPM, estimated as the sum of the risk free rate and the product of the equity beta and MRP, is relatively simple to implement. Further, robust, transparent and replicable analysis supports estimates of its input parameters.
- Other relevant material can inform the SLCAPM parameter estimates. We consider this may mitigate limitations of the model.[190] The approach, therefore, facilitates the inclusion of a broad range of material, but still provides some certainty to stakeholders as to the final return on equity value, consistent with their stated desires.[191]
- The SLCAPM can provide both a range of estimates, and a point estimate from within this range. This functionality provides further predictability to stakeholders regarding the final return on equity value.
- Contrary to what some submissions indicated, there is no compelling evidence that the return on equity estimate from the SLCAPM will be downward biased given our selection of input parameters.
- Contrary to what some submissions indicated, we do not consider the alternative return on equity estimates provided by the service providers demonstrate our return on equity is too low.

We assessed the SLCAPM against the Guideline assessment criteria in Table 3-7. Following this assessment, we are satisfied that it is the most suitable model to use as the foundation model.

Table 3-7 Summary of our assessment of the SLCAPM against criteria

Criteria	Sharpe–Lintner CAPM assessment against criteria
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are	The model reflects economic and finance principles. It is a theoretically based equilibrium asset pricing model. It transparently represents a core paradigm of

189 See AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 12–13.

190 For instance, McKenzie and Partington expressed significant reservations about the implementations of the alternative models as the service providers proposed. See McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 9. Partington reviewed submissions made after this report and concluded that they do not change his conclusions (see: Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6).

191 During the Guideline development process, consumer groups broadly supported the foundation model approach. See COSBOA, *Comments – draft guideline*, October 2013; Ethnic Communities' Council of NSW, *Submission to Better Regulation: Draft rate of return guidelines*, 10 October 2013; EUAA, *Submission to the draft guideline*, October 2013, p. 2; MEU, *Comments on the draft guideline*, October 2013, p. 25; PIAC, *Submission to the draft guideline*, October 2013, p. 29.

Criteria	Sharpe–Lintner CAPM assessment against criteria
consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	modern finance—the risk return trade-off. Its parameters are estimated with robust market data (proxies for the risk free rate based on government bonds, equity beta based on observed covariance of returns for proxy firms with the returns on a market proxy, and estimates for the MRP based on a range of information). Empirical shortcomings of the model may be addressed through exercising regulatory judgement in determining final inputs into the model.
Fit for purpose. That is, use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex approaches where appropriate.	The model was developed to predict equilibrium expected returns on risky assets.[192] This is consistent with its use to set the regulated return on equity. The model is relatively simple to implement, making it preferable to more complex models (all else equal). We consider that the careful application of the model, as we have done in the foundation model approach, will tend to give estimates of the return on equity that are sensible and reasonable over time.[193]
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets	The input parameters (risk free rate, equity beta, and MRP) can be estimated with tolerable accuracy in line with good market practice. The SLCAPM is widely used for estimating the expected return on equity for regulated companies. This includes by academics, market practitioners and other regulators. The estimation of these inputs is easily replicable based on available and credible datasets.
Where models of the return on equity and debt are used these are: - based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation	It is less complex to estimate the input parameters for the SLCAPM, than it is for the Black CAPM and the FFM. This implies: - The estimation of input parameters is likely to be relatively robust and less likely to be unduly sensitive to errors.

192 Bodie, Z., Kane, A., Marcus, A.J., *Investments*, Ed. 5, McGraw-Hill Irwin, 2002, p. 263. By definition, all assets other than risk free assets are risky.

193 Handley supports our use of the SLCAPM as the foundation model in the foundation model approach a reasonable. See Handley, *Advice on the return on equity*, October 2014, pp. 3–5. Handley also reviewed relevant submissions made after his October 2014 report, and considered they do not change the findings of his report (see: Handley, *Further advice on the return on equity*, 16 April 2015; and Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28).

Criteria	Sharpe–Lintner CAPM assessment against criteria
- based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale. The econometric derivation of input parameters, where this is used, leads to concerns about the potential for data mining.	- The choice of data used in estimating inputs to the model is more likely to avoid arbitrary filtering or adjustment as it can be more clearly based on sound rational and/or common practice.
Where market data and other information is used, this information is: - credible and verifiable - comparable and timely - clearly sourced.	All information used in the estimation of the model is credible and verifiable and can be clearly sourced. Information will generally be comparable and timely, although we note there is often a trade-off between timeliness and stability (for example, in relation to the period over which to estimate the forward looking equity beta or MRP using historical data).
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	The model can adjust to changing market conditions through the adjustment of input parameters. While the forward looking risk free proxy can immediately adjust through observable CGS yields, empirical estimates of the other parameters (particularly the equity beta) may adjust more slowly due to their higher reliance on historical information.

Source: AER analysis.

Following the submission of regulatory proposals starting in May and June 2014, we commissioned Professor Michael McKenzie and Associate Professor Graham Partington (McKenzie and Partington) to review the use of the SLCAPM as the foundation model. This was in consideration of the service providers' full proposals and supporting documents.[194] We also commissioned Associate Professor John Handley (Handley) to undertake a subsequent high level review of the foundation model approach. This review was in light of McKenzie and Partington's report, the service providers' proposals and three relevant consultant reports (CEG, NERA and SFG) that service providers submitted to support their proposals.[195]

194 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014.

195 Handley, *Advice on the Return on Equity*, 16 October 2014. For the three key expert reports, see CEG, *WACC estimates: A report for NSW DNSPs*, May 2014; NERA, *Return on Capital of a Regulated Electricity Network*, May 2014; SFG, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon and Transend*, May 2014.

The reports from both McKenzie and Partington and Handley supported our use of the SLCAPM as the foundation model.[196] Both reports indicated that the authors considered the foundation model approach (using the SLCAPM as the foundation model) would be expected to contribute to the achievement of the allowed rate of rate of return objective.[197] Partington restated this position in his subsequent reports.[198]

McKenzie and Partington indicated with respect to the SLCAPM:[199]

> With regard to the CAPM, its efficacy comes from the test of time. This model has been around for in excess of half a century and has become the standard workhorse model of modern finance both in theory and practice. The CAPMs place as the foundation model is justifiable in terms of its simple theoretical underpinnings and relative ease of application. The competing alternatives, which build upon the CAPM, serve to add a level of complexity to the analysis. It remains that case that the majority of international regulators currently base their decisions primarily on the CAPM framework.

McKenzie and Partington then stated:[200]

> The consultants raise concerns with the ability of the CAPM to provide an adequate characterisation of the relationship between risk and return. Their concerns are largely driven by the ability of modern multifactor asset pricing models to provide a more adequate explanation of the cross section of realised average returns. It is important to recognise that the cross section of average returns is only one dimension of interest when modelling the risk-return relationship. Further, recent work suggests that the evidence against the CAPM may not be as robust as previously thought. For example, Ray, Savin and Tiwari (2009) show that the statistical evidence for rejecting the CAPM is weaker than previously thought when more appropriate statistical tests are used. More importantly, Da, Guo and Jagannathan (2012) argue that the empirical evidence against the capital asset pricing model (CAPM) based on stock returns does not invalidate its use for estimating the cost of capital for projects in making capital budgeting decisions. Their argument is that stocks are backed not only by projects in place, but also by the options to modify current projects and even undertake new ones. Consequently, the expected returns on equity need not satisfy the CAPM even when expected returns of projects do. Thus, their findings justify the continued use of the CAPM irrespective as to one's interpretation of the empirical literature on asset pricing.

Handley indicated with respect to the SLCAPM:[201]

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[196] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 9–14; Handley, *Advice on the return on equity*, 16 October 2014, p. 4.

[197] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 13–14; Handley, *Advice on the return on equity*, 16 October 2014, p. 3.

[198] Partington, *Report to the AER: Return on equity*, April 2015, p. 3; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

[199] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 9.

[200] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 9–10.

> [t]he AER's choice of the Sharpe-CAPM as foundation model is entirely appropriate and reasonable for this purpose. The Sharpe-CAPM is the standard (equilibrium) asset pricing model. It has a long established and well understood theoretical foundation and is a transparent representation of one of the most fundamental paradigms of finance - the risk-return trade off.

In our decisions in April and June 2015, we considered and responded to service provider submissions on the SLCAPM.[202] Our reasoning and the position we formed still holds for this final decision. In particular:

- We consider evidence suggests our use of the SLCAPM in our foundation model approach would be expected to promote efficient investment and use of regulated infrastructure.[203] This is because we consider the regulatory regime has been supportive of investment and the service providers we regulate appear to have raised capital to support their investment programs. We consider the movements in debt market yields since our regulatory decisions in 2009 are consistent with the return on equity estimates from our application of the SLCAPM. We consider our choice of SLCAPM input parameters should lead to a rate of return that contributes to the achievement of the allowed rate of return objective. For instance:
    - our risk free rate proxy reflects the current conditions in the market for capital and is an unbiased estimator of the risk free rate that should be used in the SLCAPM[204]
    - our MRP of 6.5 per cent is a fair estimate of the excess required return on the market over the risk free rate, having regard to all the information before us[205]
    - our beta of 0.7, selected from the upper end of our estimated range, has been chosen with reference to a range of material considered on the basis of merit[206]
    - our use of the SLCAPM and input parameters are consistent with the approaches employed by investors.[207]

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201 Handley, *Advice on the return on equity*, 16 October 2014, p. 4.

202 For example, see: AER, *Final decision JGN Access arrangement 2015–20, Attachment 3*, June 2015, pp. 163–172.

203 Handley advised 'investors who supply capital to the benchmark efficient entity should receive a fair compensation having regard to the level of risk that they face…The AER's choice of the Sharpe-CAPM as the foundation model is entirely appropriate and reasonable for this purpose'. Handley, *Advice on the return on equity*, October 2014, p. 4. Given the SLCAPM provides fair compensation for the appropriate forward looking time frame (which we consider to be 10 years), we expect this would promote efficient investment and contribute to the achievement of the allowed rate of return objective.

204 See step three of the reasons for our return on equity decision.

205 See step three of the reasons for our return on equity decision and in the MRP appendix.

206 See step three of the reasons for our return on equity decision and in the equity beta appendix.

207 We considered 32 independent valuation reports dated between 27 April 2013 and 31 July 2014 that contained a discounted cash flow analysis. Only four of these reports used a model other than the SLCAPM (the DGM) to estimate the return on equity. Three of these four reports only used the DGM as a cross-check on an initial SLCAPM estimate. The remaining report used the DGM to directly estimate the value of the proposed transaction).

- McKenzie and Partington considered whether anything indicated the foundation model approach using the SLCAPM as foundation model would be expected to result in a return on equity estimate that is systematically downward biased. In response, McKenzie and Partington supported our application of the foundation model.[208] They stated:[209]

  We are of the view that the foundation model does not provide a downwardly biased estimate in this context.

  The theoretical justification for a downward bias has previously been considered in McKenzie and Partington (2012, p. 19-20) and they do not find in favour of this argument in this context. We also do not view the statistical justification (see SFG (2013a, p. 5), SFG (2014a, p. 10-12) for a discussion of the Vasicek adjustment) as valid in this context. For the latter, we note the work of Henry (2008), who finds no evidence that would support the use of the Vasicek model for Australian data. The results of the Henry (2008) study: "… suggest that there is little convincing evidence of regression to unity in this data. Therefore, it is difficult to justify the application of the Blume or Vasicek adjustments." (p. 12)

- Handley noted in relation to the evidence (from other models) on low beta bias:[210]

  [i]n considering the relevance of this evidence, however, it is important to recognize that the current objective is to determine the fair rate of return given the risk of the benchmark efficient entity rather than to identify the model which best explains past stock returns.

- In Handley's subsequent report, he clarified the key point of this statement as:[211]

  (i) given there are multiple possible (but not necessarily mutually exclusive) explanations for the low beta bias – some of which are risk based explanations and some of which are not; and

  (ii) the allowed rate of return objective makes it clear that the rate of return should reflect the risk of the benchmark efficient entity,

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See: DMR Corporate, *Re: Independent Expert's Report*, Report prepared for ILH Group Ltd, 23 July 2013, Grant Samuel & Associates Ltd:, *Financial Services Guide and Independent Expert's Report in relation to the proposal by Murray & Roberts Holdings Ltd*, 11 October 2013; *Financial Services Guide and Independent Expert's Report in relation to the proposal to internalise management*, 7 February 2014; *Financial Services Guide and Independent Expert's Report to the Independent Board Sub-Committee in relation to the proposal by APA Group*, 4 March 2014.

208 See Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 33; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 14; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

209 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 14.

210 Handley, *Advice on the return on equity*, 16 October 2014, p. 5.

211 Handley, *Report prepared for the AER: Further advice on the return on equity*, April 2015, pp. 5–6. Handley also reviewed relevant submissions made after his April 2015 report and considered they do not change the findings of his report (see: Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28).

> then there is doubt as to whether the empirical finding of a low beta bias is relevant for the purposes of determining an appropriate level of compensation since there is doubt as to whether the low beta bias reflects risk (over and above that already captured by the Sharpe-CAPM).

Partington has maintained his support for our use of the SLCAPM as the foundation model. He found that none of the information and arguments presented in the revised proposals and submissions would give him cause to change from his positions in McKenzie and Partington's 2014 report.[212]

In determining if the SLCAPM is appropriate to use as the foundation model in our foundation model approach, we also considered if service providers' alternative return on equity estimation methods would be expected to lead to a 'better' estimate of the return on equity. We conclude that they would not, for the reasons discussed in the following paragraphs. In particular, we have reservations with how service providers have applied these alternative models.

McKenzie and Partington also examined if the addition of return on equity estimates from other models and sources as proposed by the service providers would be expected to lead to a 'better' estimate of the return on equity. They concluded, 'to the extent that these alternative estimates are well founded, unbiased and appropriately combined, then we would say that such models might be useful in triangulating the cost of equity'.[213] However, they also expressed reservations about the implementations of the alternative models as the service providers proposed.[214] They considered there were problems with applying these alternative models, particularly in the Australian context. Partington also found there was little consensus on the implementation of these models in Australia and there was substantial variation in the estimated parameters.[215] Regarding applying a multi model approach, Partington advised there is no assurance that adding more information will not lower the quality of the estimate. Further, a number cannot be taken as meaningful without fully understanding the context in which it is estimated.[216]

We consider McKenzie and Partington's review of the alternative models indicated that the alternative return on equity estimates provided by the service providers should not be used for estimating the return on equity by reference to a benchmark efficient entity. We also consider their review indicated that these alternative return on equity

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212 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 11; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6; Partington & Satchell, Report to the AER: Analysis of Criticism of 2015 Determinations, October 2015, p. 16.

213 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 34; McKenzie and Partington, *Report to the AER part A: return on equity*, October 2014, p. 14; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

214 McKenzie and Partington, *Report to the AER part A: return on equity*, October 2014, p. 14.

215 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 14; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

216 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 14; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

estimates provide no compelling evidence that our return on equity would undercompensate a benchmark entity facing a similar degree of risk as SA Power Networks relative to its efficient equity financing costs.

Handley also supported our decision to not depart from the foundation model approach. He wrote that there is nothing in the regulatory proposals and the three key consultant reports that provide compelling reasons to depart from the core framework underpinning the foundation model approach.[217] Having considered the FFM, the Black CAPM, and the DGM put forward by the service providers to estimate the return on equity, Handley stated:[218]

> there are, however, limitations with each of these models that either restricts or preclude their role in determining a return on equity consistent with the allowed rate of return objective.

We have considered service providers' proposed alternatives to estimating the return on equity using a multi model approach. We have also considered their use of return on equity estimates from the alternative models to inform the SLCAPM input parameters. We do not consider these uses of alternative models would contribute to the achievement of the allowed rate of return objective. Rather, we are satisfied with using the SLCAPM as our foundation model. The return on equity estimates provided by NERA, CEG and SFG do not provide compelling reasons to depart from this position.[219]

Further discussion of the SLCAPM is contained in appendix A—equity models.

Fama French Three Factor Model (FFM)

We do not rely on the FFM to inform our estimate of the return on equity of the benchmark efficient entity. We do not consider the FFM is currently suitable for our regulatory task. We therefore do not employ it in our six step process, including not using it for:

- estimating the return on equity for the benchmark efficient entity
- performing a cross check on whether other models (including the SLCAPM) produce reasonable estimates of the return on equity that would contribute to the achievement of the allowed rate of return objective.

[217] Handley, *Advice on the Return on Equity*, 16 October 2014, p. 6. For the three key expert reports, see CEG, *WACC estimates: A report for NSW DNSPs*, May 2014; NERA, *Return on Capital of a Regulated Electricity Network*, May 2014; SFG, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon and Transend*, May 2014.

[218] Handley*, Advice on the return on equity*, 16 October 2014, p. 6.

[219] Handley, *Advice on the Return on Equity*, 16 October 2014, p. 6. For the three key expert reports, see CEG, *WACC estimates: A report for NSW DNSPs*, May 2014; NERA, *Return on Capital of a Regulated Electricity Network*, May 2014; SFG, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon and Transend*, May 2014.

Having reviewed the new material submitted since the publication of the Guideline, we remain of the view the FFM is not suitable for our regulatory task.[220] This is for the same reasons we stated in the Guideline. The key reasons for not using the model are:

- it does not appear sufficiently robust and is sensitive to different estimation periods and methodologies
- it is not clearly estimating ex ante required returns
- it suffers a lack of theoretical foundation, which might explain the instability of parameter estimates
- it is relatively complex to implement.

These are consistent with the views we expressed in the Guideline. The Guideline indicated we would not use the FFM, which largely did not meet our assessment criteria.[221] Table 3-8 sets out our assessment of the FFM against our assessment criteria.

Table 3-8 Summary of our assessment of the FFM against criteria

Criteria	FFM assessment against criteria
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	Beyond market risk, there is no clear theoretical justification for the risk factors the FFM model captures. There is no widely accepted method or specification for estimating the model.

[220] ActewAGL, AGN, AusNet Services, CitiPower/Powercor, Energex, Ergon Energy, Jemena Electricity Networks, JGN, the NSW distributors, SAPN and United Energy submitted SFG, *Using the Fama–French model to estimate the required return on equity*, 13 February 2015. ActewAGL and the NSW distributors submitted material on the FFM in SFG, *The required return on equity: Initial review of the AER draft decisions,* January 2015, pp. 17–22. ActewAGL, Ergon Energy, JGN, SAPN and TransGrid submitted SFG, *The Fama–French model*, May 2014. ActewAGL, Ergon Energy, JGN and SAPN also submitted material on the FFM in SFG, *The required return on equity for regulated gas and electricity network businesses,* May 2014, pp. 33–37. Energex also submitted material on the FFM in SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014. The NSW distributors submitted Grundy, *Letter to CFO, Networks NSW*, 9 January 2014. AGN, AusNet Services, CitiPower/Powercor, Ergon Energy, Jemena Electricity Networks, JGN,SA Power Networks, and United Energy commissioned NERA, *Review of the literature in support of the Sharpe-Lintner CAPM, the Black CAPM, and the Fama-French three-factor model*, March 2015.

[221] AER, *Rate of return guideline*, 17 December 2013, p. 13; AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 57–72 ; AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 18–23 .

Criteria	FFM assessment against criteria
Fit for purpose. That is, use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex approaches where appropriate.	The model is not fit for determining the regulatory return on capital. Its original development was empirically motivated and it is unclear whether it is estimating ex-ante returns. The model is also complex with no clearly correct specification. It also has serious limitations given its lack of stability under different specifications and lack of theoretical basis. The original purpose of the model appears to have been to develop a factor model that better fitted realised return cross sectional data. The model has been applied in numerous different ways (principally by academics) in attempting to do this. There are numerous specifications of the model that produce different estimates of the realised return on equity. There is no clearly superior specification. It is unclear whether any given application of the model is estimating an ex-ante required return on equity.
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets.	There is no accepted good practice with respect to implementing the FFM because there is no widely accepted correct method of applying the model (that is, specification). This makes the model empirically unstable. While we accept a given application of the FFM may be transparent and replicable, we do not consider the model overall is robust. The model's use for estimating expected returns on equity appears limited. This includes very limited use, if any, by other regulators.[222] Australian firms do not broadly use the FFM when valuing equity.[223]
Where models of the return on equity and debt are used these are:	The econometric derivation of the model leads to concerns about the potential for data mining. We consider the model may be applied to come up with a desired output (that is, a higher or lower estimate of the required rate of return).[224]

[222] McKenzie and Partington noted the general regulatory preference has clearly been for using the SLCAPM. See McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 32.

[223] McKenzie and Partington found there is little evidence of companies using the FFM to estimate their cost of capital. See McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 32.

[224] We consider that the FFM provides great scope for data mining given McKenzie and Partington advised: 'The evidence suggests that the estimates for Australia using the Fama and French approach are unstable and depend on both the cross section of firms selected and the sample period chosen'. Further, McKenzie and Partington warned the FFM, 'may indeed lead to invalid, incorrect or misleading inference'. See McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 18; Partington, *Report to the AER: return on equity*

Criteria	FFM assessment against criteria
– based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation – based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.	This creates significant concerns for its use in setting regulated returns (even if all the other issues with the model could be overcome). The model is insufficiently robust to not be unduly sensitive to errors in input estimation. In applying the model, there is scope for arbitrary filtering or adjustment of data without sound rational.[225] This is due to the econometric nature of the model and the assumptions and specification choices that must be made in estimating the model.
Where market data and other information is used, this information is: – credible and verifiable – comparable and timely – clearly sourced.	We consider the model can be applied using information that is credible, verifiable, comparable, timely and clearly sourced. However, we note that meeting this assessment criterion does not make the output of any given model a valid estimate of the required return on equity.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	We consider the model is sufficiently flexible to allow for changing market conditions through the adjustment of input parameters. However, this is more problematic than the SLCAPM because of the difficulty in empirically estimating additional input parameters. As with the prior assessment criterion, meeting this assessment criterion does not make the output of any given model a valid estimate of the required return on equity.

Source: AER analysis.

In our April and June 2015 decisions, we considered and responded to service providers' submissions on the FFM.[226] We consider service providers submitted similar information to support similar positions in their regulatory proposals and access arrangements currently under review.[227] As such, our reasoning and the positions we

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(updated), April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

[225] We consider this is for similar reasons to why the FFM has scope for data mining. See McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 18; Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

[226] AER, *Final decision JGN Access arrangement 2015–20, Attachment 3*, June 2015, pp. 69–74, 256–269.

[227] ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, pp. 125–126; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, pp. 19–20; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 281; United Energy, *2016*

formed in our April and June 2015 decisions still hold for this decision. Similarly, having reviewed the material presented in the regulatory proposals and access arrangement proposals, Partington found, 'the findings of McKenzie and Partington (2014) would remain unaltered in light of these additional submissions'.[228]

We consider it is difficult and complex to evaluate any given implementation of a FFM. When surveying the recent UK literature on estimating the FFM, Michou, Mouselli and Stark (2014) identified nine different methodologies.[229] The nine methodologies generated substantially different results. Five of the nine methodologies yielded a significant size premium, but the other four did not. Four of the nine methodologies generated a significant value premium, but the other five did not. One principal conclusion of Michou, Mouselli and Stark is that the results of the FFM are highly sensitive to the methodology chosen. This is such that:[230]

> factor construction methods can matter in the use of factor models and, as a consequence, factor construction methods need to be considered carefully in empirical settings.

Further, McKenzie and Partington considered the FFM in light of the service providers' proposals in detail. They supported our decision to not use the model. They expressed the following views about the model:[231]

- They did not consider the FFM capable of reliably estimating the return on equity of the benchmark efficient entity. This is because the FFM is used to estimate the average return in the cross section. But the benchmark efficient entity is not average given its low risk. The evidence suggests the model is unstable for Australia and depends on both the cross section of firms selected and the sample period chosen.
- They did not consider the FFM likely to produce stable empirical estimates. Partington considered the parameter instability in the literature as symptomatic of the model's weakness.[232]

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to 2020 Regulatory Proposal, April 2015, p. 121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 204–205; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 212–213; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 31 & 46. Energex, *2015–20 regulatory proposal*, October 2014, pp. 87 & 164–165; Ergon Energy, *Regulatory proposal, appendix C: Rate of return*, October r2014, pp. 128–129 & 146; SAPN, *Regulatory proposal 2015–20*, October 2014, pp. 313–319 & 365–367.

228 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 11; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6. Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 16.

229 Michou, M., Mouselli, S., Stark, A., 'On the differences in measuring SMB and HML in the UK - Do they matter?', *British Accounting Review*, Vol. 30, 2014, pp. 1–14.

230 Michou, M., Mouselli, S., Stark, A., 'On the differences in measuring SMB and HML in the UK - Do they matter?', *British Accounting Review*, Vol. 30, 2014, p. 12.

231 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 15–19; Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

Handley also reviewed the service providers' proposals and some relevant consultant reports.[233] He supported our decision to not depart from the foundation model framework in light of these submissions.[234] Handley noted with respect to the FFM:[235]

- The empirical evidence in support of the FFM does not necessarily mean the FFM is an appropriate model to estimate the allowed return on equity.
- The empirical evidence in support of the model is now being questioned. The evidence in support of the model may be largely an artefact of using portfolios (as opposed to individual assets) to test the performance of the model. After considering SFG's response submitted with the revised proposals, Handley clarified his original position.[236] We are satisfied that SFG's response does not raise any new material that requires us to change our views on the FFM.
- The model is not clearly determining return on the basis of risk. And, if the model is not determining returns on the basis of risk:[237]

> then the model would not be appropriate for compensation purposes since by definition the resultant estimates of the return on equity would be inconsistent with the allowed rate of return objective.

Finally, while we have not used the FFM to estimate the return on equity for this final decision, we acknowledge that the model might be suitable for regulatory use in the future if its key issues could be overcome. However, we consider it is unlikely the FFM will be suitable for regulatory use in the near term given the discussions in this decision and the issues still facing the model over 20 years since it was developed.

Further discussion of the FFM, the service providers' submissions on the FFM and our responses to these submissions is contained in appendix A—equity models.

Black CAPM

We use the theory underpinning the Black CAPM to inform our choice of the equity beta point estimate. We do not consider empirical estimates from the Black CAPM are currently suitable for our regulatory task (see Table 3-9 below).

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232 Partington also expressed this concern in Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 39; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

233 Specifically, we requested Handley to carefully consider the material in CEG, *WACC estimates: A report for the NSW DNSPs*, May 2014; NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014; SFG, *The required return on equity for regulated gas and electricity network businesses: Report for JGN, ActewAGL, Ergon, Transend and SAPN*, June 2014.

234 Handley, *Advice on the return on equity*, 16 October 2014, pp. 6–9.

235 Handley, *Advice on the return on equity*, 16 October 2014, pp. 7–9.

236 Handley, *Report prepared for the AER: Further advice on the return on equity*, April 2015, pp. 3–4; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28.

237 Handley, *Advice on the return on equity*, 16 October 2014, p. 8.

We consider the theory behind the Black CAPM demonstrates that an uplift to the raw beta estimate may be appropriate due to concerns around market imperfections affecting the SLCAPM. We consider this is consistent with our proposed use of the model in the Guideline. However, we do not consider the Black CAPM (of itself) justifies any given uplift to the SLCAPM beta for low beta stocks as a given uplift cannot be quantified from the model. McKenzie and Partington support this view.[238]

Having reviewed the new material submitted since the publication of the Guideline, we remain of the view that empirical estimates of the return on equity from the Black CAPM are not suitable for use in setting the regulated return on equity.[239] This is for the following key reasons:

- The model is not empirically reliable.[240] This is also supported by Partington.[241]
- To our knowledge, the model is not widely used to estimate the return on equity by equity investors, academics or regulators.[242]

These views are consistent with the Guideline.[243] Table 3-9 shows the model does not meet our assessment criteria well.

Table 3-9 Summary of our assessment of the Black CAPM against criteria

Criteria	Black CAPM assessment against criteria
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles	The Black CAPM reflects economic and finance principles. However, we consider the empirical implementation of the model is unreliable. We remain of the view that there are difficulties with aligning the theoretical model with available empirical analysis.

238 Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 44–45; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 20–24; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

239 The majority of service providers submitted SFG, *Beta and the Black CAPM*, February 2015 and NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015 and SFG, *the required return on equity for the benchmark efficient entity*, February 2015, p. 12. ActewAGL and the NSW distributors submitted SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 11–17. A number of service providers submitted the following reports in response to our draft decision for JGN: NERA, *Review of the literature in support of the Sharpe-Lintner CAPM, the Black CAPM, and the Fama-French three-factor model*, March 2015, and SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, March 2015.

240 For a discussion, see AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 69–71.

241 Partington found the widely divergent estimates of zero beta returns in the Black CAPM previously supplied by regulated businesses' consultants supports that there is little consensus of the implementation of the Black CAPM in Australia. See *Report to the AER: Return on equity (updated), April 2015*, p. 15; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

242 See, AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, p. 17; AER, *Final decision: Envestra access arrangement*, June 2011, p. 40.

243 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 16–18.

Criteria	Black CAPM assessment against criteria
and informed by sound empirical analysis and robust data.	
Fit for purpose. That is, use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex approaches where appropriate.	We consider the empirical application of the Black CAPM unfit for the purpose of setting or assessing any component of the allowed return on equity. The model was developed as a theoretical model that could explain empirical results that questioned the predictions of the SLCAPM. While complexity is arguably not a decisive factor, all else equal, we prefer simpler models. The Black CAPM's outputs are sensitive to its complex application and specification choices. We consider this makes it unfit to apply for regulatory purposes at this time.
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets.	Estimation of the Black CAPM, in particular the return on the zero beta portfolio, is difficult to do in a robust, transparent or replicable manner because of the complexity of the model. For these reasons, we do not consider the model can be empirically implemented in accordance with good practice at this time.
Where models of the return on equity and debt are used these are: - based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation - based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.	The econometric derivation of the model leads to concerns about the potential for data mining. We consider the model may be applied to produce a desired output (that is, a higher or lower estimate of the required rate of return). This creates significant concerns for its use in setting regulated returns (even if all the other issues with the model could be overcome). The model is insufficiently robust to not be unduly sensitive to errors in input estimation. There is also significant arbitrary filtering or adjustment of data without sound rationale in the application of the model. This is due to the econometric nature of the model and the assumptions and specification choices required in estimating the model.
Where market data and other information is used, this information is: - credible and verifiable - comparable and timely - clearly sourced.	We consider the model can be applied using information that is credible, verifiable, comparable, timely and clearly sourced. However, we note that meeting this assessment criterion does not make the output of any given model a valid estimate of the allowed return on equity.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in	We consider the model is sufficiently flexible to allow for changing market conditions through adjusting input parameters. However, this is more problematic than the

Criteria	Black CAPM assessment against criteria
regulatory outcomes, as appropriate.	SLCAPM because of the difficulty in empirically estimating changes in the zero beta return. As with the prior assessment criterion, meeting this criterion does not make the output of any given model a valid estimate of the allowed return on equity.

Source: AER analysis.

In our decisions since the Guideline, we considered and responded to service provider submissions on the Black CAPM.[244] Our reasoning and the position we formed still holds for this decision. We do not consider empirical estimates of the return on equity from the Black CAPM put forward by the service providers and their consultants provide material that alone, or in combination with other material, is helpful for our regulatory task. We do not rely on empirical estimates of the return on equity for the benchmark efficient entity using the Black CAPM. We also do not rely on these estimates to cross check whether other models (including the SLCAPM) produce reasonable estimates of the return on equity that contribute to the achievement of the allowed rate of return objective.

McKenzie and Partington considered the Black CAPM in light of the service providers' initial proposals in detail. Their report supported our decision to not use empirical results from the Black CAPM.[245] Having reviewed the material presented in the revised proposals, Partington found, 'the findings of McKenzie and Partington (2014) would remain unaltered in light of these additional submissions'.[246] Handley also considered the Black CAPM in his report prior to our November 2014 decisions, which supported our decision to not use empirical estimates from the model.[247] In summary, we received the following advice from our consultants:

- The model is not based on more realistic assumptions than the SLCAPM. It cannot be directly compared to the SLCAPM as they each involve very different investment strategies.[248] Partington later emphasised that, given this, '[a]ny attempt to compare the Black CAPM and S-L CAPM must be done with great care'.[249]

244 For example, see: AER, *Draft decision JGN Access arrangement 2015–20, Attachment 3*, November 2014, pp. 181–186.

245 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 20–25.

246 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

247 Handley, *Advice on the return on equity*, 16 October 2014, pp. 9–12.

248 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 22.

249 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 17. They demonstrated why this was the case in pp. 16–22.

- While the model might be used for estimating the return on equity for the benchmark efficient entity, the problem is the model can be very sensitive to implementation choices.[250]
- They would not recommend using the service providers' estimates from the Black CAPM to inform the equity beta given the practical difficulties with implementing the model.[251]
- The model (of itself) does not justify any uplift to the equity beta.[252]
- The model is not widely used in practice because the estimation of the zero beta rate is a non-trivial task. This parameter can fall anywhere below the expected return on the market.[253]
- The Black CAPM and low beta bias are not equivalent concepts. As such, the empirical results of Black Scholes and Jenson (1972) and Fama and French (2004) are not direct tests of the Black CAPM.[254]
- It is unclear whether low beta bias is a priced risk not already captured by the SLCAPM.[255]

Appendix A—equity models, includes a further discussion of the Black CAPM, the service providers' submissions with respect to the Black CAPM and our response to these submissions.

Dividend Growth Model (DGM)

We employ the DGM to inform the MRP. We set out the reasons for and application of our preferred DGM construction in the appendices to the Guideline and appendix B—DGM.[256]

Since publishing the Guideline, service providers submitted a variety of material to support using a DGM to estimate the return on equity for the benchmark efficient

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[250] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 25.

[251] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

[252] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24.

[253] Handley, *Advice on the return on equity*, 16 October 2014, p. 12; Handley, *Further advice on the return on equity*, 16 April 2015; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28.

[254] Handley, *Advice on the return on equity*, 16 October 2014, p. 10; Handley, *Further advice on the return on equity*, 16 April 2015; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28.

[255] Handley, *Advice on the return on equity*, 16 October 2014, p. 11; Handley, *Further advice on the return on equity*, 16 April 2015; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28.

[256] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 114–125.

entity.[257] Having reviewed this material, we remain of the view that estimates of the overall return on equity generated from DGMs are currently not suitable for our regulatory task. We discuss these submissions in appendix A—equity models.

We remain of the view that it is preferable to employ DGMs only to inform our estimate of the MRP. This is for the following reasons:

- A sufficiently robust data series exists for dividend yields in the Australian market. Whereas, there are insufficient data to form robust estimates of the required return on equity for Australian energy network service providers.[258] There are difficulties with constructing credible datasets for implementing industry specific DGMs.[259] Also, there are too few Australian comparator businesses to run DGMs on individual businesses.[260] Partington advised that while there is risk of substantial error in DGM estimates for individual firms, averaging over many firms across the market helps reduce the impact of error.[261]
- There are developed methods for estimating the growth rate of dividends in the Australian market.[262] It is unclear if there is a sufficiently robust method for estimating the long term dividend growth rate for Australian energy network service providers.[263]
- There are important limitations of DGMs that limit our ability to use them as a foundation model. For instance, DGMs can have limited robustness given they are highly sensitive to input assumptions regarding short and long term dividend growth rates.[264] This makes DGMs highly sensitive to potential errors in inputs. Further, DGMs may generate volatile and conflicting results. For example, we have observed that, over extended periods of time, DGMs generated significantly higher average returns on equity for network businesses than for the Australian market.

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257 Several service providers submitted Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, pp. 2–4. ActewAGL and the NSW distributors submitted SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 23–24. The majority of service providers submitted SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015 and SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 13–16. With the initial regulatory proposals, service providers submitted SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014; CEG, *WACC estimates, a report for NSW DNSPs*, May 2014, pp. 20–26.

258 AER, *Explanatory Statement to the rate of return guideline (appendices)*, December 2013, p. 15. For instance, for its 2014 report, SFG only used 99 return on equity estimates from analyst forecasts for the network businesses over the period 2002 to 2014.

259 AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 77.

260 AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 119.

261 Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 58–59.

262 For example, see: M. Lally, *The dividend growth model*, 4 March 2013; CEG, *Response to AER Vic gas draft decisions internal consistency of MRP and risk free rate*, November 2012; and CEG, *Update to March 2012 report: On consistency of the risk free rate and MRP in the CAPM*, November 2012.

263 AER *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 15.

264 See Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 47.

We consider this result is implausible because evidence before us indicates that the systematic risk of network businesses is less than the overall market.[265]

- McKenzie and Partington supported our decision not to use DGMs to directly estimate the return on equity.[266] They supported using our construction of the DGM to inform the MRP estimate. However, they flagged concerns around the reliability of DGMs and gave a number of reasons why DGMs are likely to overestimate the return on equity at present.[267]
- We consider SFG overstated the ability of its DGM to produce reasonably robust return on equity estimates at the industry level (also see appendix B—DGM). For instance, SFG only used its DGM to indirectly estimate the return on equity for the benchmark efficient entity. [268] Similar to us, SFG used its DGM to directly estimate the return on the market as a whole. Specifically, SFG estimated the return on equity for network businesses using the DGM for each of the available analyst estimates. It then subtracted the risk free rate to obtain an equity risk premium for each of the analyst estimates. It then determined the risk premium ratios by dividing each equity risk premium by the relevant MRP from the DGM.[269] It then took a simple average of these risk premium ratios to derive an average risk premium of 0.94, which it used as an equity beta in the SLCAPM.[270] We note that this method appears inconsistent with how the equity beta is defined in the SLCAPM, as the covariance between the return on the market and the return on the business divided by the variance of the market.[271]

Table 3-10 shows our assessment of using the DGM at the overall return on equity level against our assessment criteria.

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265 AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 120-122. The measure of systematic risk (equity beta), indicates that the benchmark efficient entity would face less systematic risk than the market as a whole (which would have an equity beta of 1.0, by definition). See Handley, *Estimating β: An update*, April 2014.

266 McKenzie, Partington, *Report to the AER Part A: Return on Equity*, October 2014, pp. 39–40; Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

267 McKenzie, Partington, *Report to the AER Part A: Return on Equity*, October 2014, pp. 26–41Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

268 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 2.

269 For instance, if there was an analyst forecast for APA on the 1st of April 2013 the DGM would determine the market value return on equity for that analyst forecast. SFG would subtract the risk free rate from the market value return on equity to determine the ERP for APA for the 1st April 2013. SFG would divide the ERP by the DGM's MRP estimate for the period 1 January 2013 to 30 June 2013 to determine the risk premium ratio. SFG would repeat this for all analyst forecasts for network businesses in its dataset.

270 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 48.

271 Bringham and Daves, *Intermediate financial management*, Ed. 10, Cengage Learning, 2010, p. 49.

Table 3-10 Summary of our assessment of the DGM against criteria

Criteria	Assessment of DGM for estimating the return on equity
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	DGM estimation reflects well accepted finance and economic theory. DGMs are based on the principle that markets are efficient and the present value (that is, market price) of a share reflects the discounted (present) value of its expected future dividends. DGMs make no assumptions on the risk factors that explain the required return on equity.
Fit for purpose. That is, use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex approaches where appropriate.	Our DGMs are relatively simple. We consider the models are fit for estimating a range within which the MRP is likely to fall. While DGMs are used in the Australian context, their use appears limited compared to the SLCAPM.[272]
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets.	The simplicity of most DGMs enable a given model specification to be estimated in a robust, transparent and replicable manner.
Where models of the return on equity and debt are used these are: - based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation - based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound	DGMs are highly sensitive to assumptions regarding the short term and long term dividend growth rates. This makes DGMs highly sensitive to potential errors.

[272] DGMs do not appear widely used in the regulatory context. We note that while IPART uses DGMs to inform its estimate of the MRP, it considers this along with additional information like historical excess returns. See IPART, *Review of WACC methodology: Research final report*, 9 December 2013, p. 2. Regarding market practitioners, we considered 32 independent valuation reports dated between 27 April 2013 and 31 July 2014 that contained a discounted cash flow analysis. Only four of these reports used a model other than the SLCAPM (the DGM) to estimate the return on equity. Three of these four reports only used the DGM as a cross-check on an initial SLCAPM estimate. The remaining report used the DGM to directly estimate the value of the proposed transaction). See: DMR Corporate, *Re: Independent Expert's Report*, Report prepared for ILH Group Ltd, 23 July 2013, Grant Samuel & Associates Ltd:, *Financial Services Guide and Independent Expert's Report in relation to the proposal by Murray & Roberts Holdings Ltd*, 11 October 2013; *Financial Services Guide and Independent Expert's Report in relation to the proposal to internalise management*, 7 February 2014; *Financial Services Guide and Independent Expert's Report to the Independent Board Sub-Committee in relation to the proposal by APA Group*, 4 March 2014.

Criteria	Assessment of DGM for estimating the return on equity
rationale.	
Where market data and other information is used, this information is: - credible and verifiable - comparable and timely - clearly sourced.	With the exception of the short and long term dividend growth estimates, the input parameters for estimating the DGM are generally credible, verifiable, comparable, timely, and can be clearly sourced. However, evidence suggests analyst forecasts are overly optimistic.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	Theoretically, readily reflects changes in the market data as it reflects changes in dividend forecasts and share prices. However, in practice, DGMs may not track these changes accurately due to biases in dividend forecasts, stickiness with dividends and the practice of financing dividends.[273] DGMs can also generate volatile and conflicting results.[274]

Source: AER analysis.

The majority of service providers, including SA Power Networks, submitted we should use empirical estimates from a DGM to estimate the return on equity.[275] These service providers submitted a construction of a DGM proposed by SFG.[276] In our decisions

273 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26–31.

274 Different consultants have produced widely different DGM estimates over short periods, From March 2012–2013, we considered DGM estimates of the MRP ranging from 5.90–9.56 per cent. See AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 101–103, Part 3, 50–56.

275 ActewAGL, *Regulatory Proposal 2015–19 Subsequent regulatory control period*, 2 June 2014, pp. 261–276; Ausgrid, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, p. 85; Endeavour Energy; *Regulatory Proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 128–129; Energex, *Regulatory proposal July 2015 to June 2020*, October 2014, pp. 164–165; Ergon Energy, *Regulatory proposal appendix C: Rate of return*, October 2014, pp. 128–130, 135–137; Essential Energy, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 114–115; JGN, *2015–20 access arrangement information, appendix 9.03 Return on equity proposal*, 5 June 2014, pp. 1–2, SAPN, *Regulatory proposal 2015–20, October 2014*, p. 319; TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, pp. 12–13, 188–191; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 45–50; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 136–138; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 43–44; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331–333; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, pp. 117–120; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 221–224; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 229–232; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 81–85.

276 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014.

following the Guideline, we considered and responded to these submissions.[277] We remain satisfied with our position, after having regard to the information presented in SA Power Networks' revised regulatory proposal and submissions on our preliminary decision.[278]

For our April-June 2015 decisions, we engaged McKenzie and Partington to consider the DGM in light of the service providers' proposals. McKenzie and Partington did not consider that using estimates from SFG's DGM would lead to a materially better estimate of the return on equity relative to our approach.[279] They also indicated that prior to its use, it would be appropriate to have substantial agreement on its superiority (over established models) in the research literature and/or extensive use of the model in practice.[280] They also indicated that they considered SFG's model could generate virtually any return on equity desired.[281] They did support the use of the DGM to inform the MRP estimate. Although, they indicated concerns around its reliability and gave a number of reasons why there was a significant risk it will overestimate the MRP and return on equity.

Handley also reviewed the submissions on the DGM and supported our decision to not use estimates based on the SFG model.[282] He considered it inappropriate to use the outputs from a model in a regulatory context where general acceptance and use of the model is not yet established.[283] He also stated regarding DGMs more generally:[284]

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277 For example, see: AER, *Draft decision JGN Access arrangement 2015–20, Attachment 3*, November 2014, pp. 186–189, 214–233.

278 SAPN submitted Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015; SFG, *Using the Fama–French model to estimate the required return on equity*, 13 February 2015; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015; SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, 13 February 2015; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015 ; NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015. Service providers submitted NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015; SFG, *Using the Fama–French model to estimate the required return on equity*, 13 February 2015; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015; SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, 13 February 2015; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015 ; SFG, *The foundation model approach of the AER to estimating the cost of equity: Report for JGN, JEN, AusNet Services, AGN, CitiPower, Ergon Energy, Powercor, SAPN and United Energy*, March 2015; NERA, *Review of the literature in support of the SLCAPM, the Black CAPM and the FFM: A report for JGN, JEN, AusNet Services, AGN, CitiPower, Ergon Energy, Powercor, SAPN, and United Energy*, March 2015. Service providers also supported the following reports since the June 2015 JGN final decision: Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015; NERA, *The Cost of Equity: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015,; Ronald L. Knecht, *Witness Statement: Ronald L. Knecht*, June 2015; Frontier Economics, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015.

279 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 40.

280 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 27.

281 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 34–35.

282 Handley, *Advice on the Return on Equity*, 16 October 2014, pp. 13–15.

283 Handley, *Advice on the* return *on* equity, 16 October 2014, p. 15.

284 Handley, *Advice on the return on equit*y, 16 October 2014, pp. 13–14.

> Notwithstanding the solid DCF [discounted cash flow] foundation upon which it is based, DGMs are not a panacea for the challenges associated with using an asset pricing model to estimate the return on equity. Arguably DGMs simply transfer the uncertainty and difficulties in estimating the parameters in an asset pricing model to uncertainty and difficulties in estimating the expected future dividend stream and in particular in estimating the expected growth rate in dividends

Handley then demonstrated that DGMs shifted the uncertainty to the growth rate. Handley showed that the return on equity estimated using a constant growth DGM simply equalled the expected dividend yield next period plus the growth rate.[285] He then stated that he considered it unclear whether the return on equity estimates from two and three stage models would be any more meaningful.[286]

See appendix B—DGM for a further discussion of the DGM, the service providers' submissions regarding the DGM, our response to these submissions, and our assessment of the model against our criteria.

Other SLCAPM specifications (Wright and long-term CAPMs)

We have not used point estimates of the return on equity from the Wright approach to SLCAPM specification and historically based 'long term' SLCAPM specification to inform our estimate of the return on equity for the benchmark efficient entity. While we have used a range from the Wright CAPM specification to inform the overall return on equity (the Wright approach), we have placed little reliance on this information given our concerns with this approach.

We consider the point estimates of the return on equity from these non-standard specifications of the SLCAPM are currently unsuitable for:

- estimating the return on equity for the benchmark efficient entity
- performing a cross check on whether other models (including the SLCAPM) are producing reasonable estimates of the return on equity that will contribute to the achievement of the allowed rate of return objective.

Having fully reviewed the new material submitted since the publication of the Guideline, we place limited reliance on the Wright approach to inform the overall return on equity.[287] This is for the same reasons stated in the appendices to the Guideline's explanatory statement and in our subsequent decisions.[288] We do not agree with the

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285 Handley, *Advice on the return on equity*, 16 October 2014, p. 14.

286 Handley, *Advice on the return on equity*, 16 October 2014, p. 15.

287 Material submitted on this includes CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, pp. 6–10; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 81; Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 10, 28–32, 54–55.

288 AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 24–28; AER, *Final decision JGN Access arrangement 2015–20, Attachment 3*, June 2015, pp. 83–88, 284–289.

form of the Wright and historically-based CAPMs. The SLCAPM is a forward looking asset pricing model.[289] Historical data (such as historical excess returns on the market) may be used as a basis for estimates of the input parameters into the model where they are good evidence of forward looking parameters. However, we do not consider using historically based estimates that are clearly not representative of the forward looking rate will result in an unbiased estimate of the return on equity.[290]

The Wright approach is an alternative implementation of the SLCAPM. This is where the return on the market portfolio and the risk free rate are estimated as separate components of the MRP. The following equation represents this relationship:

$$ke = rf + \beta e \times (rm - rf)$$

Where: ke is the expected return on equity

rf is the risk free rate

βe is the equity beta

rm is the expected return on the market

The key reasons for not using the return on equity point estimates from these historically based SLCAPM specifications are:

- The models are not theoretically justified. The SLCAPM is a forward looking equilibrium asset pricing model and therefore requires forward looking input parameters.[291]
- We consider that no compelling empirical evidence is before us to support the use of the models.
- Market practitioners, academics or regulators do not generally accept these models.[292]
- The models do not take into account changing market conditions. Therefore, they are unlikely to (at a given point in time) estimate an unbiased forward looking estimate of the required return on equity for the benchmark efficient entity.

Table 3-11 shows we consider these models do not meet our selection criteria particularly well.

289 Bringham and Daves, *Intermediate financial management*, Ed. 10, Cengage Learning, 2010, p. 53.

290 McKenzie and Partington advised 'the current marker return on equity, as given by the CAPM, requires estimates of the current risk free rate and the current market risk premium. The current risk free rate is readily estimated as the current yield on CGS of appropriate maturity'. See McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and MRP*, February 2013, p. 30.

291 Bringham and Daves state, 'The CAPM is an ex ante model, which means that all of the variables represent before-the-fact, expected values'. See Bringham and Daves, *Intermediate financial management*, Ed. 10, Cengage Learning, 2010, p. 53.

292 For example, the Wright CAPM's main use appears to be for regulatory purposes in the UK. See Wright, *Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER*, October 2012.

Table 3-11 Summary of our assessment of the alternative SLCAPM specifications against criteria

Criteria	Long term 'average' specification	Wright specification
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	The long term average specification assumes the return on equity is very stable through time. This is not supported by well accepted economic and finance principles. The empirical analysis does not clearly support the model specification.	The Wright specification appears to either assume that the standard approach to estimating the risk free rate and MRP is inconsistent; or the real market return on equity is constant and therefore the risk free rate and the MRP are perfectly negatively correlated.[293] The first assumption would be incorrect. The second assumption is not clearly theoretically supported and the empirical evidence is not compelling.[294]
Fit for purpose. That is, use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex approaches where appropriate.	The long term specification is relatively simple to implement. However, we do not consider it fit for estimating a forward looking return on equity since it relies on historical data that are clearly not representative of forward looking parameters.[295] We accept that historical data (such as historical excess returns on	The Wright specification is relatively simple to implement. However, we do not consider it fit for estimating a forward looking return on equity because it relies on historically based estimates that are clearly not representative of forward looking parameters.[296] We accept that historical data (such as historical excess

293 John C. Handley, *Advice on the Return on Equity*, 16 October 2014, pp. 7, 17; Handley, *Further advice on the return on equity*, 16 April 2015; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28; McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, 28 February 2013, pp. 21–30.

294 John C. Handley, *Advice on the Return on Equity*, 16 October 2014, pp. 17-18.

295 McKenzie and Partington advised 'the current market return on equity, as given by the CAPM, requires estimates of the current risk free rate and the current market risk premium. The current risk free rate is readily estimated as the current yield on CGS of appropriate maturity'. See McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and MRP*, February 2013, p. 30.

296 McKenzie and Partington advised 'the current marker return on equity, as given by the CAPM, requires estimates of the current risk free rate and the current market risk premium. The current risk free rate is readily estimated as the current yield on CGS of appropriate maturity'. See McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and MRP*, February 2013, p. 30.

Criteria	Long term 'average' specification	Wright specification
	the market) may be used as a basis for estimates of the input parameters into the SLCAPM where they are good evidence of forward looking parameters.	returns on the market) may be used as a basis for estimates of the input parameters into the SLCAPM where they are good evidence of forward looking parameters.
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets.	The long term specification is transparent and easy to replicate.	The Wright specification is transparent and easy to replicate.
Where models of the return on equity and debt are used these are: – based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation – based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.	The long term specification is an application of the SLCAPM. As outlined in Table 3-7, the SLCAPM performs well against this criterion.	The Wright specification is an application of the SLCAPM. As outlined in Table 3-7, the SLCAPM performs well against this criterion.
Where market data and other information is used, this information is: – credible and verifiable – comparable and timely – clearly sourced.	The long term specification uses credible, verifiable, publically available market data.	The Wright specification uses credible, verifiable, publically available market data.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	The long term specification is based on historical data and does not reflect changing market conditions.	The Wright specification is based on historical data and does not adequately reflect market conditions.

Source: AER analysis.

Service providers submitted a range of material to support using these models.[297] We largely consider this material in step four in relation to the Wright approach. While we have used the range from the Wright SLCAPM, we note that Handley questioned the theoretical and empirical support of the model.[298] Accordingly, we have placed little reliance on this information.

Handley considered the Wright SLCAPM in his report and stated:[299]

> Wright adopts an alternative non-standard approach to estimating the MRP. Rather than treating the MRP as a distinct variable he suggests estimating the return on the market – by estimating the real return on equity and combining this with a current forecast of inflation to give an estimated nominal return on equity – and the risk free rate separately.
>
> It appears to be based on two main ideas. First, a claim that the standard approach is internally inconsistent as it purportedly uses a different estimate of the risk free rate for the purposes of estimating the MRP.[300] But this is not correct. As discussed above, the item being estimated under the standard approach and the item being substituted into (6) is the MRP. It is a single estimate of a single item. It is not an estimate of the expected return on the market and an estimate of the risk free rate. Second, Wright draws on previous work by Wright, Mason and Miles (2003) which in turn draws on work by Siegel (1998) to conclude that:
>
>> "regulators should work on the assumption that the real market cost of equity is constant … as a direct consequence, whatever assumption is made on the risk free rate, the implied equity premium must move point by point in the opposite direction.[301]
>
> The theoretical justification for such an assumption is far from clear whilst the empirical evidence that is presented is not compelling. More importantly, this is a proposition whose widespread use and acceptance is yet to be established.

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297 SFG supported relying on the Wright CAPM to estimate the MRP. The majority of service providers, including SA Power Networks, submitted this material in SFG, *The required return for the benchmark efficient entity*, 13 February 2015, pp. 28–33 and Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 10, 28–32, 54–55. Energex submitted this material in SFG, *Estimating the required return on equity*, August 2014. ActewAGL, Ergon Energy, JGN, SAPN and TasNetworks submitted this material in SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014. ActewAGL and the NSW distributors submitted a criticism of how we use the Wright approach in SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015. Ausgrid, Endeavour Energy and Essential Energy submitted a report by CEG supporting using a historical SLCAPM – CEG, *WACC Estimates: A report for NSW DNSPs*, May 2014 and CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015. NERA also discussed the Wright CAPM in its report for TransGrid. See NERA, *Return on capital of a regulated electricity network*, May 2014, pp. 80–81

298 Handley, *Advice on the* return *on* equity, 16 October 2014, p. 18.

299 Handley, *Advice on the* return *on* equity, 16 October 2014, pp. 17–18.

300 CEG, *WACC Estimates: A report for NSW DNSPs*, May 2014, pp. 3–4.

301 Wright, S., 2012, *Review of risk free rate ad cost of equity estimates: A comparison of UK approaches with the AER*, 25 October 2012, pp. 2–3.

> Until then (if at all), there is no compelling reason to move from the standard approach to estimation.

We note that Handley's comments appear equally applicable to the 'long term' SLCAPM specification proposed by a number of service providers.

See appendix A—equity models for a discussion on service providers' submissions, our response to these submissions, and our assessment of Wright and 'long term' specifications of the SLCAPM against our criteria.

Risk free rate

Table 3-12 shows we estimate the risk free rate using yields on CGS with a 10 year term. Based on our assessment of this information, Table 3-12 sets out the role we have determined.

Table 3-12 Role of relevant material in determining the risk free rate

Relevant material	Role	Reasons for chosen role
Yields on 10 year CGS	Used as the proxy for the risk free rate.	CGS are low default risk securities and their yield is the best proxy for the risk free rate in Australia, as supported by the RBA.[302] This source of information is robust, credible and reflects prevailing market conditions.

Source: AER analysis.

Market risk premium (MRP)

Our assessment in step one helps us consider the relative strengths and limitations of different sources of information. Table 3-4 sets this out. This helps us determine the role we give this information in estimating the MRP, as shown in Table 3-13.

Table 3-13 Role assigned to each source of relevant material in determining the MRP

Relevant material	Role	Reasons for chosen role
Historical excess returns	Given the most reliance	Meets most of the criteria. The main potential limitation is slow response to changes in market conditions. This is not a limitation if investor expectations of the 10 year forward looking MRP move similarly slowly. Further, considering other sources of evidence reduces this limitation.
Dividend growth	Given the second	Meets most of the criteria. The main limitation is

302 RBA, *Letter to the ACCC: The Commonwealth Government Securities Market*, 16 July 2012, p. 1.

Relevant material	Role	Reasons for chosen role
models (AER's construction)	most reliance	its sensitivity to assumptions, which is significant. It is also likely to produce upward biased estimates.[303] Since it can readily reflect changes in market conditions, it complements our use of historical excess returns. However, its tracking ability is limited if it produces inaccurate results.
Survey evidence	Given some reliance (point in time estimate)	Its main strength is that it estimates investor expectations. However, limitations related to survey design and representativeness of respondents can reduce the value of these estimates. Triangulation of survey evidence may reduce these limitations.
Conditioning variables (dividend yields, credit spreads, implied volatility)	Given some reliance (directional information only)	Their main strength is their ability to detect changing market conditions. However, it is difficult to derive an MRP estimate from this information in a robust manner. Academic and empirical evidence on this information is mixed.
Other Australian regulators' MRP estimates	Cross check on how we consider information	This is indirect evidence of the MRP, which we do not use to estimate the MRP. However, we consider it useful to have regard to the approaches other regulators are taking to consider the evidence before them.
Dividend growth models (SFG's construction)	Does not inform our MRP estimate	We consider this DGM is unnecessarily complex and produces unrealistic growth rates. We consider SFG overstates its benefits because it transfers where one makes assumptions, rather than reducing the need to make assumptions. (see appendix B—DGM)
Imputation credit adjustment (AER, Brailsford et al.)	Adjust MRP estimate under the DGM and historical excess returns	This is consistent with economic and finance principles and empirical analysis indicating market returns comprise of dividends and capital gains. The adjustment is also transparent and replicable.
Imputation credit adjustment (SFG)	Does not inform our MRP estimate	This applies a formula (from Officer) differently to how we apply the Officer framework in the PTRM. Applying the formula, as SFG proposed

303 McKenzie and Partington, *Report to the AER: Part A, return on equity*, October 2014, pp. 26, 28–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50, 59; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 43–44.

Relevant material	Role	Reasons for chosen role
		could cause problems because it is based on perpetuity assumptions and assumes no capital gains.
Independent valuation reports	Does not inform our MRP estimate	More suitable for use at the overall return on equity level because writers of these reports can adjust individual parameters to obtain an overall result.
The Wright approach	Does not inform our MRP estimate	More suitable for informing the overall return on equity because it is designed to provide information at the return on equity level and does not use a direct estimate of the MRP.

Source: AER analysis.

In its revised proposal, SA Power Networks applied an MRP estimate based on reports from SFG and Frontier (specifically, Professor Stephen Gray and Dr Jason Hall [Gray and Hall]).[304] They based their estimate on historical excess returns, the Wright approach, SFG's construction of the DGM and independent expert (or valuation) reports. We do not agree with the following aspects of this approach:

- Using the Wright approach to estimate the MRP. We consider it fit for purpose to use the Wright approach to inform the overall return on equity.[305] We consider the Wright approach is an alternative implementation of the SLCAPM designed to provide information at the return on equity level. Wright's implementation of the SLCAPM does not use a direct estimate of the MRP.[306] We also do not agree with SFG's submission that using the Wright approach to inform the MRP estimate is

304 SAPN, *Revised regulatory proposal*, July 2015, pp. 331, 368 (footnote 436); SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 33 (attachment M.4 to SAPN's revised proposal); SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 19 May 2015, pp. 3, 4 (attachment M.18 to SAPN's revised proposal). This is the same as the approach applied in SAPN's initial proposal (but with updated estimates); see SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, p. 83; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 8 September 2014, pp. 3–4 (attachment 26 to SAPN's proposal). However, the updated MRP estimate presented in SAPN's revised proposal (8.0 per cent) is not equal to the updated MRP estimate presented in SFG's May 2015 return on equity update report (8.23 per cent).

305 To see how we have regard to the Wright approach at the return on equity level, see Table 3-15.

306 SFG submitted the Wright approach is not an alternative implementation of the SLCAPM, but a method for estimating the return on the market and MRP (see: SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, p. 55). We consider this is a matter of labelling that does not affect the substantive content of the analysis. However, our view is that the Wright approach is an alternative implementation of the SLCAPM, which assumes' the real market cost of equity is constant' (see Wright, *Review of risk free rate ad cost of equity estimates: A comparison of UK approaches with the AER*, 25 October 2012, pp. 2–3). Also, our view that the Wright approach does not use a direct estimate of the MRP is supported by Handley. He considered the Wright approach does not treat the MRP as a distinct variable; rather, it estimates the return on the market and the risk free rate separately (see Handley, *Advice on the return on equity*, 16 October 2014, p. 17).

the 'consensus view'.[307] In determining how we use the Wright approach, we have regard to its merits and limitations by assessing it against the criteria set out in the Guideline (see Table 3-11).

- Using independent valuation reports to estimate the MRP. We consider independent valuation reports and our foundation model estimate of the return on equity are most comparable at the overall return on equity level.[308] This recognises the tendency for writers of these reports to adjust their assumptions and point estimates. These adjustments can be unexplained and can be made to any parameter and/or the expected return on equity.[309] In determining how we use this information, we have regard to its merits and limitations by assessing it against the criteria set out in the Guideline (see Table 3-17).
- Using SFG's construction of the DGM and its proposed imputation adjustment.[310] We consider our construction of the DGM (and our imputation adjustment) is more suitable for estimating the MRP in the regulatory context (see appendix B–DGM and appendix C–MRP).
- Disregarding survey evidence. We consider market surveys can be valuable and we should have some limited reliance on them (see Table 3-4).[311]
- Disregarding evidence from conditioning variables. We consider conditioning variables can be valuable and we should have some limited reliance on them (see Table 3-4).[312]
- Only having regard to selective components of other regulator's approaches.[313] We consider it is valuable to analyse these decisions holistically by considering the final outcome in its complete context (see Table 3-4).

307 See: SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 29; SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 30. We do not consider the views of the QCA and ERA are sufficient to establish a 'consensus view'.

308 To see how we have regard to the independent valuation reports at the return on equity level, see Table 3-15. As we consider independent expert reports at the overall return on equity level, we do not use NERA's MRP estimate from independent expert reports in our estimation of the MRP (see NERA, *The relation between the MRP and risk free rate: Evidence from IREs—A report for United Energy*, April 2015, and also see our discussion at section E.7 of appendix E–other information).

309 AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 28.

310 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015.

311 See section C.3 for a more detailed response to service providers' submissions on our use of survey evidence to estimate the MRP.

312 See section C.4 for a more detailed response to service providers' submissions on our use of conditioning variables to estimate the MRP.

313 For example, see SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 47, 64, 71.

Equity beta

Our assessment in step one helps us consider the relative strengths and limitations of different sources of information. Table 3-5 sets this out. This helps us determine the role we give this information in estimating the equity beta, as shown in Table 3-14.

Table 3-14 Role assigned to each source of relevant material in determining the equity beta

Relevant material	Role	Reasons for chosen role
Conceptual analysis	Cross check of Australian empirical estimates	Allows us to form a prior expectation of where the equity beta of a benchmark efficient entity sits relative to the market average, but is necessarily qualitative in nature.
Australian empirical estimates	Primary determinant of equity beta range, with significant weight in determining the point estimate	Relevant to the benchmark efficient entity and derived from credible and commonly used estimation methods. Estimates present a consistent pattern that is robust across regression permutations.
International empirical estimates	Inform equity beta point estimate	Much less relevant to the benchmark efficient entity. Estimates are derived from credible and commonly used estimation methods but do not present a consistent pattern of results.
Evidence from the Black CAPM: (a) empirical results (b) theoretical principles	(a) No role (b) Inform equity beta point estimate	Empirical evidence is not reliable because there are major problems deriving a reasonable empirical estimate using the Black CAPM (see Table 3-9). Theoretical principles may account for certain market imperfections that affect the SLCAPM in practice. However, it is necessarily qualitative in nature and difficult to implement in accordance with good practice.
Empirical evidence from SFG's DGM construction	No role	There are numerous problems with SFG's DGM construction (see appendix B–DGM). This is also not a robust method of estimating equity beta as an input to the SLCAPM model.

Relevant material	Role	Reasons for chosen role
Empirical evidence from the Fama French three factor model	No role	Empirical implementation is relatively complex and opaque and estimates are sensitive to the choice of input assumptions (see Table 3-8).

Source: AER analysis.

In its revised proposal, SA Power Networks submitted that we should give international (primarily US) empirical estimates a determinative role in estimating equity beta for a benchmark efficient entity.[314] We consider such an approach would not be consistent with the merits of this information (see appendix D—equity beta). In particular:

- We consider international empirical estimates are not fit for purpose because they differ from the benchmark efficient entity, which operates in Australia by definition.
- We consider it is difficult to use international empirical estimates in accordance with good practice because domestic and international equity betas are not directly comparable (countries differ along a number of dimensions which are difficult to quantify).
- We are not satisfied that this approach would produce superior estimates of the domestic equity beta. We consider our comparator set of Australian energy network firms is reflective of the benchmark efficient entity. We also consider empirical analysis of our Australian comparator set has generated consistent and robust equity beta estimates over several years under a range of market conditions.
- We are, accordingly, satisfied that our use of this information, consistent with the Guideline, is appropriate and consistent with the merits of this information.

In its initial proposal, SA Power Networks submitted that if we adopt our foundation model approach set out in the Guideline, then empirical evidence from the Black CAPM, FFM and SFG's DGM construction should be used to inform the equity beta for the SLCAPM.[315] However, it made no reference to this approach in its revised

314 SAPN, *Revised regulatory proposal*, July 2015, pp. 331, 368 (footnote 436); SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, pp. 18–21 (attachment M.4 to SAPN's revised proposal); SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 19 May 2015, p. 5 (attachment M.18 to SAPN's revised proposal); SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 31 (attachment M.7 to SAPN's revised proposal). SAPN's consultant, SFG, submitted that a sample of 56 US firms should be included in our comparator set for empirical analysis. It also submitted that the international empirical estimates we consider indicate an extension of our range. We consider these submissions demonstrate SFG's (and SAPN's) consideration that we should give international empirical estimates a determinative role in estimating equity beta. See: SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 19–20; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 4, 27–28, 31, 35. SAPN also submitted this view in its initial proposal. See: SFG, *Equity beta*, May 2014, pp. 3–4 (attachment 26 to SAPN's proposal).

315 SAPN, *Regulatory proposal*, October 2014, p. 319. Also see: SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 94–96 (attachment 26 to SAPN's proposal).

proposal. Nevertheless, we consider such an approach would not be consistent with the merits of this information. In particular, we do not consider the Black CAPM, FFM and SFG's DGM produce reliable estimates of the return on equity (see Table 3-9, Table 3-8, appendix A–equity models and appendix B–DGM), which in turn, would not produce reliable estimates of the equity beta.[316]

Other information

In addition to equity models, there are a number of other relevant materials that may inform our overall return on equity estimate. Table 3-15 sets out the role we give each source of relevant material, based on our assessment criteria. The role we give to the Wright approach was discussed previously under equity models, but is also included in this table whereas the reasons are discussed above.

Table 3-15 Role assigned to relevant material in informing the overall return on equity estimate

Relevant material	Role	Reasons for role
Wright approach	Directional role to inform movements in overall return on equity	See discussion under equity models.
Return on debt relative to the return on equity	Directional role to inform movements in overall return on equity	Equity investors are residual claimants (after creditors) on a firm's assets in the event of default. But there is no consensus on the size or strength of any relationship between debt and equity returns. Directional evidence may be used with caution.
Return on equity estimates from independent valuation (expert) reports	Directional role to inform movements in overall return on equity	Issues of comparability, timeliness, and adjustments made to suit a different objective mean that point or range estimates are not directly comparable. Directional evidence may be used with caution.
Return on equity estimates from broker reports	Directional role to inform movements in overall return on equity	
Return on equity estimates from other regulators'	Directional role to inform movements in overall return	

[316] In its revised proposal, SAPN submitted a report by SFG on beta estimation (SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 32–33, 35). In this report, SFG suggested that, under our foundation model approach, we should use empirical evidence from the Black CAPM to inform the equity beta for the SLCAPM. It did not refer to the FFM or SFG's DGM.

Relevant material	Role	Reasons for role
decisions	on equity	
Transaction multiples, trading multiples	No role	A transaction multiple may imply that the regulatory rate of return is different to that required by investors, but we cannot know by how much. Given the limited usefulness of this material, and other issues of comparability, we are not satisfied that the allowed rate of return objective is furthered by its use.
Return on equity estimates and profitability measures from financial statements	No role	The practical application of this material is the same as a transaction multiple.

Source: AER analysis.

Return on debt relative to the return on equity

Equity investors are residual claimants on a firm's assets in the event of default. For this reason, equity investments are typically riskier than debt investments and therefore the return on equity should exceed the return on debt.

For a benchmark efficient entity with a similar degree of risk as SA Power Networks, we consider that the return on equity is shielded from systematic risk due to:

- natural monopoly positions providing a barrier to competition
- limited demand risk as they supply essential goods with a low elasticity of demand
- the application of revenue control mechanisms, including that:
    - some forms of control (such as a revenue cap or average revenue cap) can reduce revenue risk from unexpected changes in demand
    - a revenue control mechanism limits the interest rate risk facing the firm
    - the RAB is indexed to the outturn Consumer Price Index limiting risk from unexpected changes in inflation
    - unexpected costs may be passed through to consumers in some circumstances.

A number of stakeholders also submitted (to this determination process and other concurrent determination processes) that they expect these factors, and others, to create a low risk business environment for regulated gas and electricity network service providers.[317] Origin Energy, in its August 2014 submission on the NSW distribution NSPs' regulatory proposals, also noted the low risk of these businesses.[318] It submitted that the overall cost of capital should not be a long way above the cost of a corporate bond. This appears to indicate that Origin Energy considers the expected return on equity would not be expected to be a long way above the yield to maturity on debt. Origin Energy submitted that the NSPs are shielded from systematic risk due to their monopoly position, the effect of a revenue and/or price cap, and pass through provisions, stating:[319]

> As a result of these factors Origin considers that an efficient benchmark cost of capital for these firms is more comparable to a corporate bond rate than that of a company like Origin that manages a diverse array of risks domestically and internationally in several fuels, in a competitive environment, across an integrated supply chain.

Similarly, the Queensland Council of Social Services stated:[320]

> In view of the way in which the regulatory arrangements reduce business risk Engineroom considers that the return on investment should approximate that on a debt security rather than on a business exposed to normal market risk.

Although equity investors are residual claimants on a firm's assets in the event of default, we note that the measured return on debt does not, as a strict rule, need to be below the estimated return on equity at any given point in time. This is for two key reasons:

- regulated business debt bears different systematic risk to equity (including inflation risk)

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317 EUAA, *submission on Ergon Energy regulatory proposal*, 30 January 2015, page 13. EUAA, *submission on Energex regulatory proposal*, 30 January 2015, page 13. Origin Energy, *RE: Submission to Queensland electricity distributors' regulatory proposals*, January 2015, p. 16. Queensland Council of Social Service, *Understanding the long-term interests of electricity consumers: submission to the AER's Queensland electricity distribution determination 2015-20*, January 2015, pp. 71–72. Queensland Resources Council, *Ergon Energy Determination 2015–20*, January 2015, p. 7. EUAA, *Submission on SA Power Networks revenue proposal*, January 2015, p. 13. South Australian Council of Social Services, *SACOSS Submission to Australian Energy Regulator on SA Power Networks' 2015-2020 Regulatory Proposal*, January 2015, p. 19–21. Queensland Council of Social Service, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, July 2015, p. 20. Origin Energy, *Submission to Victorian Electricity Distributors Regulatory Proposals*, July 2015, pp. 10–11. Origin Energy, *ActewAGL Distribution 2016-21 Access Arrangement Proposal for its Australian Capital Territory, Queanbeyan and Palerang Gas Distribution Network*, August 2015, p. 5. CCP3, *The Regulated Rate of Return for an Efficiently Financed Benchmark Efficient Entity of Similar Risk to a Distribution Network Service Provider*, A response by the consumer challenge panel subgroup 3 to the rate of return proposals by the Victorian electricity distribution businesses, August 2015. p. 40.

318 Origin Energy provided similar submissions to other current AER determination processes. See: Origin Energy, *Submission to AER Preliminary Decision SA Power Networks*, July 2015, p. 9; Origin Energy, *Submission to AER Preliminary Decision Queensland Electricity Distributors*, July 2015, pp. 11–12. Origin Energy, *Submission to Victorian Electricity Distributors Regulatory Proposals*, July 2015, pp. 10–11.

319 Origin, *Submission to the NSW electricity distributors' regulatory proposals for 2014–19*, August 2014, p. 7.

320 Queensland Council of Social Service, *Understanding the long-term interests of electricity consumers: submission to the AER's Queensland electricity distribution determination 2015-20*, January 2015, pp. 71–72.

- measured debt yields are typically promised yields as opposed to the expected return on equity estimated for setting regulatory allowances.[321]

Notably, no academic consensus currently exists on the size and strength of any relationship between debt and equity premiums.[322] Given the inconclusive evidence on the size and strength of any relationship between debt and equity premiums, we consider this information is best used in a directional role.

Table 3-16 below outlines our assessment of this information against our criteria.

Table 3-16 Assessment of return on debt material against criteria

Criteria	Assessment of relevant material against criteria
Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data	Comparison of debt and equity premiums is supported by economic theory and finance principles. Complex modelling of precise size and strength of relationship between debt and equity is currently not supported by well-accepted economic principles and consequently has not been undertaken. Return on debt data is robust and sourced from credible and verifiable data sources.
The use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose	Return on debt data published by the RBA does not have any set purpose. Our use of the data is consistent with the make-up of the data. Limitations in interpreting results of comparisons between debt and equity premiums are acknowledged by providing only a directional role to this information.
Promote simple over complex approaches where appropriate	Analysis involves a simple comparison with minimal adjustments to data.
Implemented in accordance with good practice, supported by robust, transparent and replicable analysis that is derived from available credible datasets	Return on debt data is sourced from credible and verifiable data sources. The simple comparison is transparent and replicable.
In relation to models, based on quantitative modelling that	Not applicable, analysis involves only a simple comparison.

321 Expected returns on debt may be lower than promised returns after consideration of default risk. For more information, see: McKenzie and Partington, *Report to the AER: The relationship between the cost of debt and the cost of equity*, March 2013, p. 7.

322 McKenzie and Partington, *Report to the AER: The relationship between the cost of debt and the cost of equity*, March 2013, p. 10; Partington, *Report to the AER: Return on equity (updated)*, April 2015, pp. 72–73.

Criteria	Assessment of relevant material against criteria
is sufficiently robust as to not be unduly sensitive to errors in inputs estimation	
In relation to models, based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale	Analysis involves a simple comparison that minimises adjustments to data. The comparison is based on a sound rationale from economic and finance principles.
Credible and verifiable	Return on debt data is sourced from credible and verifiable data sources.
Comparable and timely	Comparison to debt premiums is made using most recently available data.
Clearly sourced	Return on debt data is sourced from credible and verifiable data sources.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate	Comparison to debt premiums is made using most recently available data.

Source: AER analysis.

Return on equity estimates from other market practitioners

Our foundation model sets out our preliminary estimate of the return on equity for a benchmark efficient entity with comparable risks to SA Power Networks. Other market participants may, in the course of their operations, also produce return on equity estimates for entities similar to our benchmark entity. Evidence of return on equity estimates from other market participants is available from independent valuation (expert) reports, broker reports, and other regulators' decisions.

Independent valuation reports (also referred to as independent expert reports) are prepared for listed businesses to provide a valuation of a business, an asset, or a project in the event of certain transactions. These transactions include takeover bids, mergers and schemes of arrangement, acquisitions, divestitures, share buy-backs, and related party transactions. The Corporations Act 2001, the Australian Securities Exchange (ASX) listing rules and the Australian Securities and Investments Commission (ASIC) regulatory guides have various provisions requiring such reports. Broker reports are prepared by equity analysts to provide information about listed companies to investors. Broker reports also often include valuations as part of information provided.

Where a valuation is made using the discounted cash flow method, the valuer or broker will estimate a discount rate, typically in the form of a weighted average cost of capital and including a return on equity. Return on equity estimates may also be found in other regulators' decisions.

When the valuation or regulatory decision is for a comparable energy network business, the return on equity estimates contained in the valuation report, broker report, or regulatory decision provides evidence of the return on equity estimates used by market practitioners. We consider this information is relevant material.

As noted by Incenta Economic Consulting,[323] brokers and independent experts providing valuation reports are subject to financial services regulation and regulatory oversight by ASIC.[324] These regulations are designed to safeguard the rigour, impartiality, and transparency of advice provided in broker reports and independent valuation reports. Broker reports and independent valuation reports are also subject to reputational risks and competitive pressures.

The legal frameworks that govern regulatory decisions by other regulators typically require estimation methods and financial models to be based on well-accepted economic and financial principles. Broader administrative law obligations also require analysis to be well reasoned, transparent and publicly available.

However, we also consider there are a number of limitations on the use of this material in setting an allowed rate of return for a regulated business. The main limitations are:

- broker reports and independent valuation reports have a different objective[325] to the allowed rate of return objective, which may affect the return on equity estimates
- lack of transparency on how the return on equity estimates are derived
- return on equity estimates from other market participants may not be completely independent of our foundation model estimate, it may be misleading to place significant reliance on them as a cross-check
- return on equity estimates from other market participants are generally company specific and therefore not directly comparable to our benchmark entity.

These limitations are discussed further in appendix E–other information. As a result of these limitations, we consider that return on equity estimates from other market participants should inform our overall return on equity, but that:

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323 Incenta Economic Consulting, *Update of evidence on the required return on equity from independent expert reports*, May 2014, p. 6.

324 The *Corporations Act 2001* requires providers of financial services to be licenced and sets out obligations of licensees. ASIC regulatory guides 111 and 112 govern the content of expert (valuation) reports and the independence of expert (valuation) reports.

325 Brokers and valuers may adjust discount rates to compensate for errors in forecast cash flows. Discount rate estimates by brokers and valuers may also take into account the one-shot nature of the relevant transactions, which may not be consistent with regular regulatory resets. See Appendix E for more detail.

- only limited reliance should be placed on these materials
- the material should be used in a directional role, as there are concerns about the comparability of other estimates, meaning that greater reliance can be placed on movements in estimates than their levels.

The CCP proposed that we use information on return on equity estimates from broker reports, valuation reports, and other regulators' decisions to inform our overall return on equity, consistent with our role as stated above.[326]

SA Power Networks proposed using valuation reports to inform estimates of the MRP.[327] We note that consideration of MRP estimates from broker and valuation reports is included in our consideration of the overall return on equity estimates from these reports (since the MRP is one component of the overall return on equity). Detailed assessment of service providers' MRP proposals are also in appendix C–MRP.

Table 3-17 below outlines our assessment of this information against our criteria.

Table 3-17 Assessment of market practitioner material against criteria

Criteria	Assessment of relevant material against criteria
Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data	Comparison of return on equity estimates from various sources is supported by economic theory and finance principles. Other regulators' decisions are generally well supported by clearly sourced material. However, broker reports are typically not provided with supporting explanation, while valuation reports have mixed results. This can make it difficult to ascertain whether or not valuation reports and broker reports are based on accepted economic and finance principles. There is also a concern that, while valuation and broker reports are in line with accepted economic and finance principles relevant to their objective, they may not be in line with the economic and finance principles relevant to a regulatory objective.
The use of estimation methods, financial models,	There is a concern that, while valuation and broker reports are in line with accepted economic and finance principles relevant

326 CCP, *Smelling the roses and escaping the rabbit holes: The value of looking at actual outcomes in deciding WACC*—Prepared for the Board of the Australian Energy Regulator, July 2014, pp. 7–11. CCP Sub-Panel 2 (Bruce Mountain), *Submission on the AER's Preliminary Decisions for Energex, Ergon and South Australia Power Networks*, July 2015, pp. 3–6. CCP Sub-Panel 2 (Hugh Grant), *Consumer Challenge Panel (CCP2 Panel) Submission AER Preliminary 2015-20 Revenue Determinations Energex and Ergon Energy Revised Revenue Proposals*, September 2015, pp. 11–13. CCP Sub-Panel 3 (David Headberry, Beverley Hughson, David Prins), *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016-2020 regulatory period*, August 2015, p. 13.

327 In support of its proposal SA Power Networks referred to a report prepared by SFG Consulting, for details, see: SFG, *The required return on equity for a benchmark efficient entity*, 25 February 2015, pp. 32-33.

Criteria	Assessment of relevant material against criteria
market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose	to their objective, they may not be in line with the economic and finance principles relevant to a regulatory objective.
Promote simple over complex approaches where appropriate	Analysis involves a simple comparison with minimal adjustments to data.
Implemented in accordance with good practice, supported by robust, transparent and replicable analysis that is derived from available credible datasets	Other regulators' decisions are generally well supported by clearly sourced material. However, broker reports are typically not provided with supporting explanation, while valuation reports have mixed results. The simple comparison is transparent and replicable.
In relation to models, based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation	Not applicable, analysis involves only a simple comparison.
In relation to models, based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale	Analysis involves a simple comparison that minimises adjustments to data. The comparison is based on a sound rationale from economic and finance principles.
Credible and verifiable	Other regulators' decisions are generally well supported by clearly sourced material. However, broker reports are typically not provided with supporting explanation, while valuation reports have mixed results.
Comparable and timely	Valuation and broker reports are released regularly, but only infrequently for reports containing a discounted cash flow analysis for businesses comparable to our benchmark entity. Other regulators' decisions are also relatively infrequent.
Clearly sourced	Other regulators' decisions are generally well supported by clearly sourced material. However, broker reports are typically not provided with supporting explanation, while valuation reports have mixed results.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate	Valuation and broker reports are released regularly, but only infrequently for reports containing a discounted cash flow analysis for businesses comparable to our benchmark entity. Other regulators' decisions are also infrequent.

Source: AER analysis.

Realised returns

A number of stakeholders submitted that we should consider material on realised returns to equity from transaction multiples and service providers' financial statements.[328] Transaction multiples involve comparison of the market value (that is, the sale price) with the book value (that is, the RAB) for a relevant asset comparable to the benchmark efficient entity. If the market value is above the book value (a transaction multiple greater than 1 x RAB), this may imply that the regulatory rate of return is above that required by investors. Conversely, when the market value is below the book value, this may imply that the regulatory rate of return is below that required by investors. Realised returns to equity are therefore relevant material.

Caution must be exercised however, before drawing inferences about the regulatory rate of return from transaction multiples. A transaction multiple greater than 1 x RAB might result from factors beyond the regulated rate of return. These could include the buyer expecting to achieve better cash flows than forecast by the regulator by outperforming regulatory forecasts.

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[328] CCP, *Smelling the roses and escaping the rabbit holes: The value of looking at actual outcomes in deciding WACC—Prepared for the Board of the Australian Energy Regulator*, July 2014. CCP, *Response to AER Draft Determination Re: ActewAGL Regulatory Proposal 2014–19*, February 2015, p. 24. Major Energy Users, *Australian Energy Regulator - Tasmanian Electricity Transmission Revenue Reset - AER Draft Decision and TasNetworks Revised Proposal - A response by Major Energy Users Inc.*, February 2015, pp. 55–56. Energy Markets Reform Forum*, Australian Energy Regulator - NSW Electricity Distribution Revenue Reset - AER Draft Decision and Revised Proposals from Ausgrid, Endeavour Energy, and Essential Energy, A response by EMRF*, February 2015, pp. 34–35. Energy Users Association of Australia, *Submission to NSW DNSP revised revenue proposal to AER draft determination (2014 to 2019)*, February 2015, pp. 11, 14. Public Interest Advocacy Centre, *A Missed Opportunity?* Submission to the Australian Energy Regulator's Draft Determination for Ausgrid, Endeavour Energy, and Essential Energy, February 2015, p. 36. Energy Users Association of Australia, *Submission to SA Power Networks Revenue Proposal (2015 to 2020)*, January 2015, p. 14. Energy Users Association of Australia, *Submission to Energex Revenue Proposal (2015/16 to 2019/20)*, January 2015, p. 13. Energy Users Association of Australia, *Submission to Ergon Energy (Ergon) Revenue Proposal (2015/16 to 2019/20)*, January 2015, p. 13. Queensland Resources Council, *Ergon Energy Determination 2015–2020*, January 2015, p. 7. Tasmanian Minerals and Energy Council, *TasNetworks Transmission Revenue Proposal 1 July 2014 - 30 June 2019*, February 2015, p. 2. CCP Sub-Panel 2 (Bruce Mountain), *Submission on the AER's Preliminary Decisions for Energex, Ergon and South Australia Power Networks*, July 2015, pp. 3–6. CCP Sub-Panel 2 (Hugh Grant), *Consumer Challenge Panel (CCP2 Panel) Submission AER Preliminary 2015-20 Revenue Determinations Energex and Ergon Energy Revised Revenue Proposals*, September 2015, pp. 11–13. [To the extent, the CCP submissions appear to be suggesting that inflation is double counted under our building block frameworks (WACC and RAB), see Attachment 2 – the regulated asset base].CCP Sub-Panel 3 (David Headberry, Beverley Hughson, David Prins), *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016-2020 regulatory period*, August 2015, pp. 68–69. Queensland Council of Social Services, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, July 2015, p. 20. Queensland Farmers' Federation, *Submission to Australian Energy Regulator (AER) on the Preliminary Determination for the Ergon Energy and Energex Regulatory Proposals for 2015-2020*, July 2015, pp. 2–3. Total Environment Centre, *Submission to the AER on the Preliminary Decisions on the QLD DBs' Regulatory Proposals 2015-20*, July 2015, pp. 8–9. Victorian Energy Consumer and User Alliance, *Submission to the AER: Victorian Distribution Networks' 2016-20 Revenue Proposals*, July 2015, p. 9.

Regulated asset sales in the market are infrequent, allowing limited opportunity to conduct this analysis. While asset sales in the future may reflect changes to the overall rate of return that are occurring at present, sales that have already occurred will not.

Ultimately, transaction multiples do not inform us on the specific return investors require. However, if these significantly and persistently differ from one, it may be informative of the reasonableness of our overall rate of return estimates over time and in context of the building block allowances. Overall, we do not consider that providing any significant role to this material would contribute to the achievement of the allowed rate of return objective.

Financial statements can be used to calculate free cash flows to equity which can be compared to our return on equity building block. Realised returns from financial statements are therefore relevant material. However, we consider that the usefulness of this material is limited and its benefits can also be provided by other material.

Differences in regulatory return on equity allowances and the return to equity holders from financial statements could be due to a range of factors. These include the financial statements including cash flows from unregulated activities and/or outperformance of regulatory benchmarks. If a comparable business had no unregulated activities and no outperformance of other regulatory benchmarks (including demand forecasts), the return on equity from financial statements should align with regulatory allowances. But this would simply be due to the business being regulated. In order to draw inferences about investors' required return on equity (and differences between it and our regulatory return on equity) we would need a measure of the market value of the business. This would need to be taken from recent asset sales or the market capitalisation of the business based on current share prices—effectively analysis of transaction multiples.

Table 3-18 below outlines our assessment of this information against our criteria.

Table 3-18 Assessment of realised returns against criteria

Criteria	Assessment of relevant material against criteria
Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data	The concept that a RAB multiple above or below one may be reflective of a regulatory return on equity that is not reflective of investors' required return on equity is supported by economic and finance principles. But economic and finance principles do not inform us of how far a regulatory return on equity may be from investors' required return on equity.
The use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations	The analysis utilises data in a way that is consistent with its original purpose. But the data is limited in its usefulness as it cannot inform us of how far a regulatory return on equity may be from investors' required return on equity.

Criteria	Assessment of relevant material against criteria
of that purpose	
Promote simple over complex approaches where appropriate	Approach involves a simple comparison of transaction value to RAB.
Implemented in accordance with good practice, supported by robust, transparent and replicable analysis that is derived from available credible datasets	Transaction data, trading data, and financial statements are credible and generally available. Analysis would be transparent and repeatable, but there is no accepted method for adjusting or filtering cash flows from unregulated activities or outperformance of regulatory benchmarks.
In relation to models, based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation	Generally not applicable as analysis involves only a simple comparison. There is no accepted method for adjusting or filtering cash flows from unregulated activities or outperformance of regulatory benchmarks.
In relation to models, based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale	Generally not applicable as analysis involves only a simple comparison. There is no accepted method for adjusting or filtering cash flows from unregulated activities or outperformance of regulatory benchmarks.
Credible and verifiable	Data from transactions and financial statements are credible and verifiable.
Comparable and timely	Transactions for businesses comparable to our benchmark entity are infrequent. Trading data is updated regularly.
Clearly sourced	Transaction data and financial statements are generally well sourced.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate	Approach is not very flexible as new information and changed market conditions are not reflected until a new transaction occurs (or until noise can be distinguished from share trading data).

Source: AER analysis.

From this point onwards, we move on to discussing the next step in our process (step three). As per the Guideline, step three is implementing the foundation model. This step requires consideration of a broad range of material to determine the foundation model parameter point estimates that contribute to the achievement of the allowed rate of return objective.

Step three: implementing the foundation model

Based on our assessment under step one and two, we adopt the SLCAPM as our foundation model. In this section, we discuss the input parameters we adopt and our reasons for adopting our point estimates. These parameters include the risk free rate, MRP and equity beta.

Risk free rate

Most approaches to estimating the return on equity require a risk free rate component.[329] This compensates investors for the time value of money. That is, committing funds for a period of time and therefore forgoing the opportunity to immediately spend money or consume goods.[330] For the benchmark efficient entity, we estimate this period of time to be 10 years.[331] We are satisfied that the risk free rate is a suitable starting point of comparison for what other investments must beat, given risk is involved. While the risk free rate varies over time, it still indicates the rate that other investments must beat.

We consider 10 year CGS yields are the most suitable proxy for the risk free rate. CGSs are low default risk securities issued by the Australian Government, and are therefore an appropriate proxy for the risk free rate.[332] The three major credit rating agencies issued their highest possible ratings to the Australian Government.[333] There is broad consensus with this position. For instance, market practitioners widely use CGS yields to proxy the risk free rate.[334] Stakeholders also widely supported using CGS yields as a proxy during the Guideline development process.[335] We use 10 year CGS yields because we adopt a 10 year term. A 10 year term emphasises the long

[329] The majority of financial models proposed by service providers include a risk free rate component. These include the SLCAPM, the Wright approach to the CAPM, the Black CAPM and the FFM. Further, the way service providers apply the DGM incorporates a risk free rate component.

[330] McKenzie, Partington, *Report to the AER: Supplementary report on the equity market risk premium*, 22 February 2012, pp. 11–12.

[331] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 48–49.

[332] Gregory also identifies the absence of re-investment risk and inflation risk and characteristics of a risk free rate. Gregory, *The risk free rate and the present value principle*, November 2012, p. 5. Lally discusses these risks in his report. Lally, *The present value principle*, March 2013, pp. 10–12.

[333] Standard and Poor's, viewed 5 March 2013, http://www.standardandpoors.com/prot/ratings/entityratings/en/us/?entityID=268976&sectorCode=SOV; Moody's, viewed 5 March 2013, http://www.moodys.com/credit-ratings/Australia-Government-of-credit-rating-75300; Fitch Ratings, viewed 5 March 2013, http://www.fitchratings.com/gws/en/esp/issr/80442187. Also see AOFM, *Australian government securities: Major features of the AGS market*, last updated 12 February 2015, viewed on 15 October 2015, link http://aofm.gov.au/ags/.

[334] See, for example, Lally, *The present value principle*, March 2013, p. 13, and Wright, *Review of risk free rate and Cost of equity estimates: A comparison of UK approaches with the AER*, October 2012, p. 3; RBA, *Letter regarding the CGS market*, July 2012; Treasury and AOFM, *Letter regarding the CGS Market*, July 2012.

[335] For example, see ENA, *Response to the draft guideline*, October 2013, p. 30; APA Group, *Submission on the draft guideline*, October 2013, p. 23-24; NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 18. Spark Infrastructure, *Response to the draft guideline*, October 2013, p. 4.

term nature of cash flows in equity investments and the long lived nature the benchmark efficient entity's assets.[336]

We use a risk free rate of 2.96 per cent in this decision. This risk free rate is based on a 20 business day averaging period, from 1 July 2015 to 28 July 2015.[337] We use this to inform our final (or substitute) decision on the return on equity for SA Power Networks' regulatory control period (1 July 2015 to 30 June 2020). This is used to determine the allowed revenues for this period, including an NPV neutral true-up for the preliminary decision (which was applied to the 2015–16 regulatory year). This approach is consistent with our letter to SA Power Networks on 21 January 2015.[338] SA Power Networks accepted this proposed approach (and averaging period) in its letter dated 4 February 2015.[339]

We are satisfied with our estimate of the risk free rate, and how this informs our estimate of the return on equity. This is because of the following:

- We are satisfied that our risk free rate, based on an averaging period of 1 July 2015 to 28 July 2015 contributes to the achievement of the allowed rate of return objective.[340]
- The averaging period of 1 July 2015 to 28 July 2015 is consistent with the conditions set out in the Guideline.[341]
- Our approach to estimating the MRP and risk free rate is internally consistent because both are 10 year forward looking estimates.[342]
- We are satisfied that an estimate of 2.96 per cent is the best estimate of the risk free rate at this time (over the specified averaging period).

Averaging period

We consider an averaging period of 1 July 2015 to 28 July 2015 contributes to the achievement of the allowed rate of return objective and has regard to the prevailing conditions in the market for equity funds.[343] This is because:

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336 While we recognise there are also reasonable arguments to support using a five year term, we find the arguments for a 10 year term more persuading. For additional reasoning, see AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 48–49.

337 This is consistent with our preliminary decision. See AER, *Preliminary decision: SAPN determination 2015–16 to 2019–20: Confidential appendix K—Rate of return—equity and debt averaging periods*, April 2015, p. 3-6.

338 General Manager– AER Networks, *Letter to SAPN: Rate of return averaging periods for the 2015–20 regulatory control period*, 21 January 2015 (Confidential), p. 2.

339 General Manager Corporate Strategy (SAPN), *Letter: Rate of return averaging periods for the 2015–20 regulatory control period*, 4 February 2015 (Confidential).

340 NER, cl. 6.5.2(f); NER, cl. 6A.6.2(f); NGR, r. 87(6).

341 AER, *Rate of return guideline*, 17 December 2013, p. 15.

342 This was recognised in Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013], ACompT 8*, 18 September 2013, paras 279, 302–308.

343 NER, cl. 6.5.2(f–g); NER, cl. 6A.6.2(f–g); NGR, r. 87(6–7).

- It is an unbiased estimate because the averaging period was chosen in advance of it occurring.[344] If an averaging period is chosen after the period occurs, the knowledge of the risk free rate at any past point of time influences the choice, creating an inherent bias. It would not matter if the period were chosen by the AER, the service provider, a user or consumer, the Australian Competition Tribunal or another stakeholder. This view has been recognised by consultants and in the Guideline.[345] We consider an unbiased estimate contributes to estimating a rate of return that is commensurate with the efficient financing costs of a benchmark efficient entity. Setting a risk free rate with foreknowledge of the outcome does not reward efficient decision making or allow a comparison to benchmark performance. It does not provide the appropriate incentive for efficient investment, as contemplated in both the NEO/NGO and the revenue and pricing principles.[346] This is because regulated service providers are to use the forward looking allowed rate of return to value their investment decisions.[347]
- It is a fair estimate because we gave service providers the opportunity to submit different periods and to formalise any arrangements for their financing needs resulting from our determination. In this way, we consider this promotes efficient decision making in a manner that also fairly respects the interests of service providers and other stakeholders.
- This produces a risk free rate that informs a return on equity estimate that has regard to the prevailing conditions in the market for equity funds, as the rules require.[348] This is because:
    - It is based on a short term (20 consecutive business days) averaging period close to the time at which we make our decision.[349] We use a short term averaging period as a pragmatic alternative to using the prevailing rate.[350] This recognises that the prevailing risk free rate is the benchmark that

344 In the Federal Court, the reference to 'an unbiased rate of return' was interpolated to involve, 'making a prediction about interest rates which although too high or too low at any particular point in time, is on average correct'. Federal Court of Australia, *ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639*, 8 June 2011, para 39.

345 AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 79–80; Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9-10. See the Federal Court of Australia's observations of the views expressed by Houston and Lally in Federal Court of Australia, *ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639*, 8 June 2011, para 145.

346 See sections 7 and 7A of the NEL for the NEO and RPP respectively. The NEO states: 'The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to price, quality, safety, reliability and security of supply of electricity; and the reliability, safety and security of the national electricity system'.

347 See Mr Gregory Houston and Dr Martin Lally, *Joint report: Prepared in the context of proceedings between ActewAGL and the AER*, 16 March 2011, p. 1. These experts agreed that, 'economic theory says that the required rate of return to be used in evaluating an investment decision is the forward looking rate estimated as at the date of that decision'.

348 NER, cl. 6.5.2(g); NER, cl. 6A.6.2(g); NGR, r. 87(7).

349 For clarity, service providers can select longer averaging periods for estimating the return on debt.

350 Lally, *The present value principle*, March 2013, p. 5; Lally, *Risk free rate and present value*, August 2012, p. 7.

returns on risky investments must outperform.[351] To estimate this, we use 10 year CGS yields because this is a suitable, easily observable proxy that reflects expectations of the risk free rate over a 10 year forward looking investment horizon.[352]

  - When using this estimate to inform our return on equity, we also had regard to a range of other prevailing market information. This included but was not limited to comparisons with the prevailing return on debt and a range of information to inform our MRP estimate, including DGM estimates and conditioning variables. Under step four and five of our foundation model approach, we have regard to other information when considering whether our return on equity estimate is reasonable. Further, our foundation model within our foundation model approach is a forward looking model.[353]

Our practice is to keep the dates of averaging periods confidential until they have expired. This allows service providers to manage their financing arrangements without the possibility of the public announcement of the potential timing of their arrangements putting them in a disadvantaged bargaining position. Therefore, at this time, we do not agree with the CCP's submission that the risk free rate averaging period should be made publicly available before it expires.[354]

Internal consistency with MRP estimate

Our approach to estimating the MRP and risk free rate is internally consistent. We use historical excess returns to estimate a prevailing 10 year forward looking MRP, not a historical MRP.[355] We also consider other sources of forward looking evidence, including DGMs, market surveys and conditioning variables. This position is supported by:

- The Australian Competition Tribunal—when APA GasNet raised this issue in its appeal in 2013, the Australian Competition Tribunal found that we did not err in using historical data in estimating the forward looking MRP. It also found there was no inconsistency in our estimation of the risk free rate and the MRP when it concluded:[356]

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351 We discuss this in previous decisions. See for example, AER, *Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013–17, Part 2: Attachments*, March 2013, pp. 88–95.

352 AER, *Explanatory statement rate of return guideline,* 17 December 2013, pp. 48–49.

353 McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 23.

354 CCP2 (Bruce Mountain), *Submission on the AER's preliminary decisions for the Qld/SA distribution network service providers (2015-20)*, 29 July 2015, p. 8.

355 Several service providers have submitted that we combine a historical, or Ibbotson inspired, MRP estimate with a prevailing risk free rate. See, for example: United Energy, Regulatory proposal: Attachment—Rate of return on equity, April 2015, p. 2. United Energy also submitted NERA, *Energy regulation insights: European regulators' WACC decisions risk undermining investment decisions*, Issue 41, February 2015, p. 4.

356 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8*, 18 September 2013, Para 308.

> APA GasNet's complaint in reality concerns the result of the AER's investigations, and not the process. In all the circumstances of this matter, it was reasonably open to the AER to choose an MRP of 6 per cent.

- Lally—who advised that our approach was internally consistent during the Victorian Gas Access Arrangement Review (VicGAAR) in 2012–13.[357] Lally confirmed our 10 year forward looking MRP estimate was equivalent to a 10 year forward looking expected return on the market less a 10 year forward looking risk free rate. Given this equivalency, Lally advised that what matters for internal consistency is to get the best estimates of the forward looking MRP and risk free rate available. Further, to the extent we also consider historical information (for example, when estimating the MRP), Lally has recognised we combine this with forward looking measures to form prevailing estimates.[358] In addition, Lally advised:[359]

> Gregory argues that the AER's use of the prevailing risk free rate for the first term within the CAPM along with the historical average risk free rate for estimating the MRP constitutes an inconsistency. I do not agree; unlike the first term of the CAPM, the MRP is not observable, and the use of a historical average risk free rate along with the historical average market return in the estimation of the MRP may give rise to a good estimate of the MRP, possibly in conjunction with other methods. To the extent that the MRP estimate is good, this approach is justified.

- The Public Interest Advocacy Centre (PIAC)—which provided an extensive submission supporting our approach as being internally consistent. In particular, PIAC submitted that we had already addressed this issue when developing the Guideline. Further, unlike the risk free rate, the MRP is not directly observable. Therefore, using historical data for informing the MRP is a reasonable and relatively transparent approach to estimating the forward looking return on equity given that this is not directly observable.[360]

Estimate of the risk free rate in the current market

Our approach using the averaging period as noted above, informed by the risk free estimated on CGS yields with a 10 year term, produces a lower estimate of the return on equity than in the past regulatory control period. However, we are satisfied this is commensurate with the returns that equity investors require in the current market.[361] We are not satisfied that the lower risk free rate environment necessarily equates to a

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357 Lally, *Review of the AER's methodology for the risk free rate and MRP*, March 2013, pp. 24–27.

358 Lally, *Review of the AER's methodology for the risk free rate and the MRP*, March 2013, p. 6.

359 Lally*, Review of the AER's methodology for the risk free rate and MRP*, March 2013, pp. 26–27.

360 PIAC, *Moving to a new paradigm: submission to the AER's NSW electricity distribution network price determination*, 8 August 2014, pp. 74–76.

361 Prevailing market evidence appear consistent with a lower estimate of the required return on equity than in the last access arrangement period. This can be seen in step five of our foundation model approach, where we evaluate the full set of material that will inform, in some way, the estimation of the expected return on equity. This includes assessing the foundation model range and point estimate alongside the other information from step four.

perception of a higher required equity risk premium by investors and that we should adopt an approach that targets a more stable return on equity (see section A.2 of appendix A—equity models and section C.7 of appendix C—MRP).

We are not satisfied that lower interest rates, in of themselves, are a reason to reject our risk free rate proxy. This is consistent with McKenzie and Partington's advice that:[362]

> [t]he fact that interest rates are low and are expected to remain low is not a compelling argument for increasing the benchmark risk free rate

This is consistent with our position formed during the VicGAAR in 2012–13 when service providers raised concerns that CGS yields were lower than in recent decades.[363] Given these concerns, we sought advice from the RBA, Commonwealth Treasury and the Australian Office of Financial Management (AOFM). They each advised that the CGS market was liquid and functioning well.[364] We observed that changes in yields for securities traded in a liquid market are likely to reflect the actions of many market participants at each point in time. Therefore, market determined CGS yields are likely to reflect prevailing conditions in the market for funds. In particular, the RBA also advised that CGS bonds remained the best proxy for the risk free rate in Australia.[365]

Consistent with our position, other stakeholders supported using short term CGS yields as the risk free rate proxy. In its report for the South Australian Council of Social Services (SACOSS), the South Australian Centre for Economic Studies (SACES) did not find any robust evidence to suggest that the market for Australian CGSs was distorted. SACES advised:[366]

> the falls in the 10 year Australian Government 10 year bond yields from 3.15 per cent in December 2012 to 2.96 per cent in December 2014 have been accompanied by even larger falls in the yields on corporate debt. The RBA's measure of the spread from Australian Government Securities to A- non-financial corporate debt falling from 215 basis points to 152 basis points from December 2012 to December 2014, and the spread to BBB rated debt falling from 347 basis points to 217 basis points over the same period. This suggests that risk aversion has been falling rather than increasing, and as such there is no reason not to use current Australian Government bond yields in calculating the WACC.

362 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 72.

363 For example, see AER, *Access arrangement final decision: SPI Networks (Gas) Pty Ltd, Part 3: Appendices*, March 2013, pp. 43–45; AER, *Access arrangement final decision: SPI Networks (Gas) Pty Ltd, Part 2: Attachments*, March 2013, pp. 88–95.

364 RBA, *Letter to the ACCC: The CGS Market*, 16 July 2012; Australian Treasury and AOFM, *Letter to the ACCC: The CGS Market*, 18 July 2012, p. 2.

365 RBA, *Letter to the ACCC: The CGS Market*, 16 July 2012.

366 SACES, *Independent estimate of the WACC for SAPN: Report commissioned by SACOSS*, January 2015, pp. 7–8.

Similarly, Partington advised, '[t]he low bond rates tell us that the required return for low risk assets is low'.[367]

Further, we are not satisfied with the belief that when interest rates fall, investors necessarily demand compensation by increasing their risk premium (the Wright argument). Regarding this belief, Partington advised:[368]

> The following statement by Fernandez (2013) rather nicely illustrates a key problem with the Wright argument, “Interest rates have a considerable bearing on share prices. Any investor’s experience shows that, in general, when interest rates fall significantly, share prices rise, and vice-versa.” We believe there are relatively few investors, or academics, who would disagree with this statement. The share prices rise because the required return falls.

In an April 2015 report, CEG presented debt beta estimates for CGS and submitted that risk free rate estimates based on CGS yields should be adjusted upwards. This is because its CGS beta estimates are currently negative, when theoretically the risk free asset should have a zero beta.[369] United Energy, Ergon Energy and SA Power Networks submitted this CEG report to us, and Australian Gas Networks (AGN) made reference to it.[370] Additionally, we received this CEG report after we published our preliminary decisions for SA Power Networks, Ergon Energy and Energex.

We acknowledge this submission but note none of these service providers appear to have applied CEG's adjustment to their estimates of the risk free rate.[371] In fact, each of these service providers has accepted our Guideline approach to estimating the risk free rate for the return on equity.[372]

Partington and Satchell considered CEG's suggestion regarding the use of beta estimates for CGS and stated:[373]

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367 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 72. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

368 Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 73. Partington and Satchell expressed similar views in Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

369 CEG, *Measuring risk free rates and expected inflation*, April 2015, p. 24.

370 See AGN, *Regulatory proposal: Attachment 10.1—Rate of return*, July 2015, p. 36; SAPN, *Revised regulatory proposal*, July 2015, pp. 350, 355, 358-359.

371 See Frontier, *An updated estimate of the required return on equity: Report prepared for Ergon Energy*, July 2015, p. 4; Frontier, *An updated estimate of the required return on equity: Report prepared for Energex*, June 2015, p. 4; Frontier, *An updated estimate of the required return on equity: Report prepared for Australian Gas Networks*, June 2015, p. 4; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, May 2015, p. 2.

372 United Energy, *Regulatory proposal: Rate of return on equity—Proposal for the 2016 to 2020 regulatory period*, April 2015, p. 94; Ergon Energy, *Revised regulatory proposal: Appendix C—Rate of return*, July 2015, p. 142; SAPN, *Revised regulatory proposal*, July 2015, pp. 329, 331 (the risk free rate estimates are the same in table 13.2 and table 13.3); AGN, *Access arrangement proposal: Attachment 10.1—Rate of return*, June 2015, p. 43.

373 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 28.

> Since, the betas of government bonds have been little studied, little is known about their empirical properties. However, on the basis of what we know about varying estimates of equity betas, it would probably be unwise to rely exclusively on CEG's (2015, β) estimate.

We recognise there may be times when CGS beta estimates are positive, and times when they are negative (as CEG has shown). Nevertheless, as noted above, the CGS yield is more or less unanimously acknowledged as the most suitable proxy for the risk free rate.

Partington and Satchell noted an inconsistency in the CEG report, in that, '… if the return on government bond is treated as risky, the equity market is no longer the correct portfolio to estimate betas against'.[374] They stated:[375]

> Resolving this inconsistency requires a new equilibrium model that is likely to result in a lower cost of equity than is obtained under the AER's current approach. Such a new equilibrium model may be worthy of consideration, but a considerable amount of research would be needed before we would recommend its adoption for the purposes of regulation.

We do not consider CEG's upward adjustment to CGS yields is warranted. There is insufficient robust empirical analysis available and the suggested uplift is based on a nascent area of study. We are satisfied that current CGS yields are commensurate with prevailing market conditions. We are not satisfied that an adjustment as suggested would contribute to the achievement of the allowed rate of return objective. Moreover, a robust analysis of this proposed adjustment could lead to the development of a new equilibrium model. Such changes would have significant impacts for all stakeholders and market participants and should, in our view, only be undertaken with extensive and comprehensive stakeholder engagement. We provide a further response to CEG's report in section C.7 of appendix C—MRP.

Market risk premium (MRP)

Under the SLCAPM, the MRP is the premium above the risk free rate an investor would need, in expectation, to invest in the market portfolio. The MRP compensates an investor for the systematic risk of investing in the market portfolio. Systematic risk is that which affects the market as a whole (such as macroeconomic conditions and interest rate risk) and investors cannot diversify it away through investing in a wide pool of firms. The 10 year forward looking MRP cannot be directly observed and there is no consensus amongst experts on which method produces the best estimate of the MRP.[376]

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[374] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 28.

[375] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 27.

[376] See Damodaran, *Equity risk premiums: Determinants, estimation and implications— the 2012 edition*, March 2012, p. 93. He also noted: 'No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate'.

We adopt a point estimate of 6.5 per cent for the MRP for this final decision. This is from a range of 5.0 to 8.6 per cent.[377] We place most reliance on historical excess returns. However, DGM estimates, survey evidence and conditioning variables also inform this estimate. We also have regard to recent decisions by Australian regulators.[378] We consider this approach provides for a return on equity that contributes to the achievement of the allowed rate of return objective and has regard to prevailing conditions in the market for equity funds.[379]

Based on the evidence before us, we consider a range of 5.0 to 8.6 per for the MRP under current market conditions (see appendix C–MRP). This is because:

- The geometric average historical excess return currently provides the lowest estimate of the MRP with a range of 3.9 to 4.9 per cent. McKenzie and Partington advised that 'the unbiased estimator of the MRP lies between the arithmetic average and the geometric average'.[380] Therefore, while we have regard to geometric averages, we consider a reasonable estimate of the lower bound will be above the geometric average.[381] Therefore, we apply a lower bound estimate of 5.0 per cent.[382]
- Our DGM currently provides the highest estimate of the MRP at about 8.6 per cent, using the upper bound of our assumptions concerning the long term dividend growth rate.[383] We apply this as the upper bound for the range.
- We note the upper and lower bound estimates reflect the evidence before us and may change over time. This is consistent with having regard to prevailing conditions in the market for equity funds.[384] The upper bound of the MRP range has not changed from the April/June 2015 final and preliminary decisions.[385]

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377 We use information up to the end of July 2015, and use a two month averaging period of July–August 2015 for our DGM estimates of the MRP. This is reasonably consistent with SA Power Networks' risk free rate averaging period (1 July 2015 to 28 July 2015).

378 AER, *Rate of return guideline*, 17 December 2013, p. 16.

379 NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

380 McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 5.

381 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 83; AER, *Draft decision: SPI Networks access arrangemen*t, September 2012, Appendix B.2.1.

382 In our final and preliminary decisions published in April/June 2015, we stated that, 'Consistent with the worked example in the Guideline, we set the bottom of the range as 20 basis points above the highest estimate from the range of geometric averages'. In the Guideline, we chose 5.0 as the bottom of the historical excess returns range instead of 4.8 because we recognised that estimating the rate of return for a service provider is not a precise science. We considered there is a limit to the specificity for which estimates of the return on equity can be determined (see AER, *Explanatory statement rate of return guideline,* 17 December 2013, pp. 64–65). Consistent with this reasoning, we do not set the bottom of the range as 20 basis points above the highest estimate from the range of geometric averages. Instead, we have regard to the geometric and arithmetic average estimates in determining a reasonable range.

383 As such, this is a conservatively high estimate using our construction of the DGM. This estimate is for the two months ending August 2015.

384 NER, cll. 6.5.2(g); NER, cll. 6A.6.2(g); NGR, rr. 87(7).

385 See, for example, AER, *Preliminary decision: SA Power Networks distribution determination 2015–16 to 2019–20: Attachment 3—Rate of return*, April 2015, p. 33. The DGM estimates are the same across the 11 final and preliminary decisions because we used the same averaging period (January–February 2015).

Given the uncertainty in MRP estimation, we must exercise our regulatory judgement to determine the MRP point estimate from within the range. In deciding upon our point estimate of 6.5 per cent, we have considered the following sources of evidence (see appendix C–MRP):

- Historical excess returns—these estimates provide a range of 5.8 to 6.4 per cent if calculated using arithmetic averages and a range of 3.9 to 4.9 per cent if calculated using geometric averages. We consider 5.0 to 6.5 per cent a reasonable range and 6.0 per cent a reasonable point estimate based on this source of evidence.
- DGMs—these estimates, from two applications of the DGM and a range of inputs, suggest a range of 7.5 to 8.6 per cent for the two months to end August 2015.[386]
- Survey evidence—surveys of market practitioners indicate that MRPs applied in Australia cluster around 6.0 per cent.[387] This holds when considering averages, medians and modes across surveys.
- Conditioning variables—we consider the conditioning variables do not support an increase (or decrease) in the MRP above (or below) that implied by historical excess returns.[388]
- We also have regard to recent decisions among Australian regulators—the majority of other regulators adopted an MRP estimate of 6.0 in their most recent decision or update. The range of MRP estimates adopted by each regulator's most recent decision or update is 6.0 to 7.6 per cent. The average of these decisions is 6.4 per cent.[389]

We have also considered:

- Australian Competition Tribunal decisions—the Australian Competition Tribunal upheld our approach to estimating the MRP when APA GasNet appealed our decision in 2013.[390] The MRP approach brought before the Australian Competition Tribunal was similar to that applied in this decision.[391]
- The potential for a relationship between the risk free rate and the MRP—the evidence has not satisfied us that there is a clear relationship (positive or negative) between the 10 year forward looking risk free rate and MRP, in general or in the current market.[392]

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386 This end date is close as practical to the publication of this decision and encompasses the final and placeholder risk free rate averaging periods we adopt for the SA/Qld DNSPs and Vic DNSPs respectively.

387 See section C.3 of appendix C—MRP for the full list of surveys (with references).

388 See section C.4 of appendix C–MRP for more information on, and charts of, the conditioning variables.

389 See section C.5 of appendix C—MRP for more information on, and references to, the other Australian regulators' MRP estimates we consider.

390 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8*, 18 September 2013, Para 308.

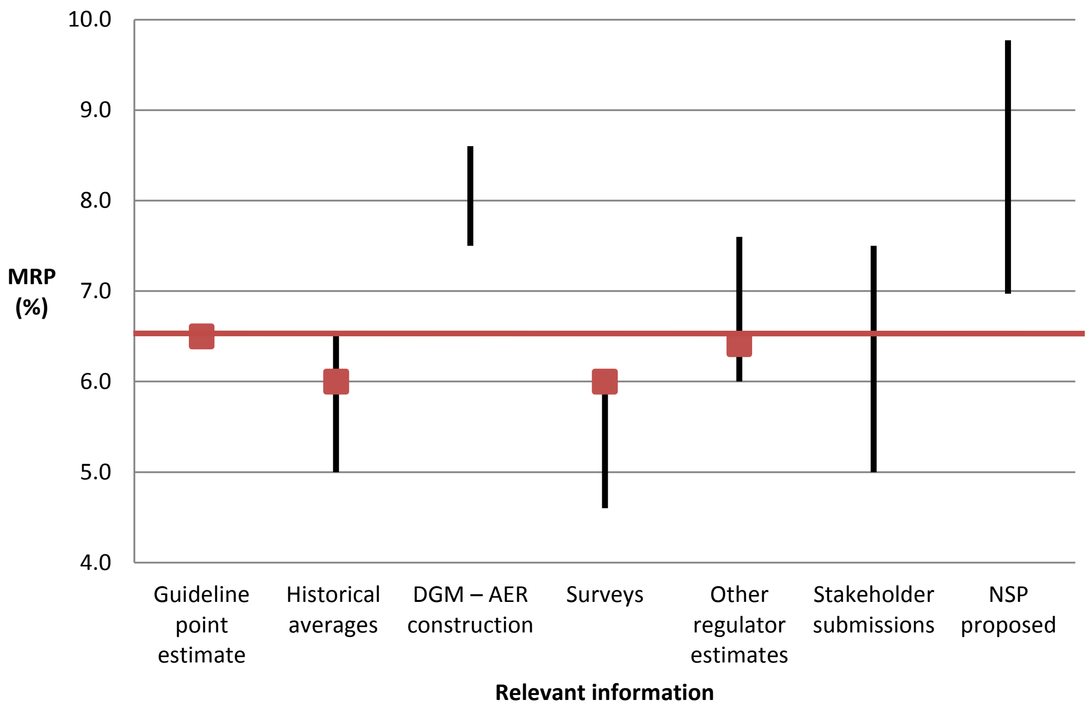
391 The most notable change to our approach is that we now place more reliance on DGMs than using them as a cross check.

392 See section C.7.

- Submissions received (from service providers and other stakeholders)—service providers have generally proposed an MRP at or above 6.5 per cent, and other stakeholders have generally recommended an MRP at or below 6.5 per cent.[393]

Figure 3-5 displays our estimates of the MRP using historical excess returns, DGMs, surveys and other regulators' decisions. The squares represent point estimates, the vertical lines represent ranges and the red horizontal line represents our point estimate of 6.5 per cent.[394]

Figure 3-5 Empirical estimates of the MRP against our point estimate of 6.5 (per cent)



Source: AER analysis

Note: The average of each state regulator's most recent decision/update on the MRP forms the point estimate (6.4 per cent) for other regulator estimates. The top of this range is 7.6 per cent—the latest estimate of the MRP applied by the ERA. The bottom of this range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC, TER and the ACCC.[395] The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network (or pipeline), and as such it does not include submissions from NSPs. The bottom and top of the stakeholder range comes from the

393 See discussion under 'Views of service providers and other stakeholders' in section C.8.2 of appendix C–MRP for more information and references.

394 See appendix C–MRP for more information on these sources of information, and the ranges and point estimates we consider are consistent with these sources of information.

395 See section C.5 of appendix C—MRP for full reference list.

CCP and Chamber of Commerce and Industry Queensland (CCIQ) respectively.[396] The bottom and top of the service provider proposed range comes from APTNT's (Amadeus gas pipeline) proposal.[397]

Figure 3-5 shows that while DGM estimates indicate an MRP above 6.5 per cent, historical excess returns indicate an MRP of around 6.0 per cent. The other evidence we consider is consistent with an MRP of between 6.0 and 6.5 per cent.[398]

We assigned a role to each source of relevant material for estimating the MRP in step two of our foundation model approach. In determining these roles we assessed the merits and limitations of each source. We consider a reasonable application of this material is as follows:

- We place most reliance on historical excess returns. Therefore, we use this information to determine a baseline estimate of the MRP. We consider 6.0 per cent is, at this time, a reasonable point estimate based on this source of evidence.
- We place less reliance on our DGM estimates of the MRP. This information indicates whether we should select an MRP point estimate above or below the baseline estimate.
- We place some reliance on the other information (survey evidence and conditioning variables). This information, in conjunction with DGM evidence, helps to indicate how far above or below the baseline estimate the MRP point estimate should be. We use other Australian regulators' MRP estimates as a cross check on how we consider information.

In applying this approach to the evidence before us for this decision, we consider:

- 6.0 per cent is a reasonable point estimate based on historical excess returns evidence.
- Our DGM estimates (for the two months to end August 2015) range from 7.5 to 8.6 per cent. This indicates that there is evidence, at this time, supporting an MRP point estimate above 6.0 per cent.
- Survey evidence and conditioning variables are generally consistent with the baseline estimate of 6.0 per cent.

We also consider that, since our Guideline application in 2013, the increase in MRP estimates derived from the DGM has largely been the result of a decrease in the risk

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396 The CCP (subpanel 2) submitted we should use an MRP of 5.0 per cent and the CCIQ submitted that we should select an MRP point estimate from a range of 5.0–7.5 per cent. See CCP2 (Hugh Grant), *AER preliminary 2015-20 revenue determinations Energex and Ergon Energy revised revenue proposals*, 3 September 2015, p. 14; CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16.

397 APTNT proposed an MRP range of 6.97 to 9.77 per cent based on the Wright approach. See APTNT, *Amadeus gas pipeline: Access arrangement proposal (information)*, August 2015, p, 21.

398 Figure 3-5 does not include evidence from conditioning variables because we do not derive quantitative estimates of the MRP from this source of evidence. However, we consider the conditioning variables we analyse do not support an increase (or decrease) in the MRP above (or below) that implied by historical excess returns (see section C.4 of appendix C–MRP).

free rate. Other inputs to the DGM have remained relatively steady.[399] We are not confident that the recent increases in our DGM estimates of the MRP necessarily reflect an increase in the 'true' expected 10 year forward looking MRP. We detail our reasons below. In summary:

- We use conditioning variables as a directional indicator for the MRP because of their potential to point to changing market conditions. We consider, overall, these do not indicate a sustained change in market conditions, and consequently, the MRP (see section C.4 of appendix C–MRP). Also, the 2015 survey estimates we consider are generally equal to or lower than their 2013 and 2014 counterparts (see section C.3 of appendix C–MRP). These are different outcomes to our DGM estimates of the MRP.
- While we consider our DGM is theoretically sound, there are many limitations in practically implementing this model. For example, we consider our, and other, DGMs are likely to produce upward biased estimates of the MRP in the current market.[400] We also consider our, and other, DGMs may not accurately track changes in the return on equity for the market.[401] See section B.5 of appendix B–DGM for a more detailed discussion of sources of potential upward bias in our, and other, DGMs.
- We do not consider there is a clear relationship (positive or negative) between the 10 year forward looking risk free rate and MRP, in general or in the current market (see section C.7 of appendix C–MRP). Partington considers it is unlikely that the MRP has increased in response to recent decreases in the risk free rate. He stated '[t]he low bond rates tell us that the required return for low risk assets is low'.[402] This is the benchmark rate against which other risky assets are priced to attract equity funds.

We are satisfied that the information set out above, at this time, could justify an MRP point estimate above the baseline of 6.0 per cent. However, we are not satisfied that it

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399 See Figure 3-26 in section C.8.2 of appendix C—MRP.

400 McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 26–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50, 59; Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6. The 2015 report by Partington and Satchell is an update to previous reports by McKenzie and Partington (2014) and Partington (2015), which considers submissions to JGN's access arrangement review. Partington and Satchell considered there is nothing in those submissions that would lead them to depart from the findings in McKenzie and Partington (2014) and Partington (2015). Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

401 McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 31–32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

402 Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 71–74. In their May 2015 report, Partington and Satchell reiterated that they consider the argument of an inverse relation between the market risk premium and interest rates to have little merit (see: Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, pp. 17–18). Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

supports an MRP point estimate above the top of the range implied by historical excess returns. Therefore, we are satisfied that an MRP point estimate of 6.5 per cent reasonably reflects prevailing conditions in the market for equity funds and provides for a return on equity that contributes to the achievement of the allowed rate of return objective.[403] It also provides a balance between the views of services providers and other stakeholders. We provide detailed analysis of technical issues and responses to SA Power Networks' revised regulatory proposal in appendix C–MRP.

Evidence from other sources of information

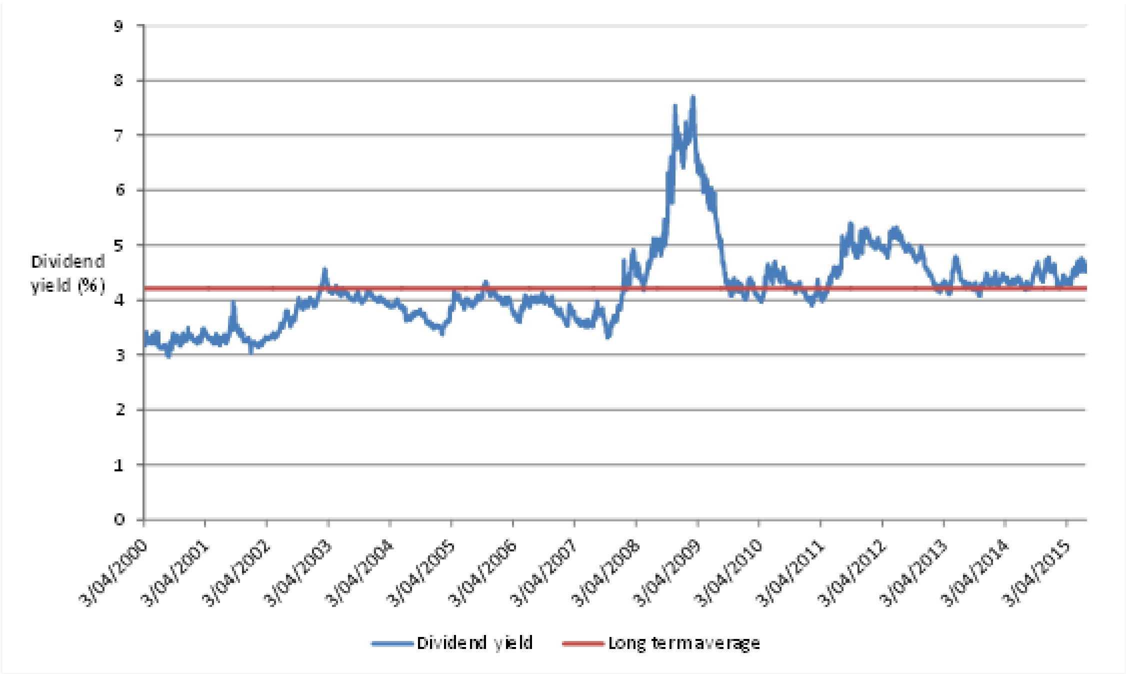
We use conditioning variables as a directional indicator for the MRP because of their potential to detect changing market conditions. These do not support the view that the MRP has increased recently. For example:[404]

- Dividend yields are close to their long term average and there is no discernible trend. These have been relatively steady over the last two years (approximately) (see Figure 3-6).
- Australian corporate bond credit spreads were showing a clear downward trend from approximately 2012 before widening slightly in recent times. The corporate bond spreads are above their pre-2007 levels but the swap spread is below its pre-2007 levels (see Figure 3-7). State government bond spreads were falling since late 2012, and are now around their pre-2007 levels with no discernible trend (see Figure 3-8).
- Implied volatility has generally been below its long term average since around January 2013, with no discernible trend (see Figure 3-9).

[403] NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

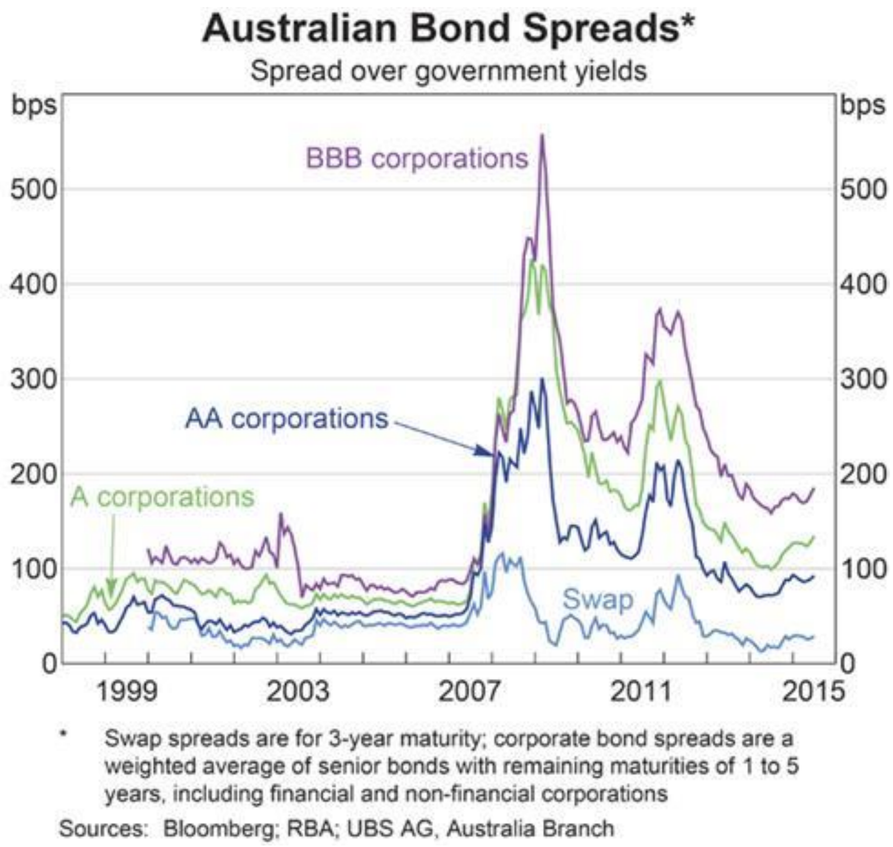
[404] This information uses data up to 28 July 2015 (except for Australian corporate bond credit spreads, which uses data up to the end of July 2015, approximately). This is the end date of the risk free rate averaging period we adopt for the SA/Qld DNSPs (1 July 2015 to 28 July 2015).

Figure 3-6 Dividend yields



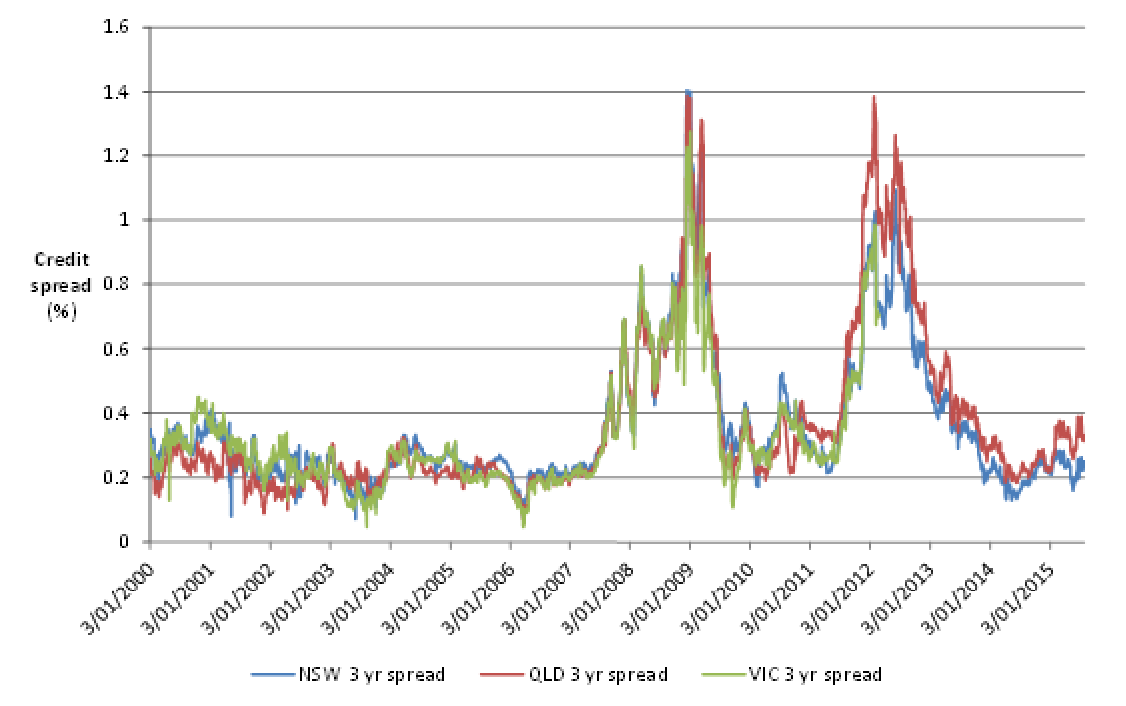
Source: Bloomberg; AER analysis.

Figure 3-7 Australian bond spreads over government yields



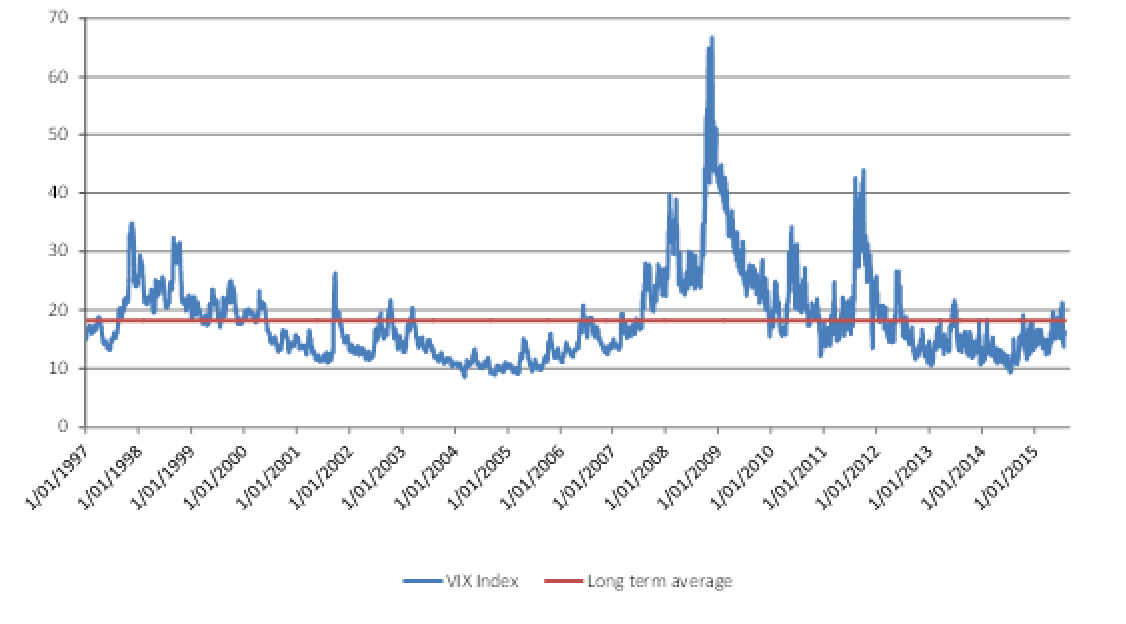
Source: RBA chart pack, August 2015 (data updated to end of July 2015, approx.).

Figure 3-8 State government bond spreads over government yields



Source: RBA; AER analysis.

Figure 3-9 Implied volatility (VIX)

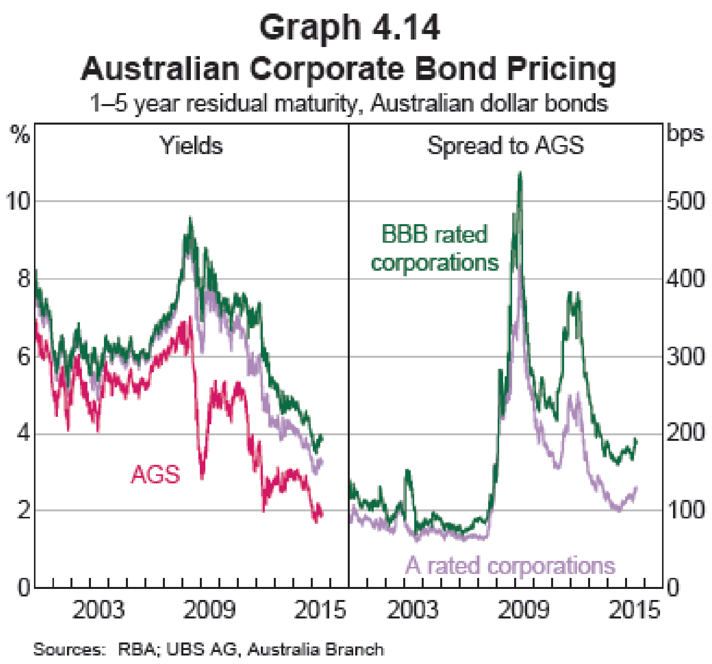


Source: ASX200 VIX volatility index, sourced by Bloomberg cost AS51VIX from 2/1/2008 and CITJAVIX prior to 2/1/2008.

We note similar patterns in other forward looking financial market indicators. For example:[405]

- Figure 3-10 shows that Australian corporate bond yields have decreased significantly since about 2011, moving closely with CGS (or Australian government securities [AGS]) yields.
- Figure 3-11 shows Australian forward price-earnings ratios since 2003. The RBA, in its August 2015 statement of monetary policy stated, 'Similarly to other advanced equity markets, forward PE ratios remain above their historical averages'.[406] The RBA also noted that Australian equity prices 'have been broadly unchanged over recent months, but are around five per cent higher than at the beginning of the year'.[407]

Figure 3-10 Australian corporate bond yields and spreads



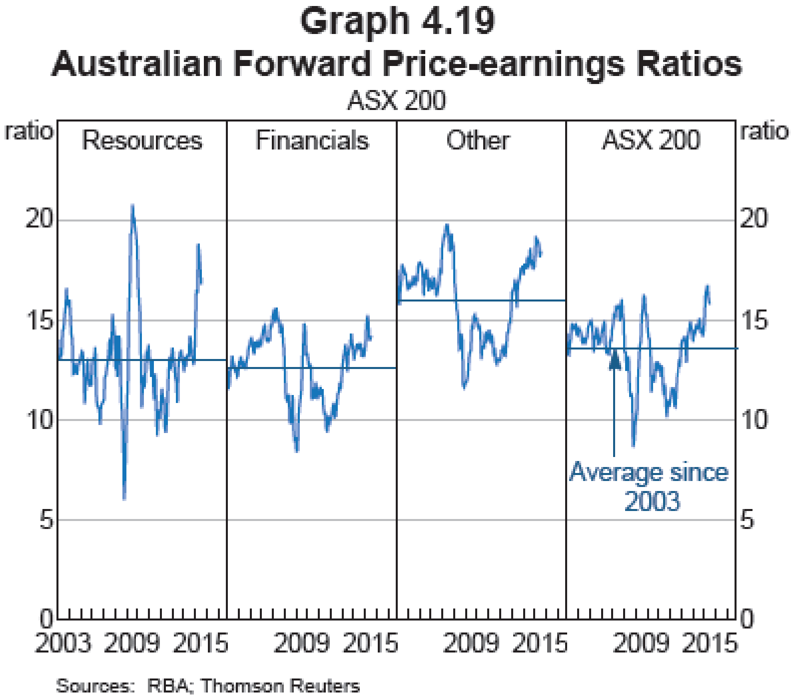
Source: RBA, *Statement of monetary policy*, August 2015, p. 53.

[405] This information is as at August 2015.

[406] RBA, *Statement of monetary policy*, August 2015, p. 55.

[407] RBA, *Statement of monetary policy*, August 2015, p. 54.

Figure 3-11 Australian forward price-earnings ratios



Source: RBA, *Statement of monetary policy*, August 2015, p. 55.

Similarly, survey estimates of the MRP cluster around 6.0 per cent. We consider survey estimates are forward looking and reflective of investor expectations because they directly ask investors what they expect and/or apply in practice. While we recognise that these estimates have timeliness issues, the most recent surveys we consider do not indicate an increasing MRP expectation. In fact, the 2015 survey estimates we consider are generally equal to or lower than their 2013 and 2014 counterparts (see section C.3 of appendix C–MRP).

Together, the other information we rely on in estimating the MRP is consistent with our baseline MRP estimate of 6.0 per cent from historical excess returns. This evidence is not consistent with our DGM estimates of the MRP.

Limitations of DGMs

While we consider our DGM is theoretically sound, there are many limitations in practically implementing this model. We consider our, and other, DGMs are likely to produce upward biased estimates of the MRP in the current market and may not track changes in the return on equity for the market accurately. We discuss these limitations of our, and other, DGMs in detail in section B.5 of appendix B–DGM.

During the Guideline process, McKenzie and Partington and Lally reviewed our DGM construction.[408] Since the Guideline, we have received new advice from McKenzie and Partington and Handley. Both experts reinforced and added to the limitations associated with implementing DGMs.

In their 2014 (and 2015) report, McKenzie and Partington advised that there is a significant risk that DGMs will overestimate the return on equity and hence also overestimate the MRP.[409] They also advised that DGMs may incorrectly track changes in the return on equity.[410] They provided the following reasons for these views:[411]

- Analyst forecasts are well understood to be upward biased.[412]
- DGMs use dividends as a proxy for free cash flow to equity, which is the share of the operating cash flow available for owners.[413] However, there are a number of problems with this approach:
    - Differences between the free cash flow to equity and the dividend in a particular period may arise as a consequence of financing transactions (that is, borrowing or issuing new shares). Where there is significant financing of dividends and/or where substantial investment demand for funds is anticipated, there is a risk that dividend growth will slow or even turn negative for a period. This is likely to result in upward biased DGM estimates of the return of equity.[414]
    - Dividends are a smoothed version of both free cash flow to equity and profits. This is because dividends follow slowly with changes in profits. Therefore, dividends are considered to be 'sticky' and are particularly sticky downwards because companies are more averse to cutting dividends. Thus, if profits and free cash flow to equity drop, and investors revise their growth expectations downwards, the share price may drop significantly without the dividend changing. Together, this will cause a higher dividend yield, giving an upwardly biased estimate of the return on equity. The reverse occurs if profits and free cash flow to equity drop, but McKenzie and Partington

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408 McKenzie, Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December 2013; Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013.

409 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 39; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 58–59. Also see: Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

410 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51.

411 Partington and Satchell expressed similar views in Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

412 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 26; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 46; McKenzie and Partington, *The DGM*, December 2013, pp. 8–9.

413 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 27; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 47.

414 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 27–29; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 47–49.

consider there is likely to be an asymmetry in the effects because of the greater reluctance to cut dividends than increase dividends.[415]

- Analysts' forecasts are slow to adjust to the information in prices. This, in conjunction with the other limitations set out in this section, means that DGMs may not accurately track changes in the return on equity. McKenzie and Partington caution against relying on month by month, or even year by year, estimates from the DGM. They recommend averaging over several years because it is more likely to reduce measurement error.[416] We note that we average our DGM estimates over two months because we consider longer averaging periods reduce the tracking ability of our DGM. However, we consider the prospect that our DGM may not be tracking changes in the return on equity for the market accurately.

Further, the risk free rate is currently lower than it has been recently. Our DGM does not include a term structure. This means that at any given point in time, the return on equity for the market is constant for all future periods in the DGM.[417] Lally observed that if DGMs do not incorporate a term structure, they are likely to produce upwardly biased estimates when the risk free rate is low relative to its long term average (and expected to increase in a future period).[418] Lally stated that:[419]

> if the current ten year risk free rate were unusually low relative to its long-term average, and therefore could be expected to be higher in ten years' time, then the current ten-year MRP would have to be unusually high relative to its long-term average by an exactly offsetting amount. This 'perfect-offset' hypothesis is implausible.

McKenzie and Partington also 'recommend that it be borne in mind that the existence of a term structure could materially change cost of equity estimates from the DGM'.[420] We provide reasons for why we do not incorporate a term structure in our DGM in section B.2 of appendix B–DGM. However, we are aware of this potential bias.

We consider there are merits associated with DGM estimates of the MRP, particularly in their ability to reflect changes in market conditions (which complements our use of

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415 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 29–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 49–50.

416 McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 31–32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51; McKenzie and Partington, *The DGM*, December 2013, pp. 8–9.

417 This means, at a given point in time, there is a uniform expectation of the return on equity across all periods in the DGM. However, this uniform expectation can change as one moves through time, because factors such as dividend forecasts, share prices or the expected growth rate in GDP can change over time. Therefore, when estimating the return on equity for the market at any given point in time, our DGM assumes that this estimate applies to all future periods. However, this does not mean our DGM always produces the same return on equity estimates for the market.

418 Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013, pp. 11–12.

419 Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013, pp. 11–12.

420 McKenzie and Partington call the market value return on equity, the 'cost of equity'. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 37; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 56.

historical excess returns). However, it is important to be aware of the limitations associated with these estimates.

Potential relationships between the MRP and risk free rate

The evidence has not satisfied us that there is a clear relationship (positive or negative) between the risk free rate and MRP, in general or in the current market (see section C.7 of appendix C–MRP for a more detailed discussion). In their 2015 reports, Partington and Satchell supported our view,[421] stating:[422]

> There is a possibility that current low interest rates could result in higher equity risk premiums, but we do not think this is likely and more importantly we have seen no convincing evidence that this is the case.

In their 2013 report, McKenzie and Partington undertook a comprehensive literature review and found there is evidence that supports both a positive and negative relationship.[423] McKenzie and Partington also found there was some support in the literature for an oscillating relationship (that is, the relationship is at times positive and at other times negative).

We also considered whether there is a clear relationship (positive or negative) between the risk free rate and MRP in the current market. Our key considerations in relation to this issue are (see section C.7 of appendix C–MRP):

- We are not satisfied that there is evidence of a widespread 'flight to quality' among investors in current market conditions.
- We consider little, if any, reliance can be placed on hurdle rates as a reliable indicator of the required return on equity. Evidence from the RBA and Deloitte indicates hurdle rates are often set above the WACC and are updated infrequently. This means they are unlikely to be commensurate with the efficient financing costs of the benchmark efficient entity or reflective of prevailing conditions in the market for equity funds.
- We do not consider DGMs provide reliable estimates of the MRP implied by equity (or share) prices, or provide reliable signals from the equity market. We consider DGMs estimate the MRP implied by the particular DGM used given its construction, inputs and assumptions. While the share price is one input in a DGM, it is not the only input. Also, the estimates produced from DGMs are highly sensitive to its underlying assumptions, some of which are unlikely to hold in reality.

Partington considered it is unlikely that the MRP has increased in response to recent decreases in the risk free rate. He stated '[t]he low bond rates tell us that the required

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[421] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 71–74; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, pp. 17–18.

[422] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

[423] McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, pp. 6, 24.

return for low risk assets is low'.[424] This is the benchmark rate against which other risky assets are priced to attract equity funds.

Equity beta

The equity beta is a key input parameter in our foundation model, the SLCAPM. It measures the sensitivity of an asset or business's returns to the movements in the overall market returns (systematic or market risk).[425] Because the SLCAPM works on the basis that investors can diversify away business–specific risk, only systematic (non-diversifiable) risk is relevant for determining the equity beta.[426]

We adopt an equity beta point estimate of 0.7 from a range of 0.4 to 0.7 for a benchmark efficient entity. We are satisfied that an equity beta of 0.7 is reflective of the systematic risk a benchmark efficient entity is exposed to in providing regulated services.[427]

We estimate the range for the equity beta based on empirical analysis using a set of Australian energy network firms we consider reasonably comparable to a benchmark efficient entity. For this analysis we commissioned an expert report from Professor Olan Henry (Henry), which uses recent data up to 28 June 2013.[428] This report is one of a number of Australian empirical studies showing a consistent pattern of equity beta estimates that is robust to the use of different econometric techniques, comparator sets and time periods. From 2002 to 2014, these empirical studies present equity beta estimates that converge on the range of 0.4 to 0.7, as set out in Table 3-19 at the end of this section.[429]

This empirical range is consistent with our conceptual analysis, which we use to cross check our empirical results. This is because our conceptual analysis suggests the systematic risk of a benchmark efficient entity would be less than the systematic risk of a market average entity (that is, less than 1.0). Our conceptual analysis is supported by McKenzie and Partington in their 2014 and 2015 reports.[430]

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[424] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

[425] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 21; Brealey, Myers, Partington, Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2000, p. 187.

[426] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp. 21–22;

[427] NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR, r. 87(3).

[428] Henry uses data from 29 May 1992 to 28 June 2013. See: Henry, *Estimating β: An update*, April 2014, p. 9. We consider the results of this report in detail (see section D.2.3 of appendix D) because they are more likely to be reflective of prevailing market conditions.

[429] As discussed in detail in section D.2.2 of appendix D, we do not consider individual firm equity beta estimates in isolation. This is because no particular energy network firm in our comparator set is perfectly representative of the benchmark efficient entity. We consider averages of individual firm estimates and estimates from various portfolios of firms are more likely to be reflective of the benchmark efficient entity. However, we place no material reliance on time varying portfolio estimates, as according to Henry, they are not grounded in financial theory and prone to measurement error. See: Henry, *Estimating β: an update*, April 2014, p. 52.

[430] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 31. This report is an update to McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 10–12. Partington and Satchell

We consider the evidence in Henry's 2014 report suggests a best empirical estimate for the equity beta of approximately 0.5.[431] However, there are additional considerations that inform our determination of the equity beta point estimate from within the range. In particular, we consider the following sources of additional information:

- Empirical estimates of international energy networks—the recent international empirical estimates we consider range from 0.3 to 1.0.[432] The pattern of international results is not consistent and there are inherent uncertainties when relating foreign estimates to Australian conditions. However, we consider international empirical estimates provide some limited support for an equity beta point estimate towards the upper end of our range. More information on international empirical estimates can be found in section D.3 of appendix D–equity beta.
- The theoretical principles underpinning the Black CAPM—the Black CAPM relaxes an assumption underlying the SLCAPM, which allows for unlimited borrowing and lending at the risk free rate.[433] For firms with an equity beta below 1.0, the Black CAPM theory may support a higher return on equity than the SLCAPM. We consider this information points to the selection of an equity beta point estimate above the best empirical estimate implied from Henry's 2014 report. However, we do not consider the theory underlying the Black CAPM warrants a specific uplift or adjustment to the equity beta point estimate.[434] The theory underlying the Black

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provided another updated report which considered submissions to JGN's access arrangement review. They noted there is nothing in those submissions that would lead them to depart from the findings in McKenzie and Partington (2014) and Partington (2015). See: Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6. In October 2015, Partington and Satchell provided another updated report which considered new material submitted by service providers since our final decision for JGN. They concluded that there is no compelling reason to change any of the findings in their previous reports (see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015).

431 We consider most of the equity beta estimates from Henry's 2014 report are clustered around 0.5 (see section D.2.3 of appendix D). In forming this view, we consider averages of individual firm estimates and fixed weight portfolio estimates.

432 See section D.3 of appendix D for more information. The lower bound reflects the estimates presented in the Alberta Utility Commission's (AUC's) 2013 Generic Cost of Capital report (published March 2015) and the upper bound reflects an average of the Brattle Group's estimates for three US energy network firms. See: AUC, *2013 Generic Cost of Capital*, 23 March 2015, pp. 24–26; The Brattle Group, *The WACC for the Dutch TSOs, DSOs, water companies and the Dutch pilotage organisation*, March 2013, p. 16. The upper bound of this range increases to 1.3 if we consider the additional Damodaran estimates SFG submitted in its 2015 report (see section D.3 of appendix D).

433 However, the Black CAPM replaces this assumption with an allowance for unlimited short selling of stocks.

434 Also, we do not consider our use of this information implies there is bias in the return on equity estimates derived from the SLCAPM. Our view is supported by McKenzie and Partington and Handley in their 2014 and 2015 reports. See: McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 23. Handley, *Advice on the return on equity*, October 2014, pp. 10-–12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 41–44; Handley, *Further advice in the return on equity*, April 2015, pp. 5–6. In his May 2015 report, Handley considered submissions to JGN's access arrangement review, and concluded that he does not consider it necessary to change any of the findings in his earlier report (Handley (2014)). See: Handley,

CAPM is qualitative in nature, and we consider this information is reasonably consistent with an equity beta point estimate towards the upper end of our range. More information on the theory underlying the Black CAPM can be found in section D.4 of appendix D–equity beta.

Further, we recognise the importance of providing stakeholders with certainty and predictability in our rate of return decisions, which we consider is consistent with the achievement of the allowed rate of return objective. The Guideline was developed, in part, to provide regulatory certainty for stakeholders under the new rules framework, and allow for our decisions to be reasonably predictable. It was also developed following consultation and analysis. The AEMC and stakeholder submissions to the 2012 rule change process accepted these views.[435] The final Guideline expanded on the draft Guideline to include input parameter estimates for our foundation model as of December 2013. We did this in response to submissions from stakeholders, particularly service providers, seeking greater certainty of process.[436]

After taking these considerations into account, we adopt an equity beta point estimate of 0.7 for this final decision, consistent with the Guideline. We consider this approach is reflective of the available evidence, and has the advantage of providing a certain and predictable outcome for investors and other stakeholders. We recognise the other information we consider does not specifically indicate an equity beta at the top of our range. However, a point estimate of 0.7 is consistent with these sources of information and is a modest step down from previous regulatory determinations.[437] It also recognises the uncertainty inherent in estimating unobservable parameters, such as the equity beta for a benchmark efficient entity.

Moreover, we consider an equity beta point estimate of 0.7 provides a balance between the views of consumer groups and service providers. While many stakeholder submissions supported the application of the approach set out in the Guideline, the CCP and a number of other stakeholders consider our equity beta point estimate was set too high.[438] For example, the Queensland Council of Social Service (QCOSS) submitted that:[439]

Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks, 20 May 2015, p. 28.

435 AEMC, *Final rule determination*, November 2012, pp. 42–43, 45, 50. Additional support for these views were provided in stakeholder submissions on the Guideline material. See: RARE Infrastructure Limited, *Submission to AER's rate of return guidelines consultation paper*, June 2013; The Financial Investor Group, *Response to the AER's rate of return guidelines consultation paper*, June 2013, p. 1; ENA, *Submission to AER's rate of return guidelines issues paper*, February 2013, p. 4; PIAC, *Submission to AER's rate of return guidelines issues paper*, February 2013, p. 17.

436 AER, *Explanatory statement: Rate of return guideline*, December 2013, p. 51.

437 From 2010 to early 2014, all our regulatory determinations have applied an equity beta of 0.8. See: AER, *Review of the WACC parameters: final decision*, May 2009, p. v.

438 Refer to section D.5.2 of appendix D–equity beta for references of stakeholder submissions supporting an equity beta lower than 0.7 for the benchmark efficient entity. While some of these are not submissions to SAPN's revised proposal, we have a common framework for estimating the return on equity for a benchmark efficient entity.

> QCOSS argues that the best available evidence should be the basis for selection of the equity beta. Using the best available evidence would suggest an equity beta around 0.5.

Conversely, SA Power Networks submitted that our equity beta point estimate of 0.7 is too low.[440] It proposed a multiple–model approach applied by SFG and Frontier (specifically, Gray and Hall) to determine the return on equity estimate. In applying this approach, they adopted an equity beta estimate of 0.82 for the SLCAPM, based on a comparator set of both Australian and US energy firms.[441] SFG also submitted that if we adopt the foundation model approach, then the equity beta estimate should be adjusted to reflect empirical evidence from the Black CAPM.[442] This resulted in an equity beta estimate of 0.91 for the SLCAPM.

We consider an equity beta of 0.7 for the benchmark efficient entity is reflective of the systematic risk a benchmark efficient entity is exposed to in providing regulated services.[443] In determining this point estimate, we applied our regulatory judgement while having regard to all sources of relevant material and using that material in a manner consistent with its relative merits. We do not rely solely on empirical evidence and we do not make a specific adjustment to equity beta to correct for any perceived biases in the SLCAPM. We also do not rely on empirical evidence from the Black CAPM, FFM or SFG's construction of the DGM (see appendix A–equity models and appendix B–DGM). We do not consider our use of the SLCAPM as the foundation model will result in a downward biased estimate of the return on equity for a benchmark efficient entity (see section A.3.1 of appendix A–equity models).

Our equity beta point estimate provides a balanced outcome, given the submissions by stakeholders and services providers. Figure 3-12 shows our equity beta point estimate and range in comparison with other reports and submissions. We are satisfied this outcome contributes to the achievement of the allowed rate of return objective, and is consistent with the NEO/NGO and RPP.[444] We provide a detailed analysis of technical issues and responses to SA Power Networks' revised regulatory proposal in appendix D—equity beta.

Therefore, we consider all stakeholder submissions when determining the equity beta estimate for each service provider.

439 QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.24.

440 SAPN, *Revised regulatory proposal*, July 2015, p. 331; SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, pp. 18–21.

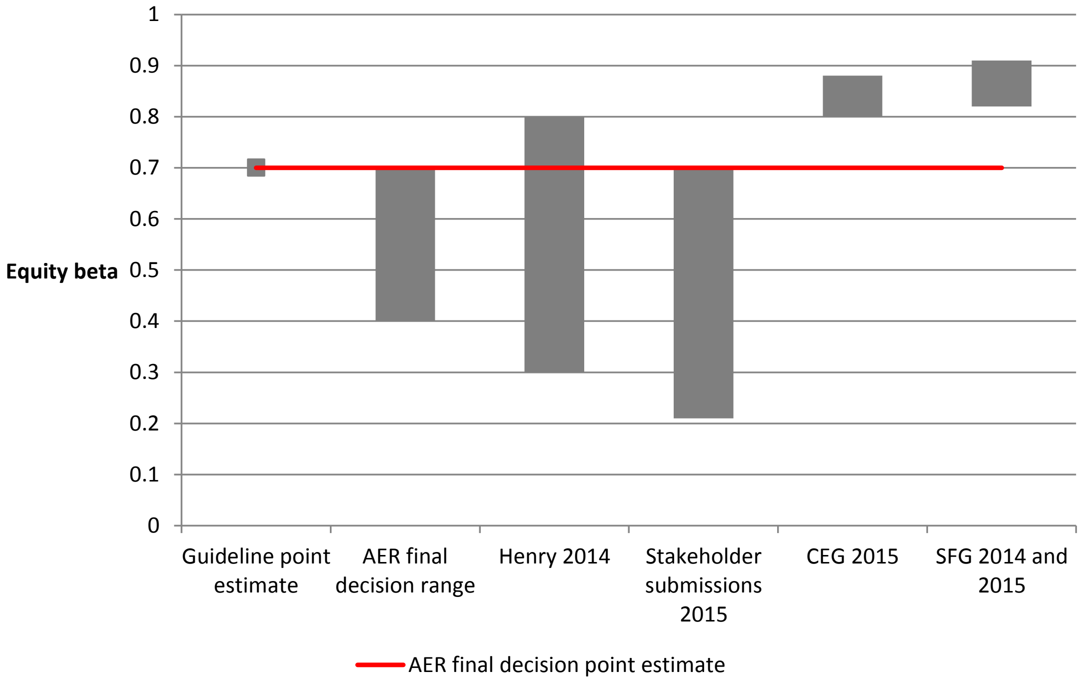
441 SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 20; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 28, 31–32, 35 (attachments M.4 and M.7 to SAPN's revised proposal, respectively).

442 SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35.

443 This benchmark efficient entity operates in Australia, by our definition. For this reason (and other reasons discussed in step two of this section and section D.2.1 of appendix D), we do not give a determinative role to international empirical estimates of equity beta.

444 NER, cl. 6.5.2(c) and 6A.6.2(c); NEL, sections 7 and 7A. NGR, r. 87(3); NGL, sections 23 and 24.

Figure 3-12 Submissions on the value of the equity beta



Source: AER analysis[445]

Note: Henry 2014 presents the range specified in Henry's 2014 report (0.3 to 0.8). The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network (or pipeline), and as such it does not include submissions from network (or pipeline) service providers. The lower bound of this range is based on the CCP's submission and the upper bound is based on Origin's submission. The CEG 2015 range is based on adjustments to SFG's regression based estimates for the mining boom. The SFG 2014 and 2015 range lower bound is based on SFG's regression analysis of Australian and US firms (submitted under a multiple model approach for the return on equity) and the upper bound is based on SFG's multiple model based equity beta estimates (under its alternative 'foundation model' approaches for the return on equity).

445 Based on our decision and the following reports: AER, *Rate of return guideline*, 17 December 2013, p. 15; Henry, *Estimating β: An update*, April 2014, p. 63; CCP2 (Bruce Mountain), *Submission on the AER's preliminary decisions for the Qld/SA distribution network service providers (2015-20),* 29 July 2015, pp. 10-11; Origin, *Submission to the AER's preliminary decision for the Qld distribution network service providers (2015-20)*, 3 July 2015, p. 12; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 57–58. SFG submitted 0.82 (under multiple model approach for return on equity) in SFG, *Equity beta*, May 2014, p. 41; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 28; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, p. 85; SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 20; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 4. SFG submitted 0.91 (under alternative 'foundation model' approaches for return on equity) in SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, p. 96; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 88; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35.

Table 3-19 Equity beta estimates for Australian energy network firms

Source	Time period	Individual firm averages	Fixed portfolios	Varying portfolios[a]	Summary of regression permutations
Henry 2014	1992–2013	0.37–0.56	0.31–0.70[b]	0.39–0.53	weekly/monthly return intervals, multiple estimation periods, OLS/LAD regressions, value/equal weight fixed portfolios, average/median varying portfolios, raw/re-levered estimates, 9 comparators
Grant Samuel 2014	2009–2014[c]	0.42–0.64			weekly/monthly return intervals, multiple estimation periods, OLS regressions, Bloomberg adjusted betas, raw estimates, 5 comparators
ERA 2013	2002–2013	0.48–0.52	0.39–0.59		weekly return intervals, OLS/LAD/MM/TS regressions, value/equal weight fixed portfolios, multiple estimation periods, re-levered estimates, 6 comparators
SFG 2013	2002–2013	0.60		0.55	OLS regressions, four weekly repeat sampling, Vasicek adjustment, re-levered estimates, 9 comparators
ERA 2012	2002–2011	0.44–0.60			weekly/monthly return intervals, OLS/LAD regressions, re-levered estimates, 9 comparators
Henry 2009	2002–2008	0.45–0.71	0.35–0.94[d]	0.41–0.78	weekly/monthly return intervals, various estimation periods, OLS/LAD regressions, value/equal weight fixed portfolios, average/median varying portfolios, re-levered estimates, 9 comparators
ACG 2009	1990–2008	0.50–0.58		0.69–0.91	monthly return intervals, OLS/LAD regressions, multiple estimation periods, raw/re-levered estimates, average/median varying portfolios, 9 comparators
Henry 2008	2002–2008	0.35–0.67	0.31–0.77[e]		daily/weekly/monthly return intervals, discrete/continuous returns, various estimation

Source	Time period	Individual firm averages	Fixed portfolios	Varying portfolios[(a)]	Summary of regression permutations
					periods, OLS/LAD regressions, value/equal weight portfolios, raw/re-levered estimates, no adjustment/Vasicek/Blume, 10 comparators
ACG 2002	2000–2002[(f)]	0.61–0.69			monthly return intervals, OLS regressions, raw/re-levered estimates (with varying debt betas), 4 comparators

Source: AER analysis.[446]

(a) As discussed in section D.2.2 of appendix D, we place no material reliance on the estimates from time varying portfolios as they are not grounded in financial theory and are prone to measurement error. See: Henry, *Estimating β: an update*, April 2014, p. 52.

(b) 0.31 is a raw LAD estimate, which we place less reliance on (see section D.2.2 of appendix D). The minimum re-levered LAD estimate is 0.38 and the minimum OLS estimate is 0.39.

(c) Grant Samuel uses equity beta estimates from the Australian Graduate School of Management (AGSM) and Bloomberg. This time period reflects AGSM's estimation, which uses a four year estimation period as at September 2013, and Bloomberg, which uses a four year estimation period as at February 2014.

(d) 0.94 is an LAD estimate based on a portfolio with only 18 monthly observations. If this portfolio is excluded the maximum estimate is 0.75, which is again an LAD estimate (which we place less reliance on). The maximum OLS estimate is 0.62.

(e) 0.31 is an LAD estimate, which we place less reliance on. The minimum OLS estimate is 0.42. 0.77 is a Blume–adjusted estimate, which we do not rely on. The maximum unadjusted estimate is 0.68, and the maximum OLS estimate is 0.66.

(f) ACG did not make it clear what time period its data covered. However, it noted that equity beta estimates were only used where there were more than 20 observations.

Step four: other information

In this section, we discuss the estimates of the return on equity we derive from the other information.

[446] Based on the following reports: ACG, *Empirical evidence on proxy beta values for regulated gas transmission activities: final report*, July 2002, pp. 35, 39–40; Henry, *Econometric advice and beta estimation*, November 2008. ACG, *Australian Energy Regulator's draft conclusions on the weighted average cost of capital parameters: commentary on the AER's analysis of the equity beta*, January 2009, pp. 22, 25; Henry, *Estimating β*, April 2009; ERA, D*raft decision on proposed revisions to the access arrangement for the Western Power network*, March 2012, pp. 202, 204; SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 12–15; ERA, *Explanatory statement for the rate of return guidelines*, December 2013, pp. 171, 173; Grant Samuel and Associates, *Envestra financial services guide and independent expert's report (appendix 3)*, March 2014, p. 6; Henry, *Estimating β: An update*, April 2014.

Our foundation model equity risk premium estimate of 4.55 per cent is within the range of premiums estimated by independent valuers (3.3 to 6.2 per cent), brokers (3.5 to 5.2 per cent), and other regulators (3.3 to 12.3 per cent).

Table 3-20 Range of estimates from other information

	Return on equity		Equity risk premium	
	Minimum	Maximum	Minimum	Maximum
AER foundation model	5.0	9.0	2.0	6.0
Wright approach CAPM	5.8	9.8	2.8	6.8
Independent valuation reports	7.5	14.7	3.3	11.7
Broker reports	6.8	9.3	3.5	5.2
Other regulators' decisions	6.1	15.6	3.3	12.3

Source: AER analysis (see Appendices E.1 through E.5 for further detail).

We estimate the return on equity under the Wright approach using a range for the long term historical average return on the market and a range for equity beta. The estimated return on the market will vary depending on the time period used.[447] Our range of equity beta estimates is discussed in step three. Using only the beta point estimate from the top of the range (0.7), return on equity estimates fall within a range of 7.9 to 9.8 per cent.

We have focused on independent valuation reports, broker reports, and other regulators' decisions that include a return on equity for businesses that provide the closest comparison to our benchmark efficient entity. For this reason, we note that the lower end of the other regulators' decisions range is likely more comparable to the benchmark efficient entity.[448] We have also focused on more recent reports over older reports, and on the equity risk premium rather than the overall return on equity. This is to isolate the business-specific risk premium from movements in the risk free rate.

We do not consider the adjustments that valuers apply to uplift discount rate estimates to address perceived risks relevant to the valuation task are consistent with the allowed rate of return objective. The upper bound shown in Table 3-20 above includes these uplifts, the lower bound excludes uplifts. We therefore consider the lower end of the valuation report range would better contribute to the achievement of the allowed rate of return objective. We also note that the number of relevant reports is too low and the

447 AER, *Explanatory statement: Rate of return guideline (appendices)*, December 2013, pp. 26–27.

448 Due to the inclusion of regulatory decisions on rail networks that may have significantly different risk characteristics than the benchmark efficient entity. In the case of the ERA's November 2014 , *Review of the method for estimating the WACC for the Regulated Railway Networks — Revised draft decision*, the annuity approach adopted in the rail access arrangements in the context of the Western Australian rail access regime are a factor in the decision to use the Wright approach to determine market risk premium. See section E.5 of appendix E for more detail.

concentration of reports among only a few valuers is too high to be able to place significant reliance on the directional evidence from valuation reports.[449]

In addition to return on equity estimates, we have also considered the return on debt relative to our foundation model return on equity estimate. The current debt market is indicating a premium over the risk free rate of about 2.4 per cent.[450] This compares to our foundation model equity premium over the risk free rate of 4.55 per cent (given a market risk premium of 6.5 per cent and a beta of 0.7), as shown in Figure 3-13.

We do not consider that the current difference of about 219 basis points between the equity risk premium allowed in our final decision and current debt risk premiums[451] to be too low, on the basis of:

- the low risk nature of our benchmark efficient entity (as outlined in step two)
- the current stabilising of debt risk premiums after a recent downward trend
- the gap between the equity risk premium and debt risk premium, which is likely to be wider than stated above since it compares a promised pre-tax return on debt to an expected post-tax return on equity.[452]

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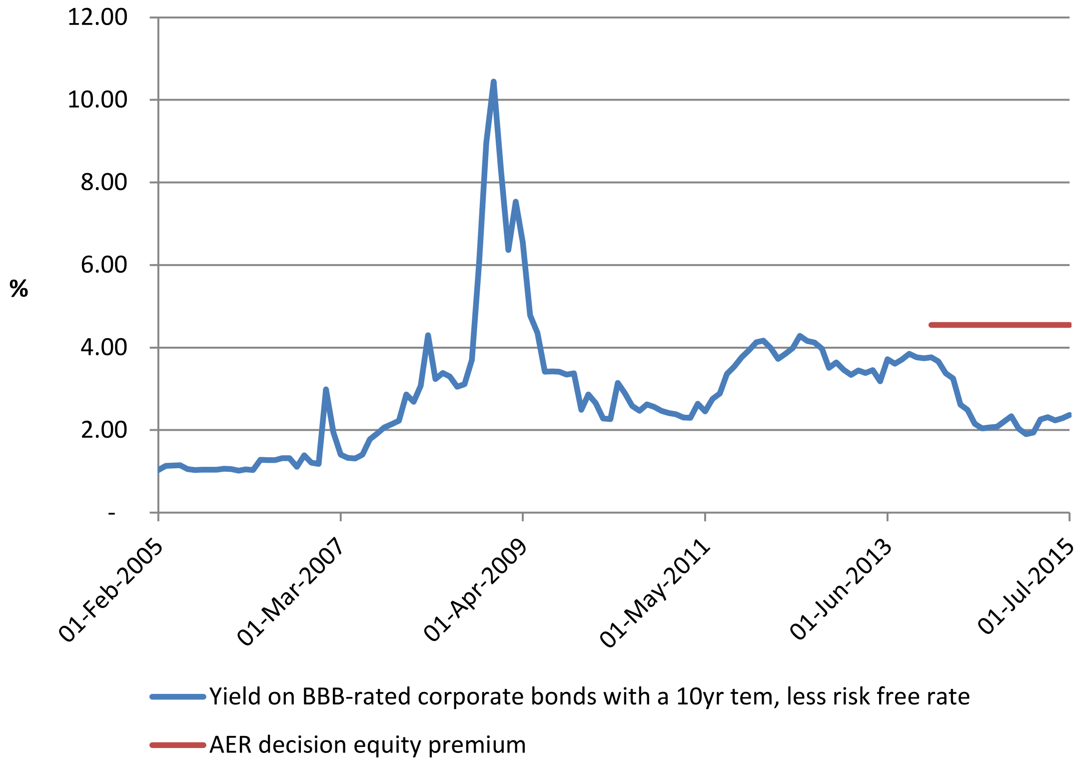
449 This position was also supported by Partington, who stated "We do not consider that expert reports should be used to directly estimate the cost of equity for regulated entities. This is because the sample size of reports for utilities is very small and the risk of idiosyncratic variation is high." [Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 69].

450 Based on the RBA's monthly data (statistical table F3) for the 31 July 2015 on yield to maturity on BBB-rated corporate bonds with a ten year term, specifically, the spread to CGS. RBA corporate bond data used for comparative purpose only. This is not reflective of our final decision return on debt estimate which is calculated as an average of the RBA and Bloomberg (BVAL) data series and estimated by reference to BBB+ rated corporate bonds. In our final decision we also make an extrapolation adjustment to the RBA data series.

451 The debt risk premiums to CGS are calculated as the extrapolated effective annual yield to maturity on BBB rated debt with 10 years to maturity less the effective annual yield to maturity on CGS with 10 years to maturity). BBB bond yields have been used instead of BBB+ because the RBA quotes BBB yields to maturity.

452 We consider that promised returns will always exceed expected returns and pre-tax returns will always exceed corresponding post-tax returns. For further explanation, see McKenzie and Partington, *Report to the AER: The relationship between the cost of debt and the cost of equity*, March 2013, pp. 7, 21; AER, *Final decision: Access arrangement final decision—Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd 2013-17*, March 2013, Part 3, p. 48.

Figure 3-13 Comparison of equity and debt premiums



Source: AER analysis, RBA F3 and F16 interest rates statistics

Our assessment of other information is discussed further in appendix E.

Step five: evaluate information set

We are satisfied that an expected return on equity estimate derived from the SLCAPM should be our starting point (foundation model). We consider there is overwhelming evidence that the SLCAPM is the current standard bearer for estimating expected equity returns. We are not satisfied that the service providers' proposed construction of other equity models, as well as proposed application of quantitative and qualitative methods to give weight to these models, will result in a return on equity that contributes to achievement of the allowed rate of return objective. [453] We are not (in principle) averse to a multi-model approach where the models are equally valid for the intended objective.[454] However, we are not satisfied that is the case. Having regard to relevant material must include having regard to the relative merits of the material. We disagree with the service providers that to have regard to other models means they must be

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453 For example, Partington noted that any return on equity estimate could be obtained from SFG's DGM construction through judicious choice of input assumptions [Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 54].

454 As indicated by our approach to estimating the return on debt using a simple average of the RBA and Bloomberg yield to maturity estimates extrapolated out to ten years.

applied. Given the limitations (as outlined in step two) of the other equity models proposed by the service providers, we consider that:

- These models should not form part of our foundation model approach, either as the sole model or as part of a multi-model approach.
- The Wright approach to specifying the SLCAPM, the DGM, and the theory underpinning the Black CAPM may provide some (albeit limited) insights. This material has been used to inform our overall return on equity estimate (Wright) or the estimation of SLCAPM input parameters (Black CAPM and DGM).[455]
- The FFM and historical specification of the SLCAPM should not be used to inform our return on equity estimate in any capacity.

Beyond models for estimating a return on equity, there is also other material that we consider useful for informing our return on equity estimate. We agree with the service providers' and CCP's proposals that the prevailing return on debt and return on equity estimates from other market practitioners (brokers, independent valuers, and other regulators) should be considered, but we disagree with their views as to the reliance they should be accorded.

Our foundation model return on equity estimate is 7.5 per cent, based on a prevailing risk free rate, a MRP estimate of 6.5 per cent, and an equity beta estimate of 0.7.[456] The estimate is calculated as follows:

$$7.5\% = 2.96\% + 0.7 * 6.5\%$$

We consider that this estimate is broadly supported by the other information set out in step four. In coming to this conclusion, without underplaying the importance of all of the relevant information, the key influential factors are:

- The regulatory regime to date has been utilising the SLCAPM to set the return on equity and has been supportive of investment. The service providers we regulate have been able to raise capital to undertake extensive investment programs.[457] This suggests the allowances set in the past using the SLCAPM were at least adequate to recover efficient costs. This provides confidence that our estimate for this final decision, while taking account of the downward trends of equity beta and current market conditions (for the risk free rate and MRP), is likely to provide SA Power Networks a reasonable opportunity to recover at least efficient costs.[458]

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455 We note that our specification of these models (particularly the DGM) may differ from that proposed by the service providers.

456 For more information on how we came to these estimates, see step three.

457 Since 2008, the transmission and distribution service providers across the national electricity market have invested in the order of $6 billion per year in capital expenditure (capex).This is a high level estimate that does not include the gas networks that we regulate.

458 Our previous decision for SA Power Networks in June 2010 adopted an equity risk premium of 6.0 per cent [AER, *Final Decision: South Australian distribution determination 2010–11 to 2014–15*, May 2010]. Our previous Rate of Return Guideline, released in May 2009, adopted an equity risk premium of 5.2 per cent [AER, *Final Decision*, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital

- Our foundation model return on equity estimate is approximately 219 basis points above the prevailing yield-to-maturity on BBB-rated debt with a 10 year term-to-maturity. The return on debt is a relative indicator; we expect that most of the time investors' expected return on equity will exceed the expected return on debt. For a benchmark efficient entity with a similar degree of risk as SA Power Networks, we would not expect the return on equity to be a long way above the prevailing return on debt.[459] On this basis, the promised return on debt material does not support any change to our foundation model return on equity estimate.
- Our foundation model return on equity estimate falls within the range of estimates derived from the Wright approach. Using the beta range and data up to the 2014 calendar year end, Wright approach return on equity estimates range from 5.8 to 9.8 per cent. This results in an equity risk premium range of 2.8 to 6.8 per cent. Using only the beta point estimate from the top of the range, return on equity estimates range from 7.9 to 9.8 per cent. We estimate the return on equity under the Wright approach using a range for the long term historical average return on the market. We use a range because the estimated return on the market will vary depending on the time period used.[460]
- Our foundation model equity risk premium estimate of 4.55 per cent is within the range of premiums estimated by independent valuers (3.3 to 6.2 per cent)[461], brokers (3.5 to 5.2 per cent), and other regulators (3.3 to 12.3 per cent). We do not consider the adjustments that Grant Samuel undertook to uplift its discount rate estimates to address perceived risks relevant to its valuation task, are consistent with the allowed rate of return objective.[462] Recent decisions for rail networks contribute to the upper end of the other regulators' range, but rail networks are unlikely to be comparable to the benchmark efficient entity. Excluding the rail decisions, the widening of the range is then due to decisions that place significant reliance on DGM and Wright approach estimates of MRP. The ERA's use of the Wright approach to estimating market risk premium is influenced by its annuity pricing framework, which is not replicated in the NER.[463] As discussed in step

(WACC) parameters, 1 May 2009]. Our last decisions prior to the 2013 Rate of Return Guideline (excluding transitional decisions) were in 2013 and adopted an equity risk premium of 5.2 per cent for ElectraNet and 4.8 per cent for Victorian gas network service providers [AER, *Final Decision: ElectraNet Transmission Determination 2013–14 to 2017–18*, 30 April 2013, p. 24; AER, *Access Arrangement Final Decision*, Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd, 2013–17, Part 2: Attachments, 15 March 2013, p. 143.]. Our most recent final decisions in April and June 2015, and this decision adopt an equity risk premium of 4.55 per cent, which is consistent with our 2013 Rate of Return Guideline.

[459] Due to the regulatory regime and the businesses' monopoly positions shielding them from systematic risk; as well as the measured prevailing debt yields likely overstating the expected return on debt due to default risk. For more information, see step 2.

[460] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 26–27.

[461] Based on the Grant Samuel report for Envestra Ltd, which is the only recent report for a company relatively comparable to the benchmark efficient entity.

[462] See Appendix A.6. 'Return on equity estimates from other practitioners' for more detail.

[463] The ERA's use of the Wright approach to estimating market risk premium is influenced by its annuity pricing framework. The ERA states: "A key consideration in the context of the rail WACC relates to the purpose. The estimate is required to contribute to the annuity that will deliver the value of the rail infrastructure assets, over their

three, we place less reliance on the DGM estimates of MRP than estimates from historical excess returns.[464]

- Service providers propose a higher return on equity than our foundation model, while users submit that our foundation model is too conservative by setting the rate of return at the upper end of the reasonable range.

In summary, the information indicates that our equity risk premium of 4.55 per cent falls within the range of other indicators available to inform the return on equity. Our task is to set the allowed rate of return to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to SA Power Networks in respect of the provision of network services.[465] Hence, the critical allowance for an equity investor in a benchmark efficient entity is the allowed equity risk premium over and above the estimated risk free rate at a given time. Under the application of the standard SLCAPM, this equals the MRP multiplied by the equity beta. We also consider the relative values of the equity risk premium and the debt risk premium of the benchmark efficient entity. Figure 3-14 shows this comparison and our point estimate (green line).

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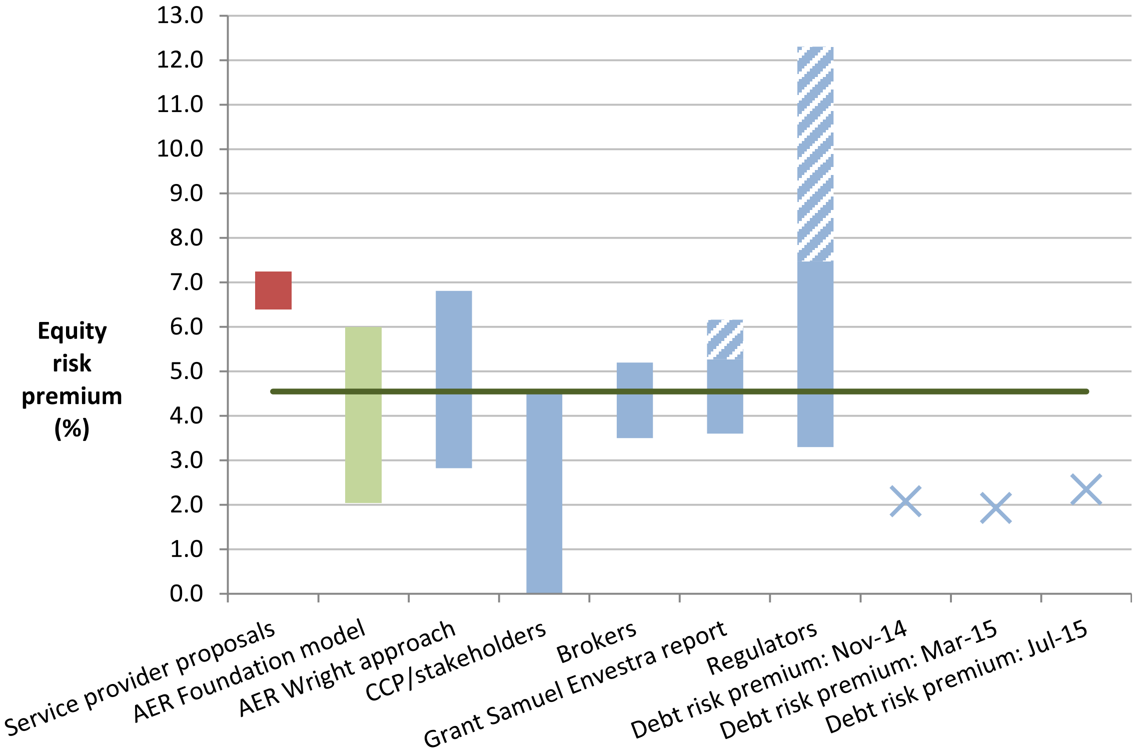
economic life. Given the length of the rail asset economic lives, the estimate is long term." [ERA, *Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railway Networks – Revised Draft Decision*, November 2014, p. 89.]

464 See Appendix E.5 for more detail.

465 While there may be many various risks associated with providing regulated network services, we consider that (consistent with modern portfolio theory) the rate of return will be commensurate with efficient financing costs if it reflects only non-diversifiable risks. Diversifiable risk can be addressed through other regulatory mechanisms, such as capex and opex allowances.

Figure 3-14 Equity risk premium comparison



Source: AER analysis and various submissions and reports.

Notes: The AER foundation model equity risk premium (ERP) range uses the range and point estimate for MRP and equity beta as set out in step three. The calculation of the Wright approach, debt premium, brokers, and other regulators ranges is outlined in Appendices E.1, E.2, E.4, and E.5 respectively.

Grant Samuel's final WACC range included an uplift above an initial SLCAPM range. The lower bound of the Grant Samuel range shown above excludes the uplift while the upper bound includes the uplift and is on the basis that it is an uplift to return on equity. Grant Samuel made no explicit allowance for the impact of Australia's dividend imputation system. We are uncertain as to the extent of any dividend imputation adjustment that should be applied to estimates from other market practitioners. Accordingly, the upper bound of the range shown above includes an adjustment for dividend imputation, while the lower bound does not. The upper shaded portion of the range includes the entirety of the uplift on return on equity and a full dividend imputation adjustment.[466]

The shaded portion of the other regulators range represents the impact of rail decisions on the range. We consider rail networks are unlikely to be comparable to the benchmark efficient entity.

The service provider proposals range is based on the proposals from businesses for which we are making final or preliminary decisions in October-November 2015.[467] Equity risk premiums were calculated as the

466 Grant Samuel, *Envestra: Financial services guide and independent expert's report*, March 2014, Appendix 3.

467 ActewAGL, Ausgrid, Directlink, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Jemena Gas Networks, SA Power Networks, TasNetworks, and TransGrid. Jemena Gas Networks' revised proposal contained an indicative return on equity based on an indicative risk free rate averaging period. On 27 March 2015 JGN provided submissions that updated its approach using values derived from its proposed averaging periods. We have shown the 27 March 2015 updates.

proposed return on equity less the risk free rate utilised in the service provider's proposed estimation approach.

The CCP/stakeholder range is based on submissions made (not including service providers) in relation to our final or preliminary decisions in October-November 2015. The lower bound is based on the Alliance of Electricity Consumers submission on Energex and Ergon Energy revised proposals. The upper bound is based on Origin Energy's submission on the preliminary decision for SA Power Networks.[468]

In having regard to prevailing market conditions we have also examined recent movements in the relevant material.[469] Overall, this information does not indicate a sustained change in market conditions, and consequently, equity risk premium. We do not consider that there is sufficient evidence to cause us to move away from our foundation model estimate. We note that:

- Movements in our foundation model range are due to the changes in our DGM estimates of the MRP. Recent movements in the range from the DGM are predominately caused by the decline in the risk free rate.[470] The same is true for the Wright approach range.[471] As discussed in section C.7, we consider that there is no clear evidence of a relationship between the risk free rate and the equity risk premium.[472]
- The range of equity risk premium estimates from valuation reports and other regulators' decisions have not materially changed.
- Debt risk premiums (spread between BBB+ rated corporate debt and the risk free rate) have not materially changed.
- The range of equity risk premium estimates from broker reports has contracted and its upper bound declined. While reasons for movements are not always provided, some brokers note that previously static risk free rate estimates should be revised in light of recent bond and share price movements.[473]
- Movements in the service providers' proposed range are due to the risk free rate estimates used in revised model estimates. As discussed in step two, we consider that the service providers' proposed models are not sufficiently reliable and do not

468 Alliance of Electricity Consumers, *Submission to the Australian Energy Regulator's Preliminary Decision (Queensland)*, July 2015, p. 29; Origin Energy, *Submission to AER Preliminary Decision SA Power Networks*, July 2015, p. 9.

469 These changes can be seen by comparing Figure 3-14 with comparable figures in previous decisions. See: AER, *Draft Decision: TransGrid Transmission Determination 2015-16 to 2017-18*, Attachment 3: Rate of Return, November 2014, p. 101; AER, *Final Decision: TransGrid Transmission Determination 2015-16 to 2017-18*, Attachment 3: Rate of Return, April 2015, p. 134.

470 See Figure 3-26 in section C.8.2.

471 In recent determinations we updated our estimate of the historical market return to the 2014 calendar year end from the 2013 calendar year end. This (on its own) had the effect of decreasing the upper bound of the Wright approach ERP range by 10 basis points, with no change to the lower bound.

472 See: McKenzie & Partington, *Report to the AER: relationship between the cost of debt and the cost of equity*, 14 March 2013; Partington, *Report to the AER: Return on equity (updated)*, April 2015, pp. 72–73.

473 For details, see section L.2 of Confidential Appendix L.

produce results that would contribute to the achievement of the allowed rate of return objective.

- In addition to the equity risk premium ranges shown in Figure 3-14, we have analysed movements in credit spreads, dividend yields, and the volatility index for the ASX200.[474] These conditioning variables can provide information about prevailing market conditions and whether or not the market is in a period of heightened risk aversion. Overall, the conditioning variables appear fairly stable and close to their long term averages.[475]
- Recent application of our foundation model return on equity estimate, as part of an overall revenue determination, does not appear to have negatively impacted investment in energy networks.[476] We also note that broker reports suggest that the AER's recent determinations have not removed the ability for listed networks to maintain payment of dividends.[477]

Having considered the overall information and all material before us, at this time we are not satisfied that this new information indicates a departure from the Guideline would contribute to the achievement of the allowed rate of return objective. We think the importance placed by all stakeholders on predictability and certainty of the Guideline is important to contribute to the achievement of the allowed rate of return objective.[478]

Next, recognising that there is no one precise estimate, we exercise our regulatory judgment. We look at all the evidence to determine whether we should adopt our foundation model point estimate as the return on equity estimate that we are satisfied will contribute to the achievement of the allowed rate of return objective.

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474 See appendix C.4 for further discussion.

475 Relative to long term trends.

476 Previously, RARE infrastructure submitted that "[t]here are many characteristics of the Australian Regulatory framework that makes its energy network potentially attractive investments" RARE Infrastructure, Letter to the AER, 13 February 2015.

477 For details, see section L.1 of Confidential Appendix L.

478 We received many stakeholder submissions supporting our guideline approach including: AGL, Submission on NSW DNSPs draft decision, 15 February 2015; Australian PV Institute, Submission on Energex's regulatory proposal 2015-20, 30 January 2015; Consumer Challenge Panel, Submission on draft decision and revised regulatory proposal, 23 February 2015; COTA, Submission on Energex's regulatory proposal 2015-20, 30 January 2015; Cotton Australia, Submission on Qld distributors' regulatory proposals 2015-20, 30 January 2015; Energy Consumers Coalition of South Australia, Submission on SAPN's regulatory proposal 2015-20, 31 January 2015; Energy Users Association of Australia, Submission on SAPN's regulatory proposal 2015-20, 30 January 2015; Energy Markets Reform Forum, Submission on NSW DNSPs draft decision and revised proposals, 16 February 2015; Origin Energy, Submission on draft decision and revised regulatory proposal, 13 February 2015; Public Interest Advocacy Centre, Submission on NSW DNSPs draft decisions, 13 February 2015; Queensland Council of Social Service, Submission on Qld distributors' regulatory proposals 2015-20, 30 January 2015; SA Council of Social Services, Submission on SAPN's regulatory proposal 2015-20, 30 January 2015; SA Financial Counsellors Australia Consortium, Submission on SAPN's regulatory proposal 2015-20, 30 January 2015 and UnitingCare Australia, Submission on SAPN's regulatory proposal 2015-20, 13 March 2015.

Step six: distil point estimate

We are satisfied that an expected return on equity derived from the SLCAPM should be the starting point for estimating the return on equity. We are also satisfied that the other information does not indicate that our equity risk premium estimate should be uplifted or downshifted to better contribute to the achievement of the allowed rate of return objective.

Following our estimation approach and having considered and given the relevant material due weight on their merits, we are satisfied that an expected return on equity estimate of 7.5 per cent derived from our implementation of the SLCAPM will contribute to the achievement of the allowed rate of return objective. We are also satisfied that this estimate is consistent with prevailing market conditions.

3.4.2 Return on debt

Our estimate of the return on debt provides a service provider with an allowance to cover its borrowing costs associated with funding investments in its network. Consistent with other components of the rate of return, we determine the return by reference to a 'benchmark efficient entity' rather than the actual service provider.

Our decision is to adopt a return on debt of 5.28 per cent, rather than the 5.29 per cent proposed by SA Power Networks.[479] This return on debt will apply to SA Power Networks for 2015–16. We will update 10 per cent of this return on debt each year over the 2015–20 period, based on the prevailing return on debt over SA Power Networks' particular debt averaging period for each year. This decision sets out how we arrived at the rate for 2015–16, and how we plan to update the return on debt in future regulatory years.

Our final decision is to maintain the return on debt methodology that we proposed in the rate of return guideline (the Guideline) and adopted in the preliminary decision.[480] Our considerations are grouped into broad approach issues and more specific implementation issues. We summarise our positions on these issues below.

Approach to estimating the return on debt

The return on debt consists of two components—a risk free rate (or base rate) component and a risk premium over the base rate. The risk premium is called the debt risk premium (DRP).

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479 SA Power Networks, *Revised regulatory proposal*, July 2015, p. 328

480 AER, *Better regulation—Explanatory statement to the rate of return guideline*, December 2013, chapters 3, 7 and 8; AER, *Better regulation—Explanatory statement to the rate of return guideline (appendices)*, December 2013, appendix G; AER, *Better regulation—Rate of return guideline*, December 2013, chapters 3,6 and appendix B; AER, *Preliminary decision–Attachment 3: Rate of return* April 2015, section 3.4.2, and appendices G and I.

We have considered four broad options for determining the return on debt. These options combine various forms of the 'on-the-day' and 'trailing average' approaches to estimating the return on debt.[481] They are:

- Option 1—Continue the on-the-day approach
- Option 2—Start with an on-the-day rate for the first regulatory year and gradually transition into a trailing average approach over 10 years
- Option 3—Hybrid transition. Start with an on-the-day rate for the base rate component and gradually transition into a trailing average approach over 10 years. This would be combined with a backwards looking trailing average DRP (that is, a base rate transition only).
- Option 4—Adopt a backwards looking trailing average approach (that is, no transition on either the base rate or DRP components of the return on debt).

Our decision is to adopt Option 2. Applied to SA Power Networks' revised proposal, this means our return on debt approach is to:

- estimate the return on debt using an on-the-day rate (that is, based on prevailing interest rates) in the first regulatory year (2015-16) of the 2015–20 regulatory control period, and
- gradually transition this rate into a trailing average approach (that is, a moving historical average) over 10 years using a forward looking approach.[482]

This means for the 2015–16 regulatory year, the return on debt is based on prevailing interest rates in 2015 (during SA Power Networks' debt averaging period) around the start of the 2015–20 regulatory control period. For subsequent regulatory years, the gradual transition will occur through updating 10 per cent of the return on debt each year to reflect prevailing interest rates (during SA Power Networks' debt averaging period) in each year.

In practical terms, our return on debt approach means that an on-the-day rate around the start of the 2015–20 regulatory control period is applied to:

- 100 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2015–16 regulatory year

[481] The 'on-the-day' approach estimates the allowed return on debt based on prevailing interest rates at the start of the regulatory control period (electricity) or access arrangement period (gas). At the next determination (electricity) or access arrangement decision (gas), the allowed return on debt is reset based on prevailing interest rates at the start of the new regulatory control period (electricity) access arrangement period (gas). The 'trailing average' approach estimates the allowed return on debt based on interest rates averaged over a moving historical period. Each year, prevailing interest rates from each new year are added to the trailing average, and interest rates from the last year of the trailing average 'fall out' of the trailing average.

[482] This decision determines the return on debt methodology for the 2015–20 regulatory control period. This period covers the first five years of the 10 year transition period. This decision also sets out our intended return on debt methodology for the remaining five years.

- 90 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2016–17 regulatory year, with the remaining 10 per cent updated to reflect prevailing interest rates during SA Power Networks' averaging period for 2016–17
- 80 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2017–18 regulatory year, with 10 per cent based on prevailing interest rates during SA Power Networks' averaging period for 2016–17, and 10 per cent updated to reflect prevailing interest rates during SA Power Networks' averaging period for 2017–18, and
- so on for the subsequent regulatory years.

After the 10 year transition period is complete, the return on debt is a simple average of prevailing interest rates during SA Power Networks' averaging periods over the previous 10 years.

Consistent with the rules requirements, this annual update will be effected through the automatic application of the return on debt methodology we set out in this decision.[483]

This debt approach is consistent with the approach we proposed in the Guideline, and have maintained in determination processes since the Guideline. In the Guideline, we based our transition on the approach recommended by the Queensland Treasury Corporation (QTC).[484] We refer to this as 'the QTC approach'.

Summary of stakeholders' views

In our current and recent determination processes, the issue of how to move from the previous on-the-day approach to the new trailing average approach is contentious and material.

Service providers have a mixed position on how to make this change:

- TasNetworks agreed with the QTC approach we adopted in the Guideline (Option 2).[485]
- Energex, Ergon Energy, CKI Group service providers (CitiPower, Powercor and SA Power Networks), Jemena group service providers (JEN and JGN), United Energy/Multinet and AusNet Services group also agreed on applying a transition. Initially, Energex, Ergon Energy, CKI, AusNet Services and Jemena group service providers agreed with the QTC approach we adopted in the Guideline.[486] Now, they,

[483] NER cl. 6.5.2(l) and cl. 6A.6.2(l)and NGR, r.87(12). The return on debt methodology for the purposes of the annual update is set out in appendix I of this attachment 3.

[484] QTC, *Moving average approach–Detailed design issues*, 8 June 2012.

[485] TasNetworks, *Revised proposal*, January 2015, p.5; Energex, *Initial proposal*, October 2014, p.167; Ergon Energy, *Initial proposal*, October 2014, p.123.

[486] Energex, *Initial proposal*, October 2014, p. 167; Ergon Energy, *Initial proposal*, October 2014, p. 123; SAPN, *Initial proposal*, October 2014, pp.338–339; JGN, *Initial proposal–Access arrangement information–Appendix 9.10*, June 2014, p.14 AusNet Services, *Submission on draft rate of return guideline*, October 2013, p.3.

AGN and United Energy/Multinet have proposed a different form of transition (Option 3).[487]

- NSW service providers (TransGrid, Ausgrid, Endeavour Energy, Essential Energy), ActewAGL (electricity distribution) and Directlink disagreed with the QTC approach and proposed we use a backwards looking trailing average approach with no transition (Option 4).[488]
- ActewAGL (electricity distribution) also proposed we adopt no transition (Option 4) in a recent determination process, however, now ActewAGL (gas distribution) agrees there should be a transition, though proposed the hybrid transition (Option 3)[489]
- Amadeus proposed a different transition which included a partial transition on the base rate.[490] Conceptually, this is somewhere in between a hybrid transition (Option 3) and a backward looking approach with no transition (Option 4), based on different assumptions about the benchmark efficient financing practices.

Generally, energy retailers, major energy users and small consumer representatives supported our approach of moving from the on-the-day approach to the trailing average approach (Option 2).[491] Among other reasons, consumer submissions highlighted the thorough and consultative nature of the Guideline development process. They considered the return on debt approach in the Guideline should be maintained. For example, in the recent JGN access arrangement process, the Public Interest Advocacy Centre stated:

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[487] CitiPower and Powercor, *Submission on first round of regulatory determinations under the new rules*, February 2015, section 4; SAPN, *Submission on SAPN issues paper*, January 2015, pp.8–10; JGN, *Revised proposal–Access arrangement information*, February 2015, p.21; and United Energy/Multinet, *Submission on first round of regulatory determinations under the new rules*, February 2015, pp.11–14; Energex, *Revised proposal*, July 2015, pp. 111–112; Ergon Energy, *Revised proposal*, July 2015, pp. 143–144.

[488] TransGrid, *Revised proposal*, January 2015, pp.118–125; Ausgrid, *Revised proposal*, February 2015, pp.179–187; and Directlink, *Revised proposal*, January 2015, pp.12–13.

[489] ActewAGL, *Revised proposal*, February 2015, p.427,473; ActewAGL distribution (gas), *Access arrangement information: Attachment 8—Rate of return, gamma and inflation*, June 2015, p. 15.

[490] APTNT, *Access arrangement revision proposal submission*, August 2015, p. 143.

[491] Energy Markets Reform Forum (EMRF), *Submission on AER draft decision Jemena gas Networks' access arrangement*, March 2015, pp.53–78; Origin Energy, *Submission on the AER draft decision for and Jemena gas networks' revised access arrangement*, February 2015, pp.8–10; Ethnic Communities' Council of NSW, Submission to AER on Jemena gas determination, March 2015, pp.3–4; PIAC, *Submission AER draft decision Jemena gas networks*, March 2015, pp.3–4. PIAC's position is stated in more detail in its submission on the draft decision for Ausgrid, Essential Energy and Endeavour Energy: PIAC, *submission on the draft decision for Ausgrid, Endeavour Energy and Essential Energy*, February 2015, p.45; Victorian Energy Consumer and User Alliance, *Submission to the AER, Victorian Distribution Networks' 2016-20 Revenue Proposals*, July 2015, pp. 12-13; Energy Retailers Association of Australia, *Re: Issues paper – Victorian electricity distribution pricing review 2016-2020*, 13 July 2015, p. 1; Origin Energy, *Re: Submission to Victorian Electricity Distributors Regulatory Proposals*, 13 July 2015, p. 9; South Australian Council of Social Service, *Submission to Australian Energy Regulator on SA Power Networks 2015-2020 AER Preliminary Decision*, June 2015, p. 10. The views of other consumer representatives are discussed in the explanatory statement to the final rate of return guideline.

> The Guideline was published in December 2013. Jemena's initial pricing proposal noted that in developing the Guideline, the AER 'consulted widely with consumer groups, network businesses, investors, banks, rating agencies and other stakeholders'.
>
> PIAC made a number of submissions to the development of the Guideline. While the final Guideline was not totally consistent with PIAC's position, the process to develop it was rigorous and the result represents an improved outcome for consumers. Given the Guideline was developed recently and through a transparent and inclusive process, PIAC takes the view that all networks (and consumers) should accept the outcome and propose a WACC that complies with the Guideline.[492]

Origin Energy made similar statements, and also highlighted the regulatory certainty and predictability that is delivered through applying the Guideline approach. Origin Energy stated:

> As part of the Better Regulation reform program, the AER released the Guideline to set out how it determines the return that electricity and gas network businesses can earn on their investments. This followed a comprehensive public consultation period to provide stakeholders with extensive opportunities to raise and discuss matters. The Guideline provides certainty and predictability of outcomes in rate of return issues and a balance between the views of distributors and consumers.[493]

Similar statements were also made by the Energy Markets Reform Forum and Ethnic Communities' Counsel of NSW.[494]

Our decision

How we move from the on-the-day approach to the trailing average approach affects the revenue that service providers may recover from consumers, and the network prices consumers pay.

For SA Power Networks, using a partially backward looking return on debt would result in regulated revenues being higher than revenues resulting from the return on debt approach SA Power Networks proposed in its initial proposal, which we accepted in the preliminary decision. Consistent with the Guideline and preliminary decision, we have also adopted that approach in this final decision.

This difference in revenue reflects the fact that prevailing interest rates are currently lower than the historical average of interest rates over the past 10 years. However, this

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[492] PIAC, *Submission AER draft decision Jemena gas networks*, March 2015, p.4.

[493] Origin Energy, *Submission on the AER draft decision for and Jemena gas networks' revised access arrangement*, February 2015, p.8.

[494] Energy Markets Reform Forum (EMRF), *Submission on AER draft decision Jemena gas Networks' access arrangement*, March 2015, pp.53–78; and Ethnic Communities' Council of NSW, Submission to AER on Jemena gas determination, March 2015, pp.3–4.

is just a consequence of the particular timing of our decision. Equally, prevailing interest rates could have been higher than the historical average. As identified by Chairmont, the Guideline approach (Option 2) would have resulted in a higher starting return on debt from approximately 2011 to late 2014.[495]

Our consideration of how to determine the return on debt is based on well-established economic, financial and regulatory principles. It would reflect our position regardless of whether prevailing interest rates were higher or lower than the 10 year historical average.

We are satisfied our return on debt approach contributes to the achievement of the national electricity and gas objectives, the allowed rate of return objective and is consistent with the revenue and pricing principles. This is because it:

- Has regard to the impact on a benchmark efficient entity of changing the method for estimating the return on debt in one regulatory control period to the next.
- Promotes efficient financing practices consistent with the principles of incentive based regulation.
- Provides a benchmark efficient entity with a reasonable opportunity to recover at least the efficient financing costs it incurs in financing its assets. And as a result it:
    - Promotes efficient investment, and
    - Promotes consumers not paying more than necessary for a safe and reliable network.
- Avoids a potential bias in regulatory decision making that can arise from choosing an approach that uses historical data after the results of that historical data are already known.
- Avoids practical problems with the use of historical data as estimating the return on debt during the global financial crisis is a difficult and contentious exercise.

Implementing the return on debt approach

Our decision is to estimate the return on debt in each regulatory year by reference to:

- a benchmark credit rating of BBB+
- a benchmark term of debt of 10 years
- independent third party data series—specifically, a simple average of the broad BBB rated debt data series published by the RBA and Bloomberg, adjusted to reflect a 10 year estimate and other adjustments[496]

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495 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 11.

496 For the RBA curve, our decision is to interpolate the monthly data points to produce daily estimates, to extrapolate the curve to an effective term of 10 years, and to convert it to an effective annual rate. For the Bloomberg curve, our final decision is to extrapolate it to 10 years using the spread between the extrapolated RBA seven and 10 year curves (for periods where the maximum published Bloomberg estimate is for 7 years), and to convert it to an

- an averaging period for each regulatory year of between 10 business days and 12 months (nominated by the service provider) prior to 25 days before submission of the annual pricing proposal or reference tariff variation proposal.[497]

In the Guideline, we proposed to use one or more third party data series to estimate the return on debt.[498] At that time, however, we had not formed a view on which data series to use. Our April 2014 issues paper outlined how we would make this choice and sought submissions from service providers. In our recent decisions, we formed a view on this issue and adopted a simple average of the RBA and Bloomberg data series. We maintain that position in this decision.

In response to our decisions, service providers have proposed a range of different approaches:

- Some service providers (Energex and Ergon Energy) proposed a simple average between the RBA and BVAL curves, and adopted the Lally method for curve extrapolation.[499] We accept this aspect of those proposals.
- Some service providers (AusNet Services, CitiPower, Powercor, SA Power Networks) proposed a simple average between RBA and BVAL curves, but with changes to the extrapolation and/or interpolation adjustments adopted by the AER in recent decisions.[500] For example, some service providers proposed an alternative extrapolation approach initially proposed by SA Power Networks, or that the extrapolation approach should be tested each year against a sample of bonds, or that manually extrapolating the BVAL 7 year estimate to 10 years is better than using the BVAL published 10 year estimate. We do not accept this aspect of those proposals.
- Some service providers (ActewAGL, AGN, JEN, United Energy) proposed an annual process to choose the data series and the extrapolation methodology.[501]

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effective annual rate. This extrapolation of the Bloomberg curve applies to the return on debt in 2015–16. However, for subsequent years this extrapolation is not necessary. This is because Bloomberg started publishing a 10 year estimate in April 2015,

497 See: appendix I of this decision.

498 AER, *Explanatory statement—Rate of return guideline*, December 2013, pp. 23–4.

499 Energex, *Revised regulatory proposal*, June 2015, p.103 (Energex stated it had two main issues in relation to the return on debt estimated by the AER in the preliminary decision. Neither of these two issues were the choice of data series or extrapolation adjustment. Accordingly, we understand that Energex has not maintained its initial proposal position on these matters. Our understanding that Energex has not maintained its initial proposal position is also informed by the following. Energex proposed to use only the RBA curve in its initial proposal. However, in a later submission, after considering our position and reasons in the November 2014 draft decision for other service providers, Energex stated it was also supportive of using a simple average of the RBA and BVAL curves. Energex, *Response to AER issues paper—Qld electricity distribution regulatory proposals*, January 2015, p. 24.; Ergon Energy, *Revised regulatory proposal—Appendix C: Rate of return*, June 2015, pp.143,151.

500 AusNet Services, *Initial regulatory proposal,* April 2015, pp.343–345; CitiPower, *Initial regulatory proposal*, April 2015, pp.234–235; Powercor, *Initial regulatory proposal*, April 2015, pp.242–243; and SA Power Networks, *Revised regulatory proposal*, June 2015, pp.389–391.

501 ActewAGL, *Initial proposal—Appendix 8.01: Detailed return on debt proposal*, June 2015, pp.1–2, 18–24; AGN, *Initial proposal—Attachment 10.1: Rate of return*, July 2015, pp.51–52; JEN, *Initial regulatory proposal—*

For example, some service providers proposed rather than deciding the data series upfront, an annual testing process should be used to identify which data series 'best fits' a sample of bonds selected on certain criteria. The particular data series to be tested, differs between each service providers' proposals. The particular test to be applied also differs between some service providers. These service providers also proposed that the choice of extrapolation method should be selected annually in a similar way. We do not accept this aspect of those proposals.

- One service provider (Amadeus) proposed sole reliance should be placed on the RBA curve.[502] We do not accept this aspect of that proposal.

The CCP maintained its position that no third party data series should be used. Instead, the CCP submitted that we should estimate the return on debt by reference to service providers' actual cost of debt.

In the following sections, we explain our key reasons for adopting the above positions. We also respond to return on debt issues raised by SA Power Networks, other service providers with recent proposals, and consumer representatives. In appendices G and H, we provide further supporting material for these positions and respond in detail to issues raised by stakeholders. In appendix I, we set out our methodology to annually update the return on debt. And in confidential appendix K we set out Energex's averaging periods for the return on debt.

For the reasons set out in this attachment, and the appendices noted above, we are satisfied our decision on the return on debt:

- is commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to JGN in providing regulated services. Accordingly, we are satisfied this return on debt contributes to the achievement of the allowed rate of return objective.
- is consistent with the national objectives and the revenue and pricing principles, including providing SA Power Networks with a reasonable opportunity to recover at least its efficient costs and providing effective incentives in order to promote economic efficiency.
- enables the revenue change resulting from the annual debt update to be automatically effected through a formula specified in the decision.[503]

Attachment 9.2: Rate of return proposal, April 2015, pp.96–101; and United Energy, *Initial regulatory proposal—Attachment: Rate of return on debt*, April 2015, pp.24–30.

502 Amadeus, *Initial proposal—Access arrangement information*, August 2015, pp.30–31.

503 NER, cl. 6.5.2(l) and cl. 6A.6.2(l); NGR, r.87(12).

Legislative framework for return on debt estimation

In section 3.3.1 of this attachment, we set out all of the legislative requirements relating to determining the rate of return. Those most relevant to the approach to determining return on debt are below.

The rules require that the return on debt for a regulatory year is to be estimated such that it contributes to the achievement of the allowed rate of return objective.[504] That objective is that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services.[505]

The rules require that we must have regard to the following factors in estimating the return on debt:[506]

- The desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the allowed rate of return objective.[507] We understand this factor to mean the difference between the return on debt allowance the AER sets (the allowed return on debt) and the cost of debt a benchmark efficient entity would incur based on our assumptions on the efficient financing practices of a benchmark efficient entity (the actual return on debt). For clarity, we do not consider this factor relates to minimising the difference between the return on debt allowance and the actual cost of debt incurred by an actual service provider. The actual cost of debt of an actual service provider is relevant only to the extent it reflects the cost of debt incurred by a benchmark efficient entity.
- The interrelationship between the return on equity and the return on debt.[508]
- The incentives that the return on debt may provide in relation to capital expenditure over the regulatory control period, including as to the timing of any capital expenditure.[509]
- Any impacts (including in relation to the costs of servicing debt across access arrangement periods) on a benchmark efficient entity referred to in the allowed rate of return objective that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory control period to the next.[510]

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504 NER cl. 6.5.2(b) and cl. 6A.6.2(c) NGR, r.87(8).
505 NER cl. 6.5.2(c) and cl. NGR, r.87(2)(3).
506 NER, cl. 6.5.2(k) and cl. 6A.6.2(k); NGR, r.87(11)
507 NER, cl.6.5.2(k)(1) and cl.6A.6.2(k)(1); NGR, r.87(11)(a),
508 NER, cl.6.5.2(k)(2) and cl.6A.6.2(k)(2); NGR, r.87(11)(b).
509 NER, cl.6.5.2(k)(3) and cl.6A.6.2(k)(3); NGR, r.87(11)(c).
510 NER, cl.6.5.2(k)(4) and cl.6A.6.2(k)(4); NGR, r.87(11)(d).

The last factor is particularly relevant to the current decision because both our method in this decision and the methods proposed by service providers with current proposals are a change from the method used to estimate the return on debt in the previous regulatory control period.[511]

Below we discuss impacts on a benchmark efficient entity that arise from changing the method for estimating the return on debt. We discuss impacts that occur across regulatory control periods, such as over the life of a benchmark efficient entity's regulated assets. We consider the rules require us to do so. The rules refer to 'any' impacts on a benchmark efficient entity as a result of changing the return on debt methodology. The rules then give an example of one impact—the cost of servicing debt across regulatory control periods. Accordingly, the rules indicate that it is appropriate to take a perspective across more than one regulatory control period.

The Australian Energy Market Commission (AEMC) has also made comments which support this perspective. It stated:

> The purpose [of this factor] … is for the regulator to have regard to the impacts of changes in the methodology for estimating the return on debt from one regulatory control period to another. Consideration should be given to the potential for consumers and service providers to face significant and unexpected change in costs or prices that may have negative effects on confidence in the predictability of the regulatory arrangements.[512]

The AEMC further stated:

> Its purpose is to allow consideration of transitional strategies so that any significant costs and practical difficulties in moving from one approach to another is taken into account.[513]

As a result, we consider that we should have regard to any impacts on a benchmark efficient entity that arise from changing the methodology for estimating the return on debt. This includes those impacts that:

- occur across regulatory control periods
- involve significant changes in cost or prices that arise from any change in the method
- involve practical difficulties.

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511 AER, *Final decision—Queensland distribution determination 2010–11 to 2014–15*, May 2010, pp. 252–253; AER, *Final decision—Victorian electricity network distribution service providers: Distribution determination 2011–2015*, p. 496; AER, *Final decision— Envestra Ltd: Access arrangement proposal for the SA gas network,* June 2011, pp. 55, 58; AER, Final decision— *Access arrangement proposal: ACT, Queanbeyan and Palerang gas distribution network*, March 2010, pp. 40, 57; AER, Final decision—NT Gas: Access arrangement proposal for the Amadeus Gas Pipeline August 2011 to June 2016, July 2011, p. 78.

512 AEMC, *Final rule change determination*, 29 November 2012, p. 85.

513 AEMC, *Final rule change determination*, 29 November 2012, p. 85.

This is important because the assets which provide regulated services tend to have long lives, well beyond a single regulatory control period. It is also consistent with the NPV principle, which we discuss later in this attachment.

Finally, if the return on debt method results in an estimate that is, or could be, different for different regulatory years, then the rules require that the resulting change to the service provider's total revenue must be effected through the automatic application of a formula that is specified in the decision for that regulatory period.[514]

Overall return on debt

In determining our approach to estimate the return on debt, we make a series of underlying decisions about the characteristics of the benchmark efficient entity. Having done so, we then design an approach that will reasonably reflect these benchmark characteristics and promote the objectives in the law and the rules.

In the regulatory proposals currently before us, service providers have proposed a range of departures from our Guideline approach. In considering these proposals, we have encountered consistent themes in the proposals put to us and in our views on those proposals. This section addresses these themes, and how we have had regard to them in our decision making. In particular, it addresses:

- the need for a simplified benchmark
- a forward-looking and unbiased approach
- risk in an incentive framework
- the introduction of greater complexity
- the consultation process of developing our position
- the alignment of our approach with actual debt costs and practices.

The need for a simplified benchmark

We are satisfied that our approach will determine an allowed return on debt that reflects the efficient financing costs of a benchmark efficient entity. Necessarily, this benchmark is a simplification of reality. Acting efficiently, individual firms may adopt variations on our benchmark efficient practices in response to factors such as:[515]

- different priorities in risk management—for example, some firms may be willing to accept a higher level of refinancing risk in order to more fully mitigate interest rate risk and vice versa.

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514 NER cl. 6.5.2(l) and cl. 6A.6.2(l), NGR, r.87(12)

515 See, for example: Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 18.

- domestic bond market opportunities—for example, some firms may perceive that prevailing market conditions favour the use of shorter or longer term debt. Similarly, firms may choose to accelerate financing in response to a period of favourable rates.
- other market opportunities—for example, firms may raise debt with different credit ratings, in overseas markets, through bank facilities or in private placement markets.
- corporate structures—some firms may adopt different strategies in response to ownership under different corporate group structures.

We engaged Chairmont to evaluate the range of alternative financing practices available to a benchmark efficient entity. Chairmont considered in detail a range of alternative strategies, including:[516]

- leaving some proportion of historical fixed rate exposure unhedged (either fixed or floating—this is a strategy that a number of service providers identified, though only APTNT proposed to adopt it. Chairmont concluded that this particular strategy was not efficient.
- issuing shorter or longer term debt
- 'lumpier' debt issuance—where the benchmark efficient entity issues a greater proportion of debt where market conditions are favourable
- issuing debt with different features—such as subordinated or enhanced debt (e.g. credit wrapped or asset-backed securities)
- combinations of the above.

Having regard to these alternative practices, Chairmont observed that:

- there is no single, unique efficient financing practice.[517]
- '[m]any of the strategies produced a somewhat lower cost than the basic approach'.[518]
- 'Any number of possible financing practices can be defined by relaxing the strict assumptions of AER's Basic Approach. However, not all possible financing practices will be efficient.'[519]

Having regard to this range of alternatives, we are satisfied that there is no single, forward looking approach that precisely matches the actual debt financing costs of

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[516] Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 21–35

[517] Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 17

[518] The AER's 'Basic Approach' as described by Chairmont is the efficient practice we have determined the service providers would have followed under the 'on the day' regime. Under this approach, at the time of transition the service provider would have a historical trailing average DRP portfolio and a prevailing base rate. Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 5–6.

[519] Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 17.

each possible efficient strategy. Further, we are not persuaded that this is what the rules require. In developing our view, we have identified a series of characteristics and practices that a benchmark efficient firm may have adopted.[520] However, we have not sought to define exclusively the precise strategy that all entities, acting efficiently, would follow. Nonetheless, we consider the relevant risks between all energy network service providers are sufficiently similar for there to be a single benchmark efficient entity. Chairmont has previously stated:[521]

> [The] AER's assumption of efficient debt raisings being limited to borrowing using 10 year bonds in a smoothly staggered manner does not reflect these broader possibilities and opens the door for some discrepancies between allowed and actual cost of debt. However, the myriad of other possible debt profiles means that it would be complicated and difficult to find agreement on what benchmark profile could be used. AER's current assumption may be the most appropriate neutral benchmark which leaves room for NSPs to seek further efficiencies in their financing programs.

We therefore consider that proposals to depart from specific aspects of the guideline approach should not be viewed in isolation. For example, we are not satisfied that it is reasonable to assess in isolation a more complex weighting approach for the trailing average portfolio while still adopting the simplifying assumption that firms consistently issue 10 year bonds. In reality, the observed sector average term of debt issuance is below 10 years,[522] and there was evidence presented during development of the Guideline that firms regularly issue debt at different terms and in different markets.[523] A more complex weighting system may incrementally reduce the mismatch between allowed revenue and costs relating to that specific aspect of the approach. However, overall it may not lead to a result that is materially preferable in view of other assumptions employed.

A forward looking and unbiased approach

It is an important feature of building block incentive regulation that the approach used to determine the rate of return is set on a forward-looking basis. In particular, use of a historical averaging period can introduce a bias in regulatory decision making from choosing an approach that uses historical data after the results of that historical data is already known.

We are satisfied that an unbiased approach will contribute to estimating a rate of return that is commensurate with the efficient financing costs of a benchmark efficient entity. Setting the rate of return with foreknowledge of the outcome does not reward efficient decision making or allow a comparison to benchmark performance. It does not provide

520 For example, we considered an approach of not hedging any of the base rate component of debt was not efficient. Chairmont finds that a strategy of leaving any amount of unhedged base rate exposure was not an efficient strategy. Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 33–35.

521 Chairmont, *Cost of debt: Transitional strategies*, April 2015, p. 26.

522 AER, *Better Regulation—Final rate of return guideline: Explanatory statements*, December 2013, p. 136.

523 AER, *Better Regulation—Final rate of return guideline: Explanatory statements*, December 2013, p. 136.

the appropriate incentive for efficient investment, as contemplated in both the NEO/NGO and the revenue and pricing principles.[524] This is because the use of backwards looking data in selecting a regulatory approach is likely to increase the risk of biased regulatory decision making.

Risk in an incentive framework

Under the building block revenue framework, we set benchmark allowances such that service providers have a reasonable opportunity to recover at least their efficient costs, while still providing appropriate incentives to innovate and to make efficient investments. This is in the long term interests of both investors and consumers because it drives efficiency improvements.

The framework provides this incentive by setting allowances based on benchmark efficient levels, then allowing the service providers to:

- retain some of the benefits of outperforming allowances
- face the consequences of underperforming compared to allowances.

Over time, we reflect these more efficient behaviours in the assumptions used to set benchmark efficient allowances.[525] By this process, the benefits of efficiency gains are shared between investors and customers of the networks. However, the scope to outperform or underperform compared to revenue requires the possibility for a mismatch between allowed revenue and actual costs. Designing an approach that entirely minimises the differences between allowed and actual costs can disrupt the efficiency incentives of the regime. In a report for the QCA, Professor Flavio Menezes observed that:[526]

> The guarantee of cost recovery, however, introduces another problem known as moral hazard. Given that it is not possible for the regulated monopolist to earn additional profits above the rate-of-return determined by the regulator, there will no economic incentives to exert any managerial or cost-reducing efforts. There are no "excess profits" left on the table.

For these reasons, we are satisfied that some potential for allowed and actual cost to diverge is desirable in promoting efficient incentives. Nonetheless, in order to achieve the NPV=0 principle, it is important that this risk is symmetrical. For example, Lally observed that:

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524 NEL s. 7 and s. 7A; NGL s. 23 and s. 24.

525 We recognise that in some cases, efficient behaviours are a response to a particular regulatory regime. However, our benchmark reflects observed efficient behaviours even where these do not appear to be direct consequences of the regulatory regime. For example, under the 'on-the-day' approach, service providers could have eliminated all interest rate risk by issuing 5 year debt entirely during the averaging period. However, we observed that many service providers instead tended to issue staggered debt over time and hedge all or most of the base rate component of this debt back to the averaging period. This behaviour appears to be a revealed efficient behaviour to mitigate refinancing risk, and forms the basis of the trailing average return on debt approach.

526 Menezes, *Incentive regulation*, 4 August 2014, p. 11.

> The AER is subject to the legal requirement to set the allowed cost of debt commensurate with the efficient costs incurred by a BEE, and this is equivalent to the net present value (NPV) = 0 principle. A policy of immediately adopting a new regime only when the one-off impact is favourable to the BEE but not otherwise would necessarily violate this NPV = 0 principle. Alternatively, a policy of immediately adopting a new regime in all cases would expose the BEE to potentially very large risks, thereby discouraging investment. It would also expose the BEE to the possibility of an adverse shock so large as to threaten its financial viability, which would either lead to regulatory relief in such cases (and hence violation of the NPV = 0 principle) or the possibility of a supply disruption. In addition, even if the policy of immediately adopting a regime change regardless of the one-off impact on the BEE were rigorously followed, the upside and downside from such a policy might not be symmetric, in which case the NPV = 0 principle would still be violated. These disadvantages are all so substantial that the only viable regulatory policy would be to neutralize the one-off effects of regime changes, possibly through a transitional regime, or at least to do so when the effects in either direction are substantial.

To ensure this risk is symmetrical, it is important to avoid bias in regulatory decision making. This is particularly sensitive in these determinations, which take place in a transitional period between rate of return regimes. Our approach is designed such that service providers will face the outcomes on their debt raising decisions consistent with the expectations when that debt was issued. That is, for debt issued under the previous return on debt regime, outcomes will be consistent with those that would have arisen under the previous regime. For debt issued under the new regime, outcomes will be as per the trailing average portfolio. We are satisfied this approach achieves the NPV=0 principle in expectation, and is symmetrical and unbiased.

We have discussed this issue in greater detail in later in this section.

The introduction of greater complexity

Across the sector, service providers have proposed a range of departures from our benchmark approach as developed in the rate of return guideline and recent decisions.

There is no consensus between service providers and stakeholders as to alternative approaches that would promote achievement of the allowed rate of return objective. In some cases, service providers have proposed divergent departures from the same guideline positions. For example, service providers proposed a range of different approaches to:

- weighting of annual estimates within the trailing average approach—see discussion later in this section and appendix G
- selecting averaging periods—see discussion later in this section
- choosing the data series to implement the return on debt estimate—see discussion later in this section and appendix I.

The proposals have in common that they increase the complexity in applying the approach, and/or the flexibility allowed to service providers in estimating the regulatory return on debt. In total, it is not possible or practicable to adopt all of the service providers' proposed approaches. Further, it is desirable from a practical perspective and a policy perspective to adopt a consistent approach across service providers.

In deciding whether to adopt these more complex proposals, we have considered the incremental advantages and costs of the more complex approach. In some cases, the advantages of a more complex approach outweigh the incremental costs. For example, the trailing average approach to estimating the return on debt is more complex to apply than the on the day approach. We are satisfied that the relatively simpler 'on the day' approach would satisfy the allowed rate of return objective. However, the trailing average approach has material benefits for both service providers and consumers.

In contrast, we are not satisfied that the advantages of some of these more complex proposals outweigh the disadvantages. For example, some service providers have proposed to adopt a PTRM-weighted average approach to estimate the return on debt rather than the simple average adopted in our Guideline approach and in decisions since the Guideline. Energex and Ergon Energy argue that this approach will minimise the difference between allowed and actual costs in the majority of plausible circumstances. However, in this case, we are not satisfied that the PTRM weighted approach results in a material difference in outcomes over time. Similarly, we are not persuaded that it promotes preferable capex incentives to those under the simple approach. We are not satisfied that the incremental gains from these departures outweigh the costs of making the approach more complex. Similarly, we are not persuaded that it is advantageous or practical to adopt a more complex approach of annually testing the choice of data series. In contrast, we have adopted a simple average of the RBA and BVAL curves, adjusted to produce daily rates and match the benchmark term.
Further, we note that despite a systematic mismatch between allowances and costs under the 'on the day' regime,[527] service providers continued to invest substantially in their networks during the last five year period (including the GFC). We therefore are not persuaded that our simplified benchmark would create a level of risk that would deter efficient investment.

We have discussed this issue in greater detail in sections 3.4.2 and appendix G, on:

- the weighting approach
- the approach to averaging periods

The consultation process of developing our position

The process of developing our return on debt approach under the current rate of return regime began in 2013, during the rate of return guideline process. At this time, we

527 See, for example: Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 37.

consulted widely with service providers, other industry stakeholders, consumers and finance experts. At the end of this process, we set out a comprehensive explanatory statement to provide guidance and certainty as to the approach we intended to adopt in upcoming determinations. Further:

- since publication of the Guideline, we have applied our approach in 11 regulatory determinations[528] and consulted widely at each stage of these determinations
- the debate and analysis on some of these issues (such as the implementation of prevailing return on debt estimates, and the need for forward looking averaging periods) stretches back as far as the 2009 AER WACC review[529]
- our position on the trailing average portfolio return on debt and the approach to transition was also developed during the period of consultation during the AEMC rule change process (2012) which resulted in the change of regime
- our position on implementation of the return on debt also included an issues paper following release of the Guideline[530]

In total, we have consulted widely and iteratively over a long period in determining our approach. We have had regard to regulatory proposals, submissions, expert reports, market information on the term of debt and credit rating and other regulators' decisions. Many of the currently proposed departures from the Guideline approach have been addressed previously through this consultation process. With regard to these issues we consider that our process of reasoning has been well documented. We have assessed and had regard to the material put to us in these current regulatory proposals. Nonetheless, transparency and predictability are important to service providers, investors and consumers.[531] Maintaining the Guideline approach promotes this predictability and transparency.[532] We are not persuaded that the proposals or submissions currently before us justify a departure from the Guideline.

We also note that the Australian Competition Tribunal is currently considering the return on debt decisions of the AER released in April 2015 for Ausgrid, Endeavour Energy, Essential Energy and ActewAGL and released in May 2015 for Jemena Gas Networks. A number of key areas of disagreement between the AER and the service providers are being considered as part of this review process. The AER will consider the decisions of the Tribunal when they are handed down.

528 Specifically, our final determinations for Ausgrid, ActewAGL, Directlink, Endeavour Energy, Essential Energy, JGN, TransGrid and TasNetworks, as well as our preliminary decisions for Energex, Ergon Energy and SAPN.

529 AER, *Electricity transmission and distribution network service providers—Review of weighted average cost of capital (WACC) parameters*, May 2009.

530 AER, *Return on debt: Choice of third party data service provider—Issues paper*, April 2014.

531 PIAC, *Submission to the consultation paper*, June 2013, p. 6; Paul Johnston, *Investor perspectives on energy market reform, Presentation to ENA forum*, 24 July 2013, p. 2.

532 For example, Moody's has previously observed that the AER following its rate of return guidelines would continue to support the predictability of regulated service providers' cash flows. See: Moody's, *2016 Outlook- Australia Regulated electricity and Gas Networks: Transparency in regulatory framework supports stable outlook, but countermeasures required to offset declining return*s, June 2015.

The alignment of our approach with actual debt costs and practices

In August 2015, we collected information on the actual costs of debt and financing practices from private sector service providers with regulatory proposals currently before the AER.[533] Since this time, we have begun the process of evaluating this information. In particular, we engaged Chairmont to aggregate the responses and to consider whether those responses could inform our analysis. In an aggregated form, we consider this information may help us to form conclusions about the financing practices historically and currently employed by the benchmark efficient entity.

Nonetheless, as we collected this information following Energex, Ergon Energy and SAPN's revised proposals, these service providers have not had an opportunity to consult on how this information could be used in our analysis. Therefore, we have not relied on this analysis in reaching our conclusions in this decision. We will consult more broadly with stakeholders on any future use of this information.

Approach to estimating the return on debt

Our decision is to estimate an on-the-day rate in the first regulatory year of the 2015–20 regulatory control period, and to gradually transition this rate into a forward looking trailing average approach over 10 years. This gradual transition will occur through updating 10 per cent of the return on debt each year to reflect prevailing interest rates during SA Power Networks' debt averaging period in each year. We are satisfied that this approach contributes to the achievement of the allowed rate of return objective.

Summary of our assessment of each approach

In this section, we explain why our approach (and SA Power Networks' approach in its initial proposal) contributes to the achievement of the rate of return objective.

In previous decisions, we applied the on-the-day approach. We understand that this was the approach required by the rules at the time.[534] However, the current provisions of the rules permit either maintaining the on-the-day approach or changing to a different approach.[535] We have decided to change to a different approach, as we proposed in the Guideline.

We considered four broad options to estimate the return on debt. These options were:[536]

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533 Specifically: AusNet Services, Australia Gas Networks, CitiPower, JEN, Powercor, SAPN and United Energy.

534 Both electricity and gas rules stated the rate of return had to reflect 'prevailing conditions in the market for funds' which suggests the on-the-day approach was required. AEMC*, Directions paper–National electricity amendment (Economic regulation of network service providers) rule 2012 and national gas amendment (price and revenue regulation of gas services) rule 2012*, March 2012, pp. 112–13.

535 NER cl. 6.5.2(j) and cl. 6A.6.2(j); NGR, r.87(10).

536 There are also variations to some of these options that are possible, particularly to option 3. We consider some of these variations in appendix G. Further, in the Guideline and our November 2014 draft decisions for other service

- Option 1—Continue the on-the-day approach
- Option 2—Start with an on-the-day rate for the first regulatory year and gradually transition into a trailing average approach over 10 years
- Option 3—Hybrid transition. Start with an on-the-day rate for the base rate component and gradually transition into a trailing average approach over 10 years. This would be combined with a backwards looking trailing average DRP (that is, a base rate transition only).
- Option 4—Adopt a backwards looking trailing average approach (that is, no transition on either the base rate or DRP components of the return on debt).

We are not satisfied that the approach SA Power Networks proposed in its revised proposal (Option 3) would better contribute to the achievement of the allowed rate of return objective, than a gradual transition to the trailing average approach (Option 2). In this section, we summarise our considerations on each option.

We are satisfied that continuing with the on-the-day approach (Option 1) or gradually transitioning to the trailing average approach (Option 2) would contribute to the achievement of the allowed rate of return objective. Whereas we consider the hybrid transition (Option 3) may contribute to the achievement of the allowed rate of return objective. Our preferred option is to gradually transition from the on-the-day approach to the trailing average approach (Option 2). We consider Option 2 would better satisfy the allowed rate of return objective than Option 1 or Option 3. Further, we consider a backwards looking trailing average approach (Option 4) would not contribute to the allowed rate of return objective.

Option 1—Continue the on-the-day approach

The on-the-day approach is the longstanding return on debt approach adopted by us and other regulators in Australia. While the rules no longer mandate we adopt this approach, it remains an approach available to us under the rules. As the on-the-day approach is the current approach, it is natural to consider the merits of continuing with the current approach relative to the merits of changing to a new approach. That is, if we change to a new approach it should be because we consider the new approach better satisfies the allowed rate of return objective than continuing with the current approach.

We are satisfied that the on-the-day approach (Option 1) is a reasonable approach and would contribute to the achievement of the allowed rate of return objective. This is because:

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providers we also considered another option which was to continue to the set the base rate component of the return on debt based on prevailing market conditions at the time of each future regulatory determination and combine with a trailing average DRP. However, as no stakeholder currently advocates that position, nor is it the current approach, we do not consider that option in this decision. For our considerations on this option, see: AER, *Draft decision Jemena gas networks access arrangement 2015–20 Attachment 3*, November 2014, appendix G2, pp.423–426.

- it provides a benchmark efficient entity with a reasonable opportunity to recover its efficient financing costs over the life of its assets—the approach is unbiased—at the time averaging periods are nominated they are in the future and so avoids a bias in regulatory decision making that can arise from choosing an approach that uses historical data after the results of that historical data is already known.
- the on-the-day approach was the approach we and our predecessor energy regulators applied in the past when service providers issued their existing debt—[537]continuing to apply that approach maintains the outcomes of service provider's past financing decisions, consistent with the principles of incentive regulation.
- it avoids practical problems with the use of historical data as estimating the return on debt during the global financial crisis is a difficult and contentious exercise.[538] However, we are satisfied that this is a relatively minor issue compared to the above points.
- it remains the standard approach adopted by several other Australian regulators[539] and is supported by advice from an academic perspective (Dr Martin Lally).[540]

Option 2—Gradual transition to the trailing average approach

We are also satisfied that gradually transitioning from the on-the-day approach to the trailing average approach (Option 2) is a reasonable approach and would contribute to the achievement of the allowed rate of return objective. This is because it shares some of the positive attributes of the on-the-day approach. Specifically the on-the-day approach (Option 1) and therefore also Option 2:

- provides a service provider with a reasonable opportunity to recover its efficient financing costs over the life of its assets— it therefore mitigates any impact on a

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537 As noted by SAPN and CEG, ESCOSA estimated SAPN's cost of debt using a 'rolling average' over prevailing rates over the preceding 5 years. As noted by ESCOSA, this was a unique approach in Australia. The 'rolling average' applied during the 2005–06 to 2009–10 regulatory period. For this reason, we accept that debt arrangements entered into under that period may not have been consistent with those under the 'on-the-day' approach. However, debt raised during this period will have a relatively lower impact on outcomes through the transition period as (at least) 5 years of the assumed 10 year debt terms have already elapsed. Therefore, we are satisfied that this conclusion holds entirely for most service providers and largely for SAPN.

538 AEMC, *Directions paper–National electricity amendment (Economic regulation of network service providers) rule 2012 and national gas amendment (price and revenue regulation of gas services) rule 2012*, March 2012, pp. 105–106

539 For example, QCA proposed to maintain the on-the-day approach with five year term for the risk free rate component and 10 year term for DRP. For more details, see: QCA, *Trailing average cost of debt: draft decision*, 24 August 2014, p.24. On the other hand, the ERA retained a form of the 'on-the-day' approach but with annual updates to the debt risk premium component of the total cost of debt. It also applies five year debt term. Economic Regulation Authority (ERA) Western Australia, *On the benchmark cost of debt: efficiency considerations*, June 2013.

540 Lally, *The trailing average cost of debt*, 19 March 2014, p.51. Also, SFG advised that the on-the-day approach satisfies the NPV principle and matches the regulated rate of return to the 'true cost of capital', whereas the trailing average approach would create investment distortions and the only arguments in favour of a trailing average approach are based on practical considerations. SFG, *Preliminary analysis of rule change proposals*, February 2012, pp.46–48.

benchmark efficient entity that could arise as a result of changing the methodology to estimate the return on debt.

- is unbiased—at the time averaging periods are nominated they are in the future and so avoids a bias in regulatory decision making that can arise from choosing an approach that uses historical data after the results of that historical data is already known.
- the on-the-day approach was the approach applied by us and our predecessor energy regulators in the past when service providers issued their existing debt—continuing to apply that approach to existing debt maintains the outcomes of service provider's past financing decisions, consistent with the principles of incentive regulation.
- avoids practical problems with the use of historical data as estimating the return on debt during the global financial crisis is a difficult and contentious exercise. However, we are satisfied that this is a relatively minor issue compared to the above points.

At the same time, it partly matches the allowed return on debt with a benchmark efficient entity's financing cashflows over the next regulatory control period as its transitions its financing practices to the trailing average approach.[541]

We consider commencing with an on-the-day rate and gradually moving towards the trailing average approach (Option 2) is preferable to maintaining the on-the-day approach (Option 1). This is because the eventual adoption of a trailing average approach:

- Reduces risk for service providers by providing a regulatory benchmark that they can more readily match in each regulatory period,[542] and
- Reduces price volatility for consumers across regulatory periods in the medium to long term.[543]

Gradually moving from the on-the-day to trailing average approach is supported by advice we have received from Dr Lally.[544] It was also supported by SAPN, Energex and Ergon Energy in their initial regulatory proposals.

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541 Specifically, it broadly matches (though over-compensates) a benchmark efficient entity for the base component of its cost of debt. This is because it is based on a 10 year term, whereas the impact of hedging is to reduce the effective term of the base rate. And as the yield curve is typically upward sloping, shorter term debt is typically cheaper than longer term debt. Whether the allowed DRP matches, or is higher or lower than, a benchmark efficient entity's financing cashflows with respect to the DRP component depends on whether the prevailing and historical average DRP is higher, lower, or around the same level as each other.

542 AER, *Explanatory statement to the final rate of return guideline*, December 2013, pp.108–110.

543 AER, *Explanatory statement to the final rate of return guideline*, December 2013, pp.108–110; AER, *Draft decision–TransGrid–Transmission determination–Attachment 3*, November 2014, pp. 123–124.

544 Lally, *Transitional arrangement for the cost of debt*, November 2014, pp.3–5; Lally, *Review of submissions on the cost of debt*, April 2015, pp.3–6; Lally, Review of submission issues on the cost of debt, October 2015, pp. 3–5.

We also engaged Chairmont to assess submissions on the approach to transition. Chairmont is an expert market practitioner, and we engaged Chairmont to provide: [545]

- advice on the efficient financing practices of a benchmark efficient entity under the previous 'on-the-day' approach, and therefore what the debt portfolio of a benchmark efficient entity would be at the start of the new regulatory period, along with what efficient financing practices a benchmark efficient entity would adopt under the AER's transition approach.
- advice on the extent of any under or over recovery of borrowing costs experienced by a benchmark efficient entity in the circumstances of particular service providers under the previous on-the-day approach, and under the AER's transition approach.

As noted by Chairmont, it did not address policy level issues.[546] Within this scope, Chairmont recommended that:

> - AER should continue to use the [hybrid approach (Option 3)] for its depiction of EFPs for NSPs going into the transitional phase.
> - As a consequence of the above, the allowed return on debt should be calculated in line with the [hybrid approach (Option 3)], i.e. a trailing average DRP and the average 1-10 year swap rates.[547]

We agree with Chairmont that the hybrid approach will provide a good match over the 10 year transition period to the costs of a benchmark efficient entity entering the transition from the 'on-the-day' regime. However, having regard to wider policy issues, we have maintained the Guideline approach. In particular we consider that proposal and adoption of the hybrid approach on the basis of changes in prevailing rates would introduce bias into regulatory decision making and violate the NPV=0 principle.

Option 3—Hybrid transition

We consider the hybrid transition (Option 3) may be a reasonable approach and contribute to the achievement of the allowed rate of return objective, but it is not our preferred approach. The benefits of this approach are that it:

- maintains the outcomes of service provider's past financing decisions consistent with the principles of incentive regulation by continuing to apply the on-the-day rate to the component of the debt which service providers had most control over (the base rate component)
- provides a good match between the allowed return on debt and a benchmark efficient entity's financing costs over the period it takes a benchmark efficient entity to transition its financing practices to the trailing average approach.

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545 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 47–48. Note: we also engaged Chairmont to assess the responses to information provided by service providers in response to recent information requests. As set out elsewhere in this report, we have not relied on this analysis in reaching our conclusions in this decision. We will consult more broadly with stakeholders on any future use of this information.

546 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 16.

547 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 14.

The downside of the hybrid transition includes:

- Transitioning from the on-the-day approach using the hybrid transition can create a mismatch between the allowed return on debt and the efficient financing costs of a benchmark efficient entity over the life of its assets. The change in the regulatory regime can therefore create windfall gains or losses to service providers or consumers. Windfall gains or losses do not result from a service provider's efficient or inefficient decisions. In effect, they are a side effect of changing the methodology for estimating the return on debt at a particular point in time. They should be avoided, so that economic regulatory decisions deliver outcomes based on efficiency considerations, rather than timing or chance.
- It has the potential to create a bias in regulatory decision making by choosing an approach that uses historical data after the results of that historical data is already known
- It does not avoid the practical difficulties with the use of historical data for the component of the return on debt where these difficulties arise (the DRP component). However, we are satisfied that this is a relatively minor issue compared to the above points.

Option 4—Backwards looking trailing average approach

We are not satisfied that adopting a backwards looking trailing average (Option 4) is reasonable or would contribute to the achievement of the allowed rate of return objective. This is because it:

- It has the potential to create a bias in regulatory decision making that can arise from the selection of historical data after the results of that data is already known.
- would exaggerate a mismatch between the allowed return on debt and the efficient financing costs of a benchmark efficient entity over the life of its assets. This means that over the life of the assets a benchmark efficient entity is likely to materially either over- or under-recover its efficient financing costs.
- does not approximately match the allowed return on debt with the efficient financing costs of a benchmark efficient entity over the 2015–20 period as it transitions its financing practices to the trailing average approach. Given a benchmark efficient entity will already have financing practices in place it entered into in the past, it needs time to unwind these practices and gradually adopt practices that match the trailing average approach. This transformation cannot occur instantly and does not avoid practical difficulties with the use of historical data. However, we are satisfied that this is a relatively minor issue compared to the above points.

In the next section we provide some background information on the meaning of efficient financing costs and also define some key financial concepts. In the sections that follow, we explain our considerations of the options above in more detail.

Meaning of efficient financing costs and key financial concepts

Meaning of efficient financing costs

The allowed rate of return objective is that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of regulated services.[548]

We consider the efficient debt financing costs of a benchmark efficient entity as those which are expected to minimise its debt financing costs over the life of its assets, while managing refinancing risk and interest rate risk:

- Refinancing risk—the risk that a benchmark efficient entity would not be able to refinance its debt when it matures.[549]
- Interest rate risk—the risk associated with a mismatch between the allowed return on debt and a benchmark efficient entity's actual return on debt.

Our approach to the meaning of efficient financing costs was broadly supported by expert advice commissioned by us (Chairmont, Lally), and by advice commissioned by the service providers in recent regulatory processes (Frontier, SFG).[550] For example, Chairmont stated:

> This is a good high level definition because it captures the required balancing of cost and risk. It also foreshadows the contentious areas in the transitional arrangements debate.[551]

Similarly, Frontier stated:

> In my view it is reasonable to consider that efficient service providers would be seeking to minimise the expected present value of its financing costs over the life of its assets. In this endeavour, the service provider would weigh up considerations such as the rate of interest (long-term debt is, on average, more expensive than short-term debt), refinancing and interest rate risk (for example, the firm would bear a very large cost if it was unable to refinance on reasonable

548 NER cl. 6.5.2(c) and cl. 6A.6.2(c); NGR, r.87(3).

549 Based on Chairmont's advice, we have slightly refined our description of refinancing risk from the description we used in some earlier decisions. Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.30.

550 Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.26–30; Lally, *Review of submissions on the cost of debt*, April 2015, pp.7–8. Frontier, *TransGrid cost of debt transition*, January 2015, p.7. SFG, *Return on debt transition arrangements under the NGR and NER–draft report for Jemena gas networks, Jemena electricity networks and United Energy*, February 2015, p.12. Lally stated the usual practice in financial economics is to assume firms seek to maximise shareholder wealth. He described the difference between this description and our description as 'subtle'. On the other hand, HoustonKemp stated firms could not manage all three factors at once. However, Chairmont's response to HoustonKemp is that a company will consider all three factors in its decision making, even if they can only partially satisfy each one.

551 Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.29.

> terms during a financial crisis), and transaction costs (for example, there are fixed costs associated with every debt issuance and with hedging activities).[552]

SFG made a similar statement to Frontier.[553]

Meaning of the key financial concepts

The return on debt consists of two components—a risk free rate (or base rate) and a risk premium over the base rate. The risk premium is called the debt risk premium (DRP).

Unlike equity instruments, debt instruments typically provide investors a specified and certain return for particular period of time—for example, 5 per cent each year—or a specific and certain method of calculating that return. However, there is a risk that the issuer of the debt will default and not be able to pay the investor that return. Accordingly, the DRP principally compensates the investor for that default risk. It also provides compensation for the systematic risk of debt and liquidity risk.[554]

The base rate component can be defined in two ways:

- a government bond rate (such as the yield on 10 year Commonwealth Government Securities (CGS)), or
- a swap rate (such as the bank bill swap rate (BBSW)).[555]

Traditionally, we have measured the DRP relative to the 10 year CGS rate. This was for consistency with how we measure the risk free rate component of the return on equity. However, market convention is to measure the DRP relative to the swap rate. As Chairmont stated:[556]

> The DRP used throughout this document is the interest rate premium for the corporate borrower over the swap rate, because practical financial management requires companies to use swaps. The AER measurement of DRP is the premium above the CGS rate(s); however CGS(s) are not a relevant instrument for corporates.

552 Frontier, *TransGrid cost of debt transition*, January 2015, p.7.

553 SFG, *Return on debt transition arrangements under the NGR and NER–draft report for Jemena gas networks, Jemena electricity networks and United Energy*, February 2015, p.12. The quotes from Frontier and SFG are similar. We note that SFG does not specifically make reference to the term 'over the life of its assets', whereas Frontier does. However, there is nothing in SFG's report to indicate that it disagrees with our or Frontier's characterisation of efficient financing costs. We also note that the Frontier and SFG reports have the same author.

554 McKenzie and Partington, *Report to the AER: The relationship between the cost of debt and the cost of equity*, March 2014, pp.20–21.

555 If the base rate is defined as the risk free rate, then the DRP is calculated as the return on debt minus the risk free rate. If the base rate is defined as the BBSW, then the DRP is calculated as the return on debt minus the BBSW.

556 Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.40.

In this decision, we refer to the swap rate when we refer to the 'base rate component' of the return on debt. And we mostly refer to the DRP over the swap rate when we refer to the DRP.

The following table explains some additional financial instruments which are discussed throughout this attachment.

Table 3.21 Meaning of key financial concepts

Financial concept	Explanation
Bond	A bond is a debt investment in which the issuer (typically corporate or governmental) borrows money from an investor for a defined period of time at a variable or fixed interest rate.
Fixed interest rate	An interest rate on a loan or bond that remains fixed for the entire term of the bond or for part of this term. A fixed interest rate may be attractive to a borrower who feels that the interest rate might rise over the term of the bond, which would increase its interest expense.
Variable interest rate	An interest rate on a loan or bond that fluctuates over time, because it is based on an underlying benchmark interest rate or index that changes periodically. The advantage of a variable interest rate is that if the underlying interest rate or index declines, the borrower's interest payments also fall. Conversely, if the underlying index rises, interest payments increase.
Fixed rate bond	A bond that pays the same amount of interest for its entire term. The benefit of owning a fixed-rate bond is that issuers know with certainty how much interest they will pay and for how long. As long as the bond issuer does not default, the bondholder can predict exactly what his or her return on investment will be.
Floating rate debt	A debt instrument with a variable interest rate. A floating rate bond's interest rate is tied to a benchmark such as the bank bill swap rate (BBSW) in Australia, or the London Interbank Overnight Rate (LIBOR) or Singapore equivalent (SIBOR), internationally. The interest rate is typically defined as a fixed margin (or DRP) above the floating base rate. For instance, a variable floating rate may be the prevailing BBSW plus 100 basis points.
Bank bill swap rate (BBSW)	The bank bill interest rate is the wholesale interbank rate within Australia and is published by the Australian Financial Markets Association (AFMA). It is the borrowing rate among the country's top market makers, and is widely used as the benchmark interest rate for financial instruments. Although frequently abbreviated to "bank bill rate", the actual term is the "bank bill swap interest rate", hence the abbreviation BBSW.
Interest rate swap	An agreement between parties (known as counterparties) where one stream of future interest payments is exchanged for another based on a specified principal amount. Interest rate swaps often exchange a fixed payment for a floating payment that is linked to an interest rate (in Australia, most often the BBSW). A company will

Financial concept	Explanation
	typically use interest rate swaps to limit or manage exposure to fluctuations in interest rates, or to obtain a marginally lower interest rate than it would have been able to get without the swap.
Fixed-to-floating interest rate swap	An advantageous arrangement between parties (counterparties), in which one party pays a fixed rate, while the other pays a floating rate. To understand how each party would benefit from this type of arrangement, consider a situation where each party has a comparative advantage to take out a loan at a certain rate and currency. For example, Company A can take out a loan with a one-year term in the U.S. for a fixed rate of 8% or a floating rate of Libor + 1% (which is comparatively cheaper, but Company A would prefer a fixed rate). On the other hand, Company B can obtain a loan on a one-year term for a fixed rate of 6%, or a floating rate of Libor +3%, but it would prefer a floating rate. Through an interest rate swap, each party can swap its interest rate with the other to obtain its preferred interest rate type (fixed or floating). And in this example, it results in each party paying a lower interest rate than if they borrowed at their preferred interest rate type (fixed or floating) directly.
Floating-to-fixed interest rate swap	Is the same instrument as a fixed-to-floating interest rate swap, from the perspective of the other counterparty. It is an arrangement where one party pays a floating rate, while the other pays a fixed rate.

Source: Pearson and Bird; Reilly and Brown.[557]

In the sections that follow, we analyse each of the four options against a range of considerations. These considerations are derived from our need to consider the impact on a benchmark efficient entity of changing our method for estimating the return on debt. They include:

- the impact on promoting efficient financing practices consistent with the principles of incentive based regulation
- the impact on a benchmark efficient entity's opportunity to recover at least its efficient financing costs over the life of its assets
- matching the allowed return on debt with efficient financing cashflows over a single regulatory period, and the potential conflict between this consideration and providing a benchmark efficient entity with a reasonable opportunity to recover efficient financing costs over the life of its assets

[557] Pearson, Brown, Easton and Howard, *Business finance*, 2002, pp.273–277, 319–340, 746–750; Reilly and Brown, *Investment analysis and portfolio management*, 2003, pp.1013–1023.

- avoiding a potential bias in regulatory decision making that can arise from choosing an approach that uses historical data after the results of that historical data is already known
- avoiding the practical difficulties in the use of historical data to calculate the allowed return on debt, particularly during the global financing crisis

Following these sections, we then set out our considerations on:

- whether we should apply annual updates to the return on debt, and
- whether the allowed return on debt should be a simple or weighted average.

Promotes efficient financing practices consistent with the principles of incentive-based regulation

The rules require us to take into account that a regulated service provider should be provided with effective incentives to promote economic efficiency.[558] In the context of an ex ante regulatory framework, we consider the effectiveness of incentives relies on service providers understanding and accepting the financial consequences of their decisions at the time they make their decision.

Incentive based regulation uses the combination of financial rewards and penalties to promote efficient behaviour.[559] In particular, it means that where a service provider:

- matches the efficient regulatory benchmark—it recovers its efficient costs. We consider this would be the outcome for the benchmark efficient entity. As it operates efficiently, it would recover its efficient costs.
- does not match the regulatory benchmark—it keeps the financial benefits or financial detriments that flow from its actions. An example of this would be where a service provider is able to source debt at rates cheaper than the allowed return on debt it is able to keep the difference.
- adopts a risk position which is either higher or lower risk than that embedded in the regulatory process—it keeps the financial benefits or wears the financial detriments that flow from its actions.

An example of the last two points would be where a service provider adopts a level of gearing higher than the benchmark gearing ratio. By adopting a higher gearing ratio, the service provider exposes itself to greater financial risk than compensated for through the regulatory process. In turn, it bears the positive or negative consequences of that chosen risk strategy. The cost of debt is generally cheaper than the cost of equity. Accordingly, by adopting a greater proportion of debt (that is, higher gearing) than the regulatory benchmark, the service provider uses more of the cheaper debt and less of the more expensive equity. Accordingly, the service provider may increase

558 NEL s. 7A; NGL, s, 24(3).

559 AEMC Chair, 'Carrots, sticks and tightropes: The regulator's balancing act in incentivising efficient behaviour', speech, May 2012, p.8.

its expected profits. However, the greater proportion of debt exposes the service provider to the risk that its actual cost of debt will differ from the return on debt allowance, in dollar terms. It also exposes the service provider to the higher financial risk associated with higher gearing, such as an increased risk of bankruptcy. In such a scenario, the regulator should not penalise the service provider if it earns higher profits because of its higher gearing level. Similarly, the regulator should not 'bail out' the service provider if the service provider's decision to adopt a higher gearing level than the regulatory benchmark causes the service provider to face financial distress.

Ensuring service providers face the financial outcomes of their actions, whether positive or negative, is consistent with the revenue and pricing principle in the NEL/NGL for us to provide effective incentives for efficient investment.[560]

SA Power Networks agrees with us that a benchmark efficient entity will issue long term debt, and that the benchmark debt term should be 10 years. This means that a benchmark efficient entity's current financing practices will reflect the various financing arrangements it has entered into over the past 10 years. It also means that a benchmark efficient entity's financing decisions involve impacts that extend beyond the length of a single regulatory control period, which is typically five years.[561]

When a benchmark efficient entity previously issued its existing debt over the past 10 years, it would have expected the on-the-day approach to be applied to that existing debt in this determination.[562] This is also the case for SA Power Networks who has issued debt over the past 10 year period under the incentive framework that results from the on-the-day approach. This expectation can be demonstrated by examining SA Power Networks' previous regulatory decisions and the development of the current rules framework and our Guideline development process.[563]

Effective *ex ante* incentive regulation relies on service providers understanding and accepting the financial consequences of their decisions at the time they make their decision. For the return on debt, the principle of incentive regulation could be achieved through maintaining a consistent approach over time—that is, maintaining the on-the-

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560 NEL, s. 7A(3)(a); NGL, s. 24(3)(a)

561 Lally, *Transitional arrangements for the cost of debt*, November 2014, p.38; CEG, *Efficient debt financing costs*, January 2015, p.8.

562 As noted by SA Power Networks and CEG, ESCOSA estimated SAPN's cost of debt using a 'rolling average' over prevailing rates over the preceding 5 years. As noted by ESCOSA, this was a unique approach in Australia. The 'rolling average' applied during the 2005–06 to 2009–10 regulatory period. For this reason, we accept that debt arrangements entered into under that period may not have been consistent with those under the 'on-the-day' approach. However, debt raised during this period will have a relatively lower impact on outcomes through the transition period as (at least) 5 years of the assumed 10 year debt terms have already elapsed. Therefore, we are satisfied that this conclusion holds entirely for most service providers and largely for SA Power Networks.

563 In 2005, SA Power Networks was regulated by ESCOSA. ESCOSA, *Final determination—Electricity distribution price review 2005–10*, June 2005; AER, *Final decision—South Australia distribution determination 2010–11 to 2014–15*, May 2010. The AER final decision was varied by the Tribunal on the 19 May 2011; AEMC, *Rule determination–Economic regulation of network service providers and price and revenue regulation of gas services*, November 2012; AER, *Better regulation–Rate of return guideline*, December 2013.

day approach (Option 1). Alternatively, in the current case of a change in the regulatory regime, it could be achieved by:

- maintaining the previous regime (on-the-day) for existing debt that was issued under that regime, and
- applying the new regime (trailing average approach) only to new debt issued after the announcement of the new regime.

This is the approach we have adopted in this determination (Option 2), by gradually transitioning from the on-the-day approach to the trailing average approach. One of our reasons for this approach is so service providers face the financial outcomes of their past financing decisions, whether positive or negative, consistent with the principles of incentive regulation. This is consistent with our reasons in the preliminary decision.

Alternatively, the on-the-day approach could be applied only to the component of the return on debt which the benchmark efficient entity had most control over, which is the base rate. This would result in the hybrid approach (Option 3), which SA Power Networks proposed in its revised proposal. This would maintain the incentive that service providers should reduce risks which are within their control.

Accordingly, we consider that maintaining the on-the-day approach (Option 1), the gradual transition to the trailing average (Option 2) and the hybrid transition (Option 3) may each promote efficient financing practices consistent with the principles of incentive-based regulation.[564]

Under our approach, the allowed return on debt for debt that existed at the start of SA Power Networks' 2015–20 regulatory control period is set in a manner similar to the previous on-the-day approach. Accordingly, the impact on a benchmark efficient entity is not, in principle, different to the impact on a benchmark efficient entity if we had continued to adopt the on-the-day approach. This means that there is a minimal impact on the level of financial risk faced by a benchmark efficient entity as a result of changing the return on debt methodology from one regulatory control period to the next.[565] Lally agreed with this position, and stated:[566]

> …in respect of existing debt, the impact on the [benchmark efficient entity] of the AER's proposed transitional arrangements is very similar to that which would have occurred had the AER continued to employ the on-the-day regime. Thus I agree with the AER on this point.

One financial risk that a benchmark efficient entity faces is interest rate risk which results from the potential mismatch between their allowed return on debt and their actual return on debt. The impact on the interest rate risk of SA Power Networks, or a

[564] As both Option 2 and Option 3 satisfy the considerations in this section, these considerations provide us with no reason to depart from the approach in the Guideline and JGN's (initial) access arrangement proposal (Option 2) and to instead prefer JGN's revised proposal approach (Option 3).

[565] NER, cl.6.5.2(k)(1) and cl.6A.6.2(k)(1); NGR, r.87(11)(a),

[566] Lally, *Review of submissions on the cost of debt*, April 2015, p.16.

benchmark efficient entity in SA Power Networks' circumstances, is not substantively different from the application of our gradual transition to the trailing average (Option 2) than if we continued with the on-the-day approach (Option 1).

Our assessment of the four options against the considerations in this section are summarised in the following table.

Table 3.22 Option analysis— Promotes efficient financing practices consistent with the principles of incentive based regulation?

Option		Assessment
1	Maintain on-the-day	Yes
2	Gradually transition from on-the-day to trailing average	Yes
3	Hybrid transition	Yes
4	Backwards looking trailing average approach	No

Source: AER analysis

Provides a benchmark efficient entity with a reasonable opportunity to recover efficient financing costs

In this section, we assess whether the four options provide a benchmark efficient entity with a reasonable opportunity to recover at least its efficient financing costs over the life of its assets.

The NEL and NGL require us to take into account that a regulated service provider should be provided with a reasonable opportunity to recover at least its efficient costs.[567] Lally advised that this principle in the NEL/NGL is 'equivalent' to the net present value (NPV) principle.[568]

The NPV principle is a fundamental principle of economic regulation. The NPV principle is that the expected present value of a benchmark efficient entity's regulated revenue should reflect the expected present value of its expenditure, plus or minus any efficiency incentive rewards or penalties.[569] In other words, departures from cost recovery are acceptable and desirable, so long as they are the result of management induced efficiencies or inefficiencies, rather than windfall gains or losses. Windfall gains or losses would result in a service provider being over- or under-compensated

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567 NEL s. 7A(2); NGL s. 24(3)

568 Lally, *The risk free rate and the present value principle*, 22 August, 2012. SFG also appears to support using the NPV principle to assess rate of return approaches. SFG, *Preliminary analysis on rule change proposals*, February 2012, p.47.

569 The NPV principle can be equivalently stated that the present value of a benchmark efficient entity's future regulated cashflows should equal the value of the initial regulatory asset base.

for its efficient costs. The building block model which the NGR require us to use is based on this principle.[570]

Lally also advised that the NPV principle and the allowed rate of return objective are 'equivalent'. Lally stated:[571]

> The legal requirement for the allowed cost of debt to be commensurate with the costs incurred by a [benchmark efficient entity] is not sufficiently precise to be readily implemented, and therefore requires formalizing. This is obtained through the NPV = 0 principle: the allowed prices or revenues of the regulated business should be such that the present value of the resulting revenues net of opex and taxes must equal the initial investment. Lower revenues than those that satisfy this principle will fail to entice producers to invest and higher revenues constitute the very excess profit that regulation seeks to prevent (Marshal et al, 1981). I consider this economic principle to be equivalent to the [allowed rate of return objective].

Accordingly, there is a strong connection between the NPV principle, the allowed rate of return objective and the NGL revenue and pricing principle of providing service providers with a reasonable opportunity to recover at least efficient costs. Lally advised that each of these principles or objectives are equivalent. We therefore consider it is useful to assess the four return on debt approaches for consistency with the NPV principle.[572] It follows that providing service providers with a reasonable opportunity to recover their efficient costs will also provide effective incentives for efficient investment. And if service providers are fairly compensated for their efficient costs, but not over-compensated, then consumers will not pay more than necessary for a safe and reliable network.

The rules require us, when estimating the return on debt, to consider any impacts on a benchmark efficient entity from changing the return on debt method from one regulatory control period to the next.[573] In this decision, we are changing the method from the previous on-the-day approach. We are gradually transitioning from the on-the-day approach to a trailing average portfolio approach (Option 2). So, we must consider the impact of this change in debt approach on the benchmark efficient entity.

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570 For more details on the NPV principle and building block framework, generally, see Biggar, D., *Public utility regulation in Australia: Where have we got to? Where should we be going?* Working paper no. 4, ACCC/AER working paper series, July 2011, p.58; Biggar, D., *Incentive regulation and the building block model*, 28 May 2004; Lally, *The risk free rate and the present value principle*, August 2012; and Lally, *The present value principle: risk, inflation and interpretation*, 4 March 2013. Also, we explain the legislative origins of the connection between the NGR, the building block model, and the present value principle in appendix G.

571 Lally, *Review of submissions on the cost of debt*, April 2015, p.19.

572 Lally advised that the NPV principle should be viewed as a compatible combination of regulatory policy and service providers' actions that satisfy the NPV principle. For more details on the NPV principle in respect of the return on debt, see: Lally., *Trailing average cost of debt*, 19 March 2014, pp.8–9; Lally, *Transitional arrangements for the cost of debt*, November 2014, pp. 22-25; and Lally, *Review of submissions on the cost of debt*, November 2014, pp.18-37.

573 NER, cl.6.5.2(k)(4) and cl.6A.6.2(k)(4); NGR, r.87(11)(d).

A contentious issue in current and recent determinations is the timeframe over which it is appropriate to consider the impact of this change. In particular, in relation to providing a benchmark efficient entity a reasonable opportunity to recover its efficient financing costs, whether it is appropriate to consider the impact on the benchmark efficient entity over the life of its assets. Some service providers submit that the approach to debt should not be determined by reference to the activities and investments of a benchmark efficient entity beyond the access arrangement or regulatory control period in question. We disagree.

The rules refer to 'any' impacts on a benchmark efficient entity as a result of changing the return on debt methodology. The rules then give an example of one impact—the cost of servicing debt across access arrangement periods. That is, the rules specifically give an example where it is appropriate to take a perspective across more than one access arrangement period.

We consider another impact that is encompassed in the rules is the impact on whether a benchmark efficient entity remains able to recover its efficient financing costs over the life of its assets, in light of the regime change. In other words, we are satisfied that the rules require us to consider whether the regime change results in a benchmark efficient entity being over or under compensated over the life of its assets. That is, we consider another relevant impact is on whether the NPV principle is satisfied or not, in light of the regime change.

If applied consistently over the life of a regulated asset, both the on-the-day (Option 1) and trailing average (Option 4) methods would provide, on average, an allowed return on debt commensurate with the efficient financing costs of a benchmark efficient entity.[574] Changes in interest rates may create differences between the allowed and actual return on debt of the benchmark entity during a particular access arrangement period. However, consistent application of either method accounts for these differences, because it promotes revenue with an expected present value equal to the present value of the entity's efficient costs. This is consistent with the NPV principle. Thus, under the on-the-day approach, service providers have been fairly compensated for their efficient financing costs.

For the base rate component, we consider the allowed and actual return on debt of a benchmark efficient entity would have broadly matched in each access arrangement period. This match arises because a benchmark efficient entity is and was able to undertake hedging arrangements under the on-the-day approach.[575]

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[574] Lally, *Review of submissions on the cost of debt*, April 2015, p.26.

[575] The allowed base rate and actual base rate of a benchmark efficient entity would have broadly matched, though the allowed base rate would have over-compensated the actual base rate. This is because the allowed base rate was set on a 10 year term. Whereas the result of hedging is that the base rate is effectively a 5 year term. As the yield curve is generally upward sloping, the allowed 10 year base rate would have overcompensated the actual 5 year base rate during most periods. Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.33; Lally, *Review of submissions on the cost of debt*, April 2015, p.9.

For the debt risk premium component, we consider the allowed and actual return on debt of a benchmark efficient entity would have usually differed in each access arrangement period. This is because the DRP component could not have been efficiently hedged to the allowed debt risk premium. So, in some access arrangement periods, the allowed debt risk premium would have exceeded the actual debt risk premium of a benchmark efficient entity. In other access arrangement periods, the allowed debt risk premium would have been less than the actual debt risk premium. Over number of periods, these differences in the DRP component would be expected to broadly cancel each other out.[576] Accordingly, under the on-the-day approach, service providers have been fairly compensated for their efficient financing costs, when taking a life of the assets perspective.

Relationship with the return on equity

In determining the return on debt, one of the factors the rules require us to have regard to is the interrelationship between the return on equity and the return on debt.[577] In particular, we have considered the impact of interest rate risk on the return on equity, and any resulting impacts on whether the service provider has a reasonable opportunity to recover efficient costs.

Interest rate risk is a component of systematic risk.[578] And shareholders are compensated for systematic risk through the return on equity.[579] To the extent that the DRP mismatch risk is a subset of interest rate risk, the difference between the allowed DRP and actual DRP of a benchmark efficient entity under the on-the-day approach in previous access arrangement periods is a risk that the benchmark efficient entity was compensated for in previous access arrangement periods through the equity beta component of the return on equity. This is because the sample of privately owned service providers whose practices have informed our view of efficient financing practices, are largely also the same sample of service providers whose empirical equity beta estimates we have had primary regard to in estimating the equity beta.[580] This position is supported by Lally, who stated:

> The actual outcome could involve the allowed DRP being more than that paid (or less) because the allowance for a year is the … DRP prevailing at the beginning of the year whilst the rate paid is the … trailing average. However, any systematic risk associated with such mismatches is in principle

576 Lally, *Review of submissions on the cost of debt*, April 2015, pp.33–34.

577 NER, cl.6.5.2(k)(2) and cl.6A.6.2(k)(2); NGR, r.87(11)(b).

578 McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp.11–12, 16–17; Chairmont, Financing practices under regulation: Past and transitional, October 2015, p. 40.

579 McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp.11–12, 16–17.

580 AER, *Final decision–Review of electricity transmission and distribution WACC parameters*, May 2009, pp.255–260, 331–332; AER, *Explanatory statement to the final rate of return guideline (appendices)*, December 2014, pp.46–49.

> compensated for ex-ante through the asset beta, and therefore these possible mismatches would not give rise to a violation of the NPV = 0 principle.[581]

From this logic, under the on-the-day approach, service providers have been fairly compensated for their efficient financing costs in each and every access arrangement period, in addition to when taking a life of the assets perspective.

However, we also recently engaged Chairmont to consider this issue. Chairmont concluded that:[582]

> Interest rate risk per se is a systematic risk for all or most companies in the market. However, the form of interest rate risk applicable to NSPs in the 'on-the-day' regime was something quite specific to firms under that regulatory umbrella. Most industries would have had greater total interest rate risk than regulated NSPs, as most enterprises do not have the benefit of a direct link between the interest rate impact of their revenues and their costs which NSPs do. This places NSPs in a better position than an unregulated business, as the allowance is in effect a revenue item that they can manage to, even with the uncertainties of the DRP mismatch component.
>
> Ex-post results for the DRP mismatch would have impacted the profit results of the NSPs, which may then have caused some benefit or drag to the share price of the specific NSP. However, it may be argued that this is not a systematic risk. The variability of cashflow is specific to the industry and the individual NSP and may be diversifiable by investors. If this is so, then the required return on equity would not be affected by the DRP mismatch risk as it was a diversifiable specific risk rather than a component of market systematic risk. Therefore, the return on equity should be the same regardless of the existence of DRP mismatch risk and beta should not change because of it.

We have not reached a definitive view on the correct interpretation of the risk of a DRP mismatch, and we accept that experts can differ on this point. To the extent that the DRP mismatch risk is not a subset of interest rate risk, we are persuaded by Chairmont's analysis. This would suggest that the DRP mismatch risk does not impact the return on equity and would not have affected the equity beta. However, this would only be the case to the extent that investors are able to diversify the risk of a DRP mismatch. If investors are able to diversify this risk, it suggests that the risk of a DRP mismatch should not be compensated through the regulatory return on capital which should only reflect non-diversifiable risks.[583]

Therefore, under either interpretation of the specific type of risk arising from the potential for a DRP mismatch under the on-the-day approach, we are satisfied that service providers either:

- have been fully compensated through the equity beta; or

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[581] Lally, *Review of submissions on the cost of debt*, April 2015, p.25.

[582] Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 40.

[583] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp.11–12.

- do not require compensation for the risk of a DRP mismatch through the rate of return, as investors would have been able to diversify this risk. Further, we are satisfied that there is no need for a further cash-flow adjustment, as we are not persuaded that the risk of a DRP mismatch under the 'on-the-day' approach was asymmetrical.[584]

Overs and unders in the 'on the day' regime

This section addresses the question of whether a benchmark efficient entity would expect to recover its efficient costs had the 'on the day' regime continued. This question is important, because:

- It informs our assessment of whether continuing with the 'on the day' approach (Option 1) would promote achievement of the allowed rate of return objective
- In turn, this is important for our assessment of whether alternative transition strategies would promote achievement of the allowed rate of return objective.

We consider a benchmark efficient entity would have hedged the base rate component of its debt to the allowed return on debt. This position is supported by advice from Chairmont and Lally. However, alternatively, a service provider might have chosen to not hedge the base rate component. For example, the NSW service providers adopted this approach. For these service providers, the total allowed return on debt may have exceeded their total actual return on debt in some regulatory control periods, and been less in other regulatory control periods. That is, both the base rate component and the debt risk premium component of a service provider's actual return on debt could have exceeded or been less than the allowed return on debt. Over a number of periods, these differences in the total return on debt may have broadly cancelled each other out. NERA, a consultant for a service provider, agreed with this point. NERA stated:[585]

> We note that the previous 'on-the-day' approach to setting the return on debt did not impose a windfall loss when the prevailing debt yield was less than a benchmark efficient TNSP historical trailing average debt costs. This is because, although historical debt costs can diverge from the return on debt allowance at the time of a decision, over the long term periods of over recovery should be balanced by periods of the under recovery. In other words, in some decisions the return on debt allowance will be above the benchmark efficient TNSP's debt costs while, in others, it will be below.

Recently, HoustonKemp also appeared to agree with this point in a report for a service provider (TransGrid). It advised that TransGrid's debt practices (of not hedging) under the on-the-day approach resulted in TransGrid having "a reasonable prospect of

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[584] This is a long-standing approach to compensation for diversifiable risk. For example, in the Victorian electricity distribution determinations for 2011–15, we did not accept aspects of self-insurance proposals where those risks were not asymmetrical in aggregate. See: AER, *Final decision appendices— Victorian electricity distribution network service providers Distribution determination 2011–2015*, October 2010, p. 459.

[585] NERA, *Return on capital of a regulated electricity network*, May 2014, p.32

recovering its debt costs over the long term".[586] This statement demonstrates an understanding that some periods TransGrid would over-recover its costs, some periods it would under-recover its costs, but these differences would largely balance out in the long term.

More recently, Chairmont advised that we are not able to reliably conclude that the over and under recoveries under the on-the-day approach would have broadly cancelled out.[587] Chairmont observed that:

- systematic (excluding management efficiencies and inefficiencies) overs and unders existed under the on-the-day regime
- these overs and unders were driven by two factors:[588]
    - an upward systematic bias—this is due to the use of a 10 year base rate under the on-the-day approach. In contrast, the benchmark efficient service provider is assumed to have hedged the base rate to the 5 year regulatory period. Therefore, the margin between the 10 and 5 year base rate results in a mismatch. Chairmont advised that in data since 2001, this margin would on average have resulted in a 25 basis point over-recovery (from December 2001 to September 2015).
    - randomness— Chairmont indicated that the larger part of the over or under recoveries would have arisen due to random market movements. Under the on the day approach, the return on debt was set for five years using a short averaging period close to the commencement of the regulatory control period. To the extent that the prevailing rates during the averaging period were more or less than the service providers' portfolio costs, this resulted in over or under recoveries. Overall, Chairmont concluded that there was insufficient basis to conclude that these over-recoveries would offset over the life of the assets. This is in part because the volatility of market rates results in 'sequence risk' depending on the timing of averaging periods, and conclusions are complicated further by the growth in RAB values over time.

We accept that it is not predictable at a high degree of certainty that over or under recoveries would cancel out over the life of the assets under the on-the-day regime. However, Chairmont has not concluded that this level of risk is overall biased upwards or downwards. Therefore, we are satisfied that the benchmark efficient entity could still have reasonably expected to recover efficient costs over the life of the assets while recognising some risk of overall mismatches. To the extent that there existed a risk of mismatch, Chairmont identified that:

> Under the ‘on-the-day’ approach both NSPs and sophisticated investors would understand that due to DRP mismatch there is a variability and therefore risk. A professional investor should be aware of the revenue allowance calculation

586 HoustonKemp, *Response to draft decision on the return on debt allowance*, January 2015, p. iii.

587 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 39.

588 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 37–38.

> methodology and the well-publicised possible changes. Accordingly, a rational investor would factor this into consideration when valuing an investment opportunity.
>
> …
>
> [t]he variability of cashflow was specific to the industry and the individual NSP and as such could be diversified away by investors

Therefore, we are satisfied that:

- over the long asset lives of the networks, service providers would have a reasonable expectation of recovering their efficient costs. We are satisfied that the commentary by Lally, NERA and HoustonKemp supports this conclusion.
- to the extent there remains a risk of mismatch due to sequence risk, investors would have been able to manage this risk by diversification. To the extent they could not manage this risk through diversification, investors would already have been compensated for this risk through the equity beta. We are satisfied that the significant growth in regulatory asset bases over the previous regulatory control period supports this proposition, as investors do not appear to have been deterred by the existence of interest rate reset risk.

Fairness of returns in expectation

At the time a particular investment is made, it will not be known which periods will result in an over-recovery and which periods will result in an under-recovery through applying the on-the-day approach. Accordingly, the allowed return on debt will be fair at the time it is set, and the allowed return on debt will be the same as the expected actual return on debt over the life of that asset. That is, in expectation, the allowed return on debt and the actual return on debt will correspond.

Regardless of whether a benchmark efficient entity would have hedged (as we consider) or not hedged, continuing to apply the on-the-day approach (Option 1) over the life of the assets would reasonably be expected to satisfy the NPV principle. However, when the method for estimating the return on debt changes during the life of a regulated asset, the NPV principle is unlikely to be met automatically. Any accumulated differences between the allowed and actual return on debt of a benchmark efficient entity remain. The service provider will receive a return on debt that is different from that of a benchmark efficient entity, and consumers could be required to pay prices that incorporate this difference. This would mean that a benchmark efficient entity is either over-compensated or under-compensated for its efficient financing costs over the life of its assets.

In these circumstances, departures from the NPV principle do not result from efficiency gains or losses, but from changing the regulatory regime. For this reason, we consider the resulting benefits or detriments are windfall gains or losses that the change in methodology for estimating the return on debt should avoid. In other words, regardless of who faces the benefit or detriment, an immediate change from one return on debt method to another could have undesirable consequences. This possibility should concern both service providers and consumers. This is because, prior to a change in method occurring, neither could know whether they would face a benefit or detriment.

As Lally demonstrated through various interest rate sensitivity analyses, gradually transitioning from the on-the-day approach (Option 2) to the trailing average approach largely avoids the undesirable outcomes of changing the return on debt method. This allows the regulatory regime to account for accumulated differences between the return on debt estimate and the actual return on debt of a benchmark efficient entity, despite any change in method. This also means a benchmark efficient entity would receive a return on debt commensurate with its efficient financing costs over the life of its assets (rather than commensurate with windfall gains or losses). For these reasons, we are satisfied that gradually transitioning from the on-the-day approach to a trailing average approach (Option 2) will result in a return on debt that contributes to the achievement of the allowed rate of return objective.

Symmetry in regulatory approach to regime changes

Prevailing interest rates are currently lower than the historical average of interest rates over the past 10 years. However, this is just a consequence of the particular timing of our decision. Equally, prevailing interest rates could have been higher than the historical average. Lally emphasised the importance of a regulator applying symmetry in its approach to regime changes. That is, immediately applying the backwards looking trailing average (Options 3 or 4) when it results in windfall gains to service providers, but gradually transitioning into the trailing average (Option 2) when Options 3 or 4 would lead to windfall losses to service providers would be a biased approach and violate the NPV principle by over-compensating service providers. He further advised that a policy of not applying transitional measures (Options 3 or 4) in both scenarios would increase regulatory risk and potentially threaten a service provider's financial viability. Accordingly, the regulator should apply transitional measures (Option 2) in both scenarios if the matter is material. Lally advised:

> In summary, immediately adopting a new regime only when the one-off effect is favourable to the [benchmark efficient entity] but not otherwise would necessarily violate the NPV = 0 principle. Alternatively, the policy of immediately adopting a new regime regardless of whether the one-off impact was favourable or unfavourable would expose the [benchmark efficient entity] to a 'roll of the dice', with potentially very adverse effects, thereby discouraging investment. It would also expose the [benchmark efficient entity] to the possibility of an adverse shock so large as to threaten its financial viability, which would lead to either regulatory relief in such cases (and hence violation of the NPV = 0 principle) or the possibility of a supply disruption. In addition, even if the policy of immediately adopting a regime change regardless of the one-off impact on the [benchmark efficient entity] were rigorously followed, the upside and downside from this policy might not be symmetric, in which case the NPV = 0 principle would still be violated. These disadvantages are all so substantial that the only viable regulatory policy would be to neutralize the one-

> off effects of regime changes, possibly through a transitional regime, or at least to do so when the one-off effects in either direction are substantial.[589]

Historical over or under recoveries

The return on debt significantly increased during the global financial crisis, but has subsequently decreased. In previous decisions, we have relied on high-level analysis by Lally regarding the expectations of windfall gains or losses, having regard to these historical rates compared to the allowed rates of return over this period.[590] In response, service providers submitted several reports disputing Lally's findings.[591] We considered these reports, and engaged both Lally and Chairmont to review these submissions.

In summary, we consider:

- Having regard to analysis from Chairmont,[592] we are persuaded that the available third party yield data is of a sufficiently high quality to rely on from roughly 2001 onwards. Prior to this time, there is insufficient reliable data to draw robust conclusions about prevailing rates in our benchmark debt markets.
- We can conclude with a reasonably high degree of confidence that the benchmark efficient entity would have been overcompensated over the previous round of regulatory periods. This is because we are able to estimate a full 10 year trailing average portfolio from 2011 onwards using 2001 as a data threshold. This allows us to make a relatively complete comparison of benchmark trailing average portfolio costs against allowed returns on debt for this period. The consultant reports submitted by the service providers support the conclusion that the particular service providers accumulated substantial over-recoveries over this period.[593] Further, Lally notes that the GFC represented an unprecedented shock to DRPs.[594] This in turn might suggest that any windfall gains or losses in the last regulatory period are abnormally significant compared to the likely outcomes in prior periods.
- Similarly, we can forecast with a high degree of confidence the future impact of our transitional approach compared to the hybrid transition. This is because the

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589 Lally, *Review of submissions on the cost of debt*, April 2015, pp.27–28. Lally's statements specifically refer to Option 4 (backwards looking return on debt). However, as both Option 4 and Option 3 (hybrid transition with backwards looking DRP) utilise backwards looking data, Lally's views on Option 4 are also applicable to Option 3.

590 AER, *Final decision for JGN: Rate of return attachment*, May 2015, pp. 173–174.

591 In particular: QTC, *Return on debt transition analysis—A joint report for Energex and Ergon Energy*, June 2015; CEG, *The hybrid method for the transition to the trailing average return on debt: Assessment and calculations for United Energy*, April 2015; CEG, *The hybrid method for the transition to the trailing average return on debt: Assessment and calculations for AGN*, April 2015; CEG, *The hybrid method for the transition to the trailing average return on debt: Assessment and calculations for SAPN,* June 2015.

592 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 39.

593 QTC, *Return on debt transition analysis—A joint report for Energex and Ergon Energy*, June 2015; CEG, *The hybrid method for the transition to the trailing average return on debt: Assessment and calculations for United Energy*, April 2015; CEG, *The hybrid method for the transition to the trailing average return on debt: Assessment and calculations for AGN*, April 2015; CEG, *The hybrid method for the transition to the trailing average return on debt: Assessment and calculations for SAPN,* June 2015.

594 Lally, *Review of submissions on transition issues for the cost of debt*, October 2015, p. 10.

difference is a product of the difference between the trailing average historical DRP and the prevailing DRP at the time of transition between the regime. Chairmont stated that:

> [t]o emphasise, if AER uses an 'on-the-day' DRP for the allowance, yet the industry is carrying a trailing average staggered debt portfolio with a corresponding trailing average DRP, that fixed difference will be realised by the industry progressively over the 10-year transition. It will be a fixed measurable figure on day one with no further chance of new over or under compensation to occur in the future.

- However, as stated by Lally:[595]

> …in respect of the transitional regime leaving businesses no better or worse off than they would have been had the regime change not occurred, the adverse impact on [Energex and Ergon Energy] that the QTC has highlighted is not a consequence of the regime change or even the regime change with a transitional period. None of the past losses are caused by the transitional process, nor are the future expected losses identified by the QTC because they would still have occurred had the old regime remained in place. These losses are principally caused by the combined effect of the GFC and the timing of the regulatory resets for [Energex and Ergon Energy].

- However, due to the unavailability of reliable older data, we are unable to draw reliable conclusions about accumulated windfall gains or losses in preceding regulatory periods. Chairmont stated:[596]

> Based on our research and the papers of Lally, QTC and CEG it is concluded that there is insufficient history of relevant BBB bond data to measure over and under compensation for an adequate time period to come to any definitive conclusion about the net result over the life of energy assets[21].

- To the extent we rely on the existence of any accumulated windfall gains or losses, we accept that it is important to identify these accumulated gains or losses with reasonable confidence. Nonetheless, we consider that the possible existence of an accumulated windfall gain or loss was only one factor that informed past decisions on the choice of approach to transition. In particular, the existence or otherwise of a prior gain or loss would increase our sensitivity to changing approach without transition. However, as identified by Chairmont:[597]

> It is not necessary to determine an exact measurement technique for calculating overs and unders in the past, as this exercise may still not lead to a definitive answer to the question of correct debt cost recovery over the life of the assets.

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595 Lally, *Review of submissions on transition issues for the cost of debt*, October 2015, pp. 31–32.

596 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 38–39.

597 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 39.

As a result, we have not relied on the historical balance of over or under recoveries in making our decision. Nonetheless, for the reasons set out in the rest of this section, we remain satisfied that our approach (Option 2) provides a benchmark efficient entity with a reasonable opportunity to recover efficient financing costs.

Summary

Our assessment of the four options against the considerations in this section are summarised in the following table.

Table 3.23 Option analysis—Provides a benchmark efficient entity with a reasonable opportunity to recover efficient financing costs over the life of its assets?

Option		Assessment
1	Maintain on-the-day	Yes
2	Gradually transition from on-the-day to trailing average	Yes
3	Hybrid transition	Yes: Base rate No: DRP
4	Backwards looking trailing average approach	No

Source: AER analysis

In the next section, we assess whether each of the four options match the allowed return on debt with efficient financing cashflows over a single access arrangement period, and the potential conflict between this consideration and providing a benchmark efficient entity with a reasonable opportunity to recover its efficient financing costs over the life of its assets.

Matches allowed return on debt with efficient financing cashflows regulatory period-by-period

We consider that in estimating the efficient debt financing costs of a benchmark efficient entity, it can be useful to consider the efficient debt financing practices of a benchmark efficient entity. By extension, efficient debt financing costs result from efficient debt financing practices.

For the base rate component of the return on debt, we are satisfied a gradual transition from the on-the-day approach to the trailing average approach reduces the potential mismatch between the allowed return on debt and actual cost of debt of a benchmark efficient entity over the 2015–20 period while the entity transitions its financing practices in line with the new regulatory approach.

The on-the-day approach was a regulatory approach in past regulatory decisions for setting the allowed return on debt. It was designed to match the allowed return on debt to prevailing market conditions in the market for funds at the start of each access arrangement period.

One of the factors we must have regard to in estimating the return on debt is any impacts (including in relation to the costs of servicing debt across access arrangement periods) on a benchmark efficient entity that could arise as a result of changing the return on debt methodology from one access arrangement period to the next.

So, to understand the impact of changing the return on debt methodology on a benchmark efficient entity, we considered how such an entity would likely efficiently finance itself under the on-the-day approach. We then considered what a benchmark efficient entity's likely financing strategy would be to transition its financing practices to a trailing average approach. We were assisted in this assessment through advice from Chairmont and Dr Lally.

There are a number of financial instruments and financing strategies for a benchmark efficient entity to choose between, in deciding what is efficient, and these choices may also change over time. For example, Chairmont advised that these choices include:

- issuing fixed rate bonds, floating rate notes or hybrid debt in either the domestic or foreign markets
- taking out bilateral loans with one bank or syndicated loans with a number of banks, which is typically arranged in the domestic market
- short term debt funding facilities, such as overdrafts and working capital bank facilities
- borrowing for terms of 10 years that match the AER's debt term benchmark. Or the possibility of borrowing for shorter or longer terms than the AER benchmark of 10 years.
- a smoothly staggered debt profile. Or an uneven staggered debt profile, responding to unusually strong or weak investor demand at particular times or unusually high or low credit margins available at particular times.[598]

Chairmont also advised that the decision as to which market and product to use will depend on availability and the relative pricing as it changes over time.[599]

Recently, we engaged Chairmont to consider whether a range of these alternative strategies were efficient, and their implications for the appropriate regulatory benchmark efficient strategy. [600] Chairmont's analysis indicated that most of the alternative financing strategies would have relatively lower financing costs at the time of transition compared to the either the AER's transition approach (Option 2) or the hybrid transition (Option 3).[601] This means that a benchmark efficient entity could

598 Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.22, 26.
599 Chairmont, *Cost of debt: Transitional analysis*, April 2015, p. 26.
600 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 21–35.
601 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, pp. 10–11.

employ a range of valid alternative strategies to outperform the AER's simplified benchmark.

All models are by definition a simplified version of reality.[602] This is also true of the regulatory model (or benchmark). It is not practical for the regulatory return on debt benchmark to be a complicated amalgamation of bonds, hybrid debt, bilateral loans, syndicated loans, overdrafts and other features. Models seek to abstract away from some of the realities of the real world to focus on core concepts or relationships. We consider the core relationship is that the efficient financing practices of a benchmark efficient entity are practices which are expected to minimise a benchmark efficient entity's debt financing costs over the life of its assets, while managing refinancing risk and interest rate risk.

We consider an efficient financing practice of a benchmark efficient entity under the on-the-day approach would have been to borrow long term and stagger the borrowing so only a small proportion of the debt matured each year. We consider a benchmark efficient entity would have combined this practice with interest rate swap contracts to broadly match the base rate component of its actual return on debt to its return on debt allowance. Specifically, we consider an efficient financing practice would have been to:

- borrow long term (10 year) debt and stagger the borrowing so only a small proportion (around 10 per cent) of the debt matured each year
- borrow using floating rate debt, or borrow fixed rate debt and convert it to floating rate debt using fixed-to-floating interest rate swaps at the time of the debt issue, which extended for the term of the debt (10 years)
- enter floating-to-fixed interest rate swaps at, or around, the time of the service provider’s averaging period, which extended for the term of the access arrangement period (typically five years).[603]

Our reasoning is that this financing strategy:

- compared with the alternative broad debt financing strategies, would have more effectively managed refinancing risk and interest rate risk, and resulted in a lower expected actual return on debt[604]

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[602] IMF Institute (Sam Ouliaris), *Back to basics–What are economic models?–How economists try to simulate reality*, Finance and Development, June 2011, p.46.

[603] We do not necessary consider all efficient service providers would have adopted precisely this strategy. However, we consider this is a reasonable approximation of the range of efficient financing practices that a benchmark efficient entity would have adopted under the on-the-day approach. For example, Chairmont advised "AER’s assumption of efficient debt raisings being limited to borrowing using 10 year bonds in a smoothly staggered manner does not reflect these broader possibilities and opens the door for some discrepancies between allowed and actual cost of debt. However, the myriad of other possible debt profiles means that it would be complicated and difficult to find agreement on what benchmark profile could be used. AER’s current assumption may be the most appropriate neutral benchmark which leaves room for NSPs to seek further efficiencies in their financing programs." Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.26.

[604] Lally, *Transitional arrangement for the cost of debt*. November 2014, pp. 25–30

- was generally adopted by most privately owned service providers under the on-the-day approach.[605]

Under this financing strategy, the base rate component of a benchmark efficient entity's actual return on debt would have broadly matched the on-the-day rate, while the debt risk premium component each year would have reflected the average of the previous 10 years.

The staggering of debt under this strategy would have lowered the refinancing risk, compared with the risk if a benchmark efficient entity had issued all its debt during the averaging period. Adopting a staggered debt portfolio with interest rate swaps, compared with a staggered debt portfolio without interest rate swaps, would have led to the same degree of refinancing risk. However, the former strategy would also have resulted in:

- lower interest rate risk—this is because interest rate risk would have been borne on only the debt risk premium component of the return on debt, rather than on the total return on debt
- a lower actual return on debt—this is because hedging via interest rate swaps would have reduced the effective term of the debt. Because longer term debt is typically more expensive than otherwise equivalent shorter term debt (given the holders of long term debt face greater risks), reducing the effective term would have likely reduced the actual return on debt, on average.[606]

Our assessment that the above strategy was an efficient financing practice of a benchmark efficient entity under the on-the-day approach is supported by expert advice from both an academic perspective (Dr Lally) and a financial market practitioner perspective (Chairmont).[607]

A staggered debt portfolio with interest rate swaps is also the financing strategy that most privately owned service providers generally adopt under the on-the-day approach. This tendency is reflected in:

- corporate treasurers' statements to our 2009 weighted average cost of capital (WACC) review[608]
- the data on debt financing strategies of the privately owned service providers we collected during the 2009 WACC review,[609]

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605 Deloitte, *Refinancing, debt markets and liquidity*, 12 November 2008, p. 13; Jemena, *Submission to the rate of return guideline consultation paper*, June 2013, p. 19; Lally, M, *Transitional arrangement for the cost of debt*. November 2014, pp. 25–30.

606 Lally, *Transitional arrangement for the cost of debt*. November 2014, pp. 25–30.

607 Lally, *Transitional arrangement for the cost of debt*. November 2014, pp. 8–10, 15. Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.30–33.

608 The Joint Industry Associations (JIA), *Submission on the explanatory statement: WACC review,* February 2009, Appendixes, E, F, G, H and I; see www.aer.gov.au/node/11822.

- submissions from privately owned service providers to the Australian Energy Market Commission (AEMC) during the 2012 network regulation rule change process[610]
- submissions to our development of the 2013 rate of return guideline.[611]

Efficient financing practices as benchmark efficient entity transitions its debt portfolio to the trailing average approach

For the above reasons, we consider a staggered debt portfolio with interest rate swaps was an efficient financing practice of a benchmark efficient entity under the on-the-day approach. For the base rate component, we now consider the impact on a benchmark efficient entity of gradually moving to the trailing average approach (Option 2 or 3) or adopting a backwards looking trailing average approach (Option 4).

For the on-the-day approach, Lally examined what the financing arrangements of a benchmark efficient entity would be at the end of the access arrangement period:[612]

> So, at the end of the most recent regulatory cycle, a swap of floating to five-year fixed for all of the firm's debt would just have matured (in line with the end of the regulatory cycle). If the previous regime had been maintained, the firm would then have entered a new swap of floating to five-year fixed for all of its debt. However, upon the introduction of a trailing average regulatory regime, the rationale for these swap contracts would disappear and the firms could be expected to desist from them at that point. Nevertheless, in respect of the risk-free rate component of its debt, the existing debt has already been converted to floating rate debt and these swaps have residual lives of up to nine years (arising from ten-year debt that was issued one year ago).

Similarly, Chairmont also advised that the efficient financing practices of a benchmark efficient entity under the on-the-day approach would not already resemble the efficient practices under the trailing average approach. Chairmont advised that:

> A [benchmark efficient entity] needs to transition its debt portfolio because at the start of the 2014 regulatory period it does not look like a 'trailing average' portfolio. The portfolio immediately prior to the 2014 new regulatory regime would consist of staggered floating rate debt with fixed rate swaps either maturing or about to mature; whereas, a 'trailing average' portfolio would consist of only staggered fixed rate debt.

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609 AER, *Final decision: review of electricity transmission and distribution WACC parameters*, May 2009, pp.150–4; AER, *Explanatory statement review of electricity transmission and distribution WACC parameters*, December 2008, pp.103–7.

610 ETSA Utilities, CitiPower and Powercor Australia, *Submission attachments: joint response to AER and URCC rules change proposals*, December 2011, pp. 138–43; ENA, *Response to AEMC directions paper—economic regulation of network service providers (AEMC rules change),* 20 April 2012, Attachment E, pp. 3–5.

611 Jemena, *Submission to the rate of return guideline consultation paper*, June 2013, p. 19.

612 Lally, M, *Transitional arrangements for the cost of debt*, November 2014, pp. 7–8.

Lally examined the actual and allowed base rate component of the return on debt for a benchmark efficient entity under various future interest rates. He demonstrated that gradually transitioning from the on-the-day to trailing average approach (Option 2) would reduce the mismatch between the actual and allowed base rate. He calculated the mismatch between the base rate component of a benchmark efficient entity's actual costs and those allowed under a gradual transition to the trailing average (Option 2) would be between an average over recovery of 0.6 per cent of the debt portfolio per year for the transitional period, and an average under recovery of 0.4 per cent per year.[613] From this calculation, Lally considered the actual outcome for a benchmark efficient entity would not differ much from zero.[614]

Lally also investigated the impact of an alternative strategy for a benchmark efficient entity:[615]

> This analysis presumes (plausibly) that, upon the introduction of the trailing average regime with the proposed transitional regime, firms will desist from entering into the floating to five-year fixed rate swap contracts that they would have entered into under the previous regime. However, it is possible that firms might enter into alternative arrangements in an attempt to reduce or eliminate the exposure shown in equations (3). The best such option would involve the regulated businesses entering into a series of swap contracts upon the commencement of the new regime, to swap each of their prevailing floating-rate exposures into a fixed rate for the remainder of the borrowing. Thus, the debt with one year to maturity would be swapped into one-year fixed-rate debt, the debt with two years to maturity would be swapped into two-year fixed-rate debt, etc.

He estimated this strategy's outcome for a benchmark efficient entity would be an average over recovery of 0.23 per cent of the debt portfolio each year. Accordingly, under either financing strategy, Lally concluded:[616]

> … if the proposed transitional arrangements are adopted, the actual outcome for firms will not differ much from zero.

Based on this analysis, we are satisfied that gradually transitioning from the on-the-day to trailing average approach (Option 2) reduces the potential mismatch between the base rate component of the allowed return on debt and the actual return on debt of a benchmark efficient entity, as the entity transitions its financing practices. Specifically, a gradual transition (Option 2) broadly matches (though over-compensates) a benchmark efficient entity for the base component of its actual return on debt. Whether the allowed DRP matches, or is higher or lower than, a benchmark efficient entity's

[613] This calculation assumes the averaging period for the existing debt is June 2014. The averaging period differs for different service providers, which would affect the calculation for each service provider, but not the overall conclusions drawn from this calculation.

[614] Lally, M, *Transitional arrangements for the cost of debt*, November 2014, p. 10.

[615] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.10.

[616] Lally, M, *Transitional arrangements for the cost of debt*, November 2014, p. 11.

financing cashflows with respect to the DRP component depends on whether the prevailing and historical average DRP is higher, lower, or around the same level as each other.

Our assessment of the four options against the considerations in this section are summarised in the following table.

Table 3.24 Option analysis—Matches allowed return on debt with efficient financing cashflows access arrangement period-by-period?

Option		Assessment: Existing debt	Assessment: New debt
1	Maintain on-the-day	Yes: Base rate Depends: DRP	Yes: Base rate Depends: DRP
2	Gradually transition from on-the-day to trailing average	Yes: Base rate Depends: DRP	Yes
3	Hybrid transition	Yes	Yes
4	Backwards looking trailing average approach	No: Base rate Yes: DRP	Yes

Source: AER analysis

In the next section, we assess whether each of the four options avoids a potential bias in regulatory decision making that can arise from choosing an approach that requires historical data after the results of that historical data are already known.

Avoids a bias in regulatory decision making

We consider the use of an unbiased estimate is of significant importance in achieving the allowed rate of return objective. This provides for the rate of return to be commensurate with the efficient financing costs of a benchmark efficient entity.

We do not consider the practice of selecting averaging periods after they have occurred is an effective mechanism for achieving the allowed rate of return objective. This is because choosing the averaging period in advance is important for obtaining an unbiased estimate. By bias, here we mean that at the time the averaging period is selected, it is not known with certainty whether it will result in a higher or lower estimate than the estimate from a different potential averaging period.

If an averaging period is chosen after the nominated period has occurred, the knowledge of the return on debt at any past point of time may influence the choice. It would not matter if the period were chosen by the AER, the service provider, a user or consumer, the Australian Competition Tribunal or another stakeholder. We made this clear in the Guideline when we specified the importance of determining an averaging period in advance.[617] In particular, we specified that if a service provider could select an averaging period by looking at historical yields, it could introduce an upward bias.[618]

The above considerations reflect our long standing view about the importance of selecting averaging periods in advance of the period (for either the return on equity or debt).[619] For example, in the Victorian gas access arrangement review several service providers proposed using a historical average risk free rate (for the return on equity). We did not accept this proposal. As part of our reasons, we stated:[620]

> Determining the averaging period in advance helps achieve an unbiased risk free rate.
>
> Regulated businesses have an incentive to seek a WACC that is as high as possible, because it will increase their revenue allowance. If a regulated business can select an averaging period by looking at historical yields, they may introduce an upward bias.[621] They can select a period with the highest yield available. But, when an averaging period is agreed or specified in advance regulatory "gaming" is less likely because the risk free rate is unknown for that future period.
>
> …
>
> The AER thus maintains its position that a short averaging period, determined in advance, minimises the likelihood of bias.

Applying the on-the-day approach (Option 1) enables the averaging period to be selected in advance and reduces the risk of bias in the selection of that period. Similarly, our approach of starting with an on-the-day rate and gradually transitioning to the trailing average approach (Option 2) only uses averaging periods for each year that are nominated in advance. Further, we proposed this approach during the Guideline process when the level of current prevailing interest rates (used for the on-the-day rate in the first year) was not known. In contrast, Options 3 and 4 utilise backwards looking return on debt data and so do not contain this positive feature.

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617 AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 79–80.

618 Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9-10.

619 We note that in other components of the rate of return, such as the market risk premium and equity beta, we have regard to historical market data. However, with these parameters, we are broadly consistent in our approach over time of having regard to historical market data. In contrast, if we switched from having primary regard to historical market data to primary regard to prevailing market data, or vice versa, and we made this switch when it was either most financially advantageous to service providers or consumers, then this switch could raise the perception of bias. In the current scenario, the NSW service providers are proposing the switch from the old regime (on-the-day) to the new regime (trailing average) at the time when it is the most financially advantageous from them to do so. Lally, M., *Review of submissions on the cost of debt*, April 2015, p.37.

620 AER, *Access arrangement draft decision–Envestra Victoria 2013–17*, September 2012, p.190.

621 Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9-10. Lally's comments in this report were made about a specific approach proposed in the relevant determination but are consistent with the approach taken by the AER in this decision.

Our debt approach in this final decision is consistent with the approach we proposed in the Guideline and adopted in the draft decision. In the Guideline, we based our transition on the approach recommended by the Queensland Treasury Corporation (QTC). We refer to this as 'the QTC approach'. In recommending a gradual transition into the trailing average approach, QTC stated:

> The transitional rule ensures that the NSP is not able to receive a higher initial rate simply by electing to use the moving average approach. It also avoids the need to reach agreement on the return on debt calculation for each of the preceding nine years.[622]

We agree with QTC's advice.

Comparative assessments of portfolio costs

We also note JGN, SA Power Networks and the Victorian service providers supported our proposed transition (Option 2) during the Guideline development process, but now support the hybrid transition approach (Option 3). The main difference between the two approaches is that our approach commences with an on-the-day rate for the DRP, whereas the hybrid approach commences with a backwards looking DRP. At the time of the Guideline, when those service providers supported our approach, it would not have been clear which result provided the higher DRP. However, now that we are closer to (or past) the averaging period for the first regulatory year, a comparison between the return on debt between the two approaches can be made. Under this approach, it is difficult to avoid the perception of bias in their change of position—in the sense of JGN and the other privately owned service providers selecting an approach that uses historical data after the results of that data is known.

Chairmont recently assessed the initial financing costs of various financing strategies from December 2011 to June 2015.[623] The results of this are set out in Chairmont's chart 1, repeated below. Chairmont describes the chart as follows:[624]

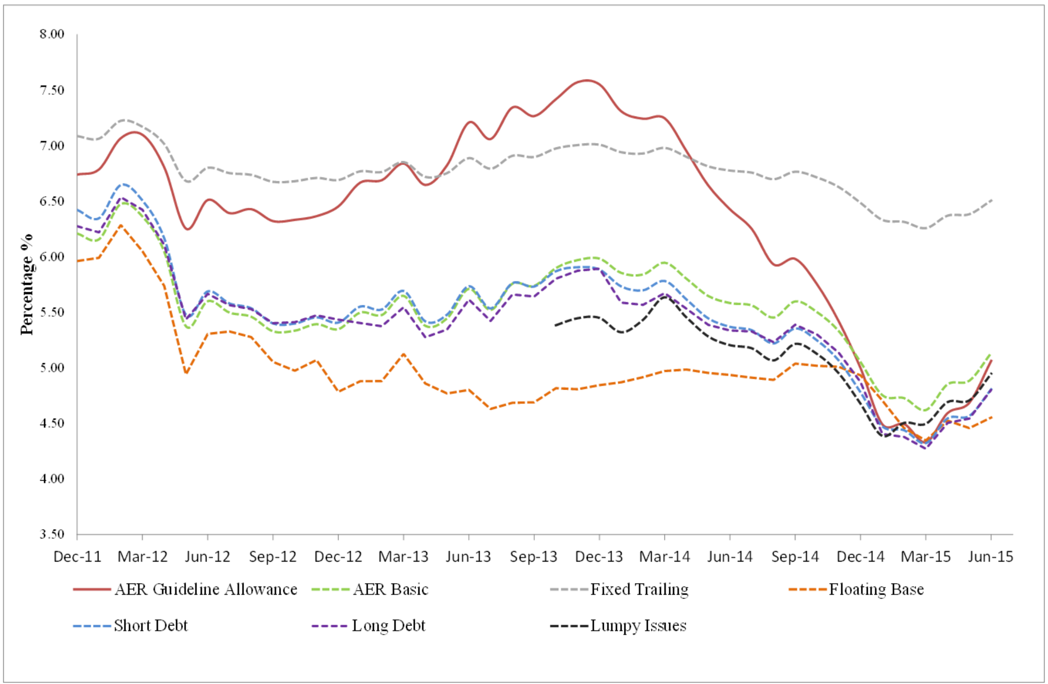
> Graph 1 displays the rate for the debt portfolio in the first year of the transition period. The lines represent the relativities between strategies for each different point in time. They do not represent an ongoing cost for a single NSP. For example, the date of December 2011 shows the calculated cost of debt which would occur, or allowance provided, for a hypothetical transition period commencing in December 2011.

[622] QTC, *Moving average approach–Detailed design issues*, 8 June 2012.

[623] Chairmont, *Financing practices under regulation: Past and transitional*. October 2015.

[624] Chairmont, *Financing practices under regulation: Past and transitional*. October 2015, p. 11.

Figure 3-15 Chairmont Chart—Initial financing costs of debt portfolio



Source: Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 10.

Using this chart, we are able to compare the transitional allowed return on debt that would have been set under the Guideline approach (option 2) against the allowed return on debt that would've been set under a hybrid transition (option 3). The Guideline approach is labelled 'AER Guideline approach', and the hybrid transition is labelled 'AER Basic'.

- at the time QTC designed and proposed the Guideline approach as a transitional mechanism (June 2012), the initial portfolio costs from the Guideline approach significantly exceeded the initial financing costs of a hybrid transition. This means that the service providers would have received a substantially higher allowance under the Guideline approach compared to the hybrid approach.
- At the culmination of the Guideline development process, the QTC, Ergon Energy, APA Group, Jemena (gas and electricity) and AusNet Services supported the Guideline approach to transition (option 2).[625] At that time, the initial portfolio costs from the Guideline approach significantly exceeded the initial financing costs of a hybrid transition. This means that the service providers would have received a substantially higher allowance under the Guideline approach compared to the hybrid approach.

625 APA Group, *Submission on the draft guideline*, October 2013, p. 33; Ergon Energy, *Submission on the draft guideline*, October 2013, p. 6; Jemena, *Submission on the draft guideline*, October 2013, p. 1; QTC, *Submission to the draft guideline*, October 2013, p. 2; SAPN, *Initial proposal*, October 2014, pp.338–339; JGN, *Initial proposal–Access arrangement information–Appendix 9.10*, June 2014, p.14 AusNet Services, *Submission on draft rate of return guideline*, October 2013, p.3.

- At the time Energex and Ergon Energy submitted their initial proposals (October 2014), the initial portfolio costs from the Guideline approach significantly exceeded the initial financing costs of a hybrid transition. This means that the service providers would have received a higher allowance under the Guideline approach compared to the hybrid approach.
- At the time Energex, Ergon Energy and SAPN submitted revised proposals (July 2015) and the Victorian service providers submitted initial proposals (April 2015), all of these service providers proposed to adopt the hybrid approach. During this period, the relationship between starting portfolios had reversed. That is, at these times, the starting portfolio costs under the Guideline approach were less than those under the hybrid approach. This means that the service providers would have received a higher allowance under the hybrid approach compared to the hybrid approach.

Following this timeline, it is difficult to avoid the perception of bias—in the sense that service providers' preferred approaches have changed in response to market movements, having regard to historical data after the results of that data is known. Lally also made this point.[626] On this basis, and for the reasons set out by various service providers,[627] it appears that the service providers would have maintained their support for the Guideline approach had DRPs remained at or above the level of the hybrid approach. Table 3.25 summarises the commentary of the Queensland and South Australian service providers that changed their positions on the approach to transition in between initial and revised proposals. This supports a conclusion that service providers would not have proposed the hybrid approach where the Guideline approach produced a higher return on debt.

Table 3.25 Service provider commentary on the approach to transition in response to a change in interest rates

Service provider	Comment of change in interest rates
Energex	At the time it submitted its original proposal, based on the then prevailing interest rate environment the potential difference between either applying the transition or moving to the trailing average immediately was not material. In its original proposal, Energex therefore did not propose to depart on this issue. However, since the original proposal was lodged, the interest rate environment has materially changed and the prevailing DRP has fallen considerably. Accordingly, there is now a more significant difference between the trailing average cost of debt and the prevailing rate, which translates into a material mismatch between the regulated and actual cost of debt.
Ergon Energy	We followed the AER's Rate of Return Guideline in these respects because, at the time of our October Regulatory Proposal, this allowed Ergon Energy to recover a return on debt consistent with the allowed rate of return objective and the NER.

[626] Lally, Transitional arrangements for the cost of debt, November 2014, p.22.

[627] For example: Energex, *Revised regulatory proposal*, July 2015, p. 106; Ergon Energy, *Revised regulatory proposal*, July 2015, p. 148; SAPN, *Revised regulatory proposal*, July 2015, p. 380.

Service provider	Comment of change in interest rates
	… However, since the time of our October Regulatory Proposal, further downward movements in base interest rates have further depressed the overall WACC and revealed errors in the AER's approach on debt and, in particular, its approach to transition. The transition to a trailing average approach for the cost of debt leads to a mismatch between our regulated return and the efficient financing costs of a benchmark entity with a long-term staggered debt portfolio and base rate hedging (as acknowledged by the AER as the efficient approach to financing under the "on the day" method).
SAPN	Therefore, in our Original Proposal,[480] SA Power Networks accepted that the allowed return on debt could be determined by gradually moving from the 'on the day' method of determining debt to the trailing average method in a manner that was consistent with the AER's Guideline even though we did not consider this to be the correct approach conceptually. … However, since lodging our Original Proposal, the debt risk premium has fallen further[481] and this 'on the day' fall relative to efficient hybrid debt financing practices further depressed the over-all weighted average cost of capital relative to market rates. We realised that, to deliver a market based return, it would also be necessary to remedy flaws in the AER's approach on debt by bringing it back into alignment with the efficient hybrid debt financing practices of a benchmark efficient entity.

Source: Energex, *Revised regulatory proposal*, July 2015, p. 106; Ergon Energy, *Revised regulatory proposal*, July 2015, p. 148; SAPN, *Revised regulatory proposal*, July 2015, p. 380.

We consider that it would be asymmetrical and biased regulatory policy to shift away from the Guideline approach where prevailing rates decreased but not where they remained constant or increased. Further, we consider this would violate the NPV=0 principle.

Our assessment of the four options against the considerations in this section are summarised in the following table.

Table 3.26 Option analysis—Avoids a potential bias in regulatory decision making that can arise from choosing an approach that uses historical data after the results of that historical data is already known?

Option		Assessment
1	Maintain on-the-day	Yes
2	Gradually transition from on-the-day to trailing average	Yes
3	Hybrid transition	Yes: Base rate No: DRP
4	Backwards looking trailing average approach	No

Source: AER analysis

In the next section, we consider whether each of the four options avoids the practical difficulties in the use of historical data to calculate the allowed return on debt, particularly during the global financing crisis.

Avoids practical difficulties with the use of historical data

Adopting the hybrid transition (Option 3) or backwards looking trailing average approach (Option 4) would require historical data on the return on debt from approximately 2006 to 2015.[628] Whereas continuing with the on-the-day approach (Option 1) or gradually transitioning from the on-the-day to the trailing average approach (Option 2) does not require historical data before 2015.

For the base rate component, high quality historical data is readily available.[629] However, for the debt risk premium component, similarly high quality and readily available data is not available. This is because:

No third party data series is available for the full 10 year historical period, meaning a mixture of data series for different time periods would be required. The RBA and Bloomberg (BVAL) data series commenced in January 2005 and April 2010 respectively.[630] But the Commonwealth Bank of Australia (CBA) Spectrum and Bloomberg fair value (BFV) curve data series ceased publication in August 2010 and May 2014 respectively.

There is no consensus among service providers on how to estimate the historical debt risk premium. Service providers with current regulatory proposals and their consultants proposed a combination of data series to implement the historical component of the backwards looking trailing average approach (and adopted differing approaches and data series for the estimate of prevailing rates in 2015):

- Some service providers (Energex and Ergon Energy)[631] proposed a simple average between the RBA and BVAL curves, and adopted the Lally method for curve extrapolation. While we accept this aspect of the proposals for estimation under the Guideline approach (Option 2), these series produced markedly different results during the GFC and the choice of series historically may be more contentious.
- Some service providers (AusNet Services, CitiPower, Powercor, United Energy, ActewAGL distribution, Australian Gas Networks, SA Power Networks and United Energy) proposed a simple average between the RBA and BVAL curves with the

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[628] For the ActewAGL, Ausgrid, Endeavour Energy, Essential Energy, TasNetworks and TransGrid data would be needed for 2005–06 to 2014–15; and for Directlink, Energex, Ergon Energy, JGN and SAPN data would be needed for 2006–07 to 2015–16. For Option 4, historical data would be needed for the total return on debt; for Option 3 historical data would be needed for the DRP component.

[629] If the base rate is defined as the risk free rate, data on the historical yield of long term Commonwealth Government securities (CGS) is available from the Reserve Bank of Australia. If the base rate is defined as the bank bill swap rate (BBSW), data is available from Bloomberg.

[630] We note the BVAL series has missing data, particularly from late October 2010 to late January 2011.

[631] Energex, *Appendix 7.9—Debt transition analysis*, July 2015; Ergon Energy, *QTC—Ergon debt transition analysis*, July 2015;

Lally extrapolation methodology for the 9 year historical period from 2006–14, then adopted annual tests to determine which data series or combination of data series and extrapolation methodology it would adopt for the estimate of prevailing rates in the placeholder averaging period.[632]

- For JEN, it is not clear which historical data series or combination of data series they have adopted. Their estimate of the historical DRP is 2.69 (semi-annual),[633] and is attributed to a report by CEG. However, we were unable to reconcile their estimate of 2.69 with CEG's estimates using Bloomberg only (2.37), RBA and Bloomberg (2.45) or RBA, Bloomberg and CBA estimates (2.49).[634]
- One service provider (Amadeus) proposed sole reliance should be placed on the RBA curve. We do not accept this aspect of that proposal.

The results of the different data series vary considerably, which complicates the choice and materiality of choosing or combining different data series for different time periods.[635] Lally stated:[636]

> Furthermore, there has been considerable variation in the results from four such indexes since early 2007, most particularly in early 2009 when the estimates of the RBA, CBA Spectrum, and BFV indexes were 9.5%, 5.0% and 3.5% respectively (CEG, 2014, Figure 1); this variation complicates the process of choosing estimates for that historical period.

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632 AusNet Services, *Regulatory proposal*, April 2015, p. 349; CitiPower, *2016–2020 Price Reset: Appendix I—Annual updating process for cost of debt*, April 2015, p. 8; Powercor, *2016–2020 Price Reset: Appendix I—Annual updating process for cost of debt*, April 2015, p. 8; United Energy, Regulatory proposal, April 2015, p. 107; ActewAGL distribution, Appendix 8.01—Detailed return on debt proposal, June 2015, p. 14; Australian Gas Networks, Access arrangement information, July 2015, p. 105; CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015, pp. 73, 91; SA Power Networks, Regulatory proposal, July 2015, p. 393; CEG, Transition to the trailing average rate of return on debt: Assessment and calculations for SAPN, June 2015, p. 25; CEG, *The Hybrid Method for the Transition to the Trailing Average Rate of Return on Debt: Assessment and Calculations for United Energy*, June 2015, p. 76; CEG, *The Hybrid Method for the Transition to the Trailing Average Rate of Return on Debt: Assessment and Calculations for AGN*, June 2015, p. 71.

633 JEN, Attachment 9–02: Rate of return proposal, April 2015, p. 111.

634 CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015, p. 91.

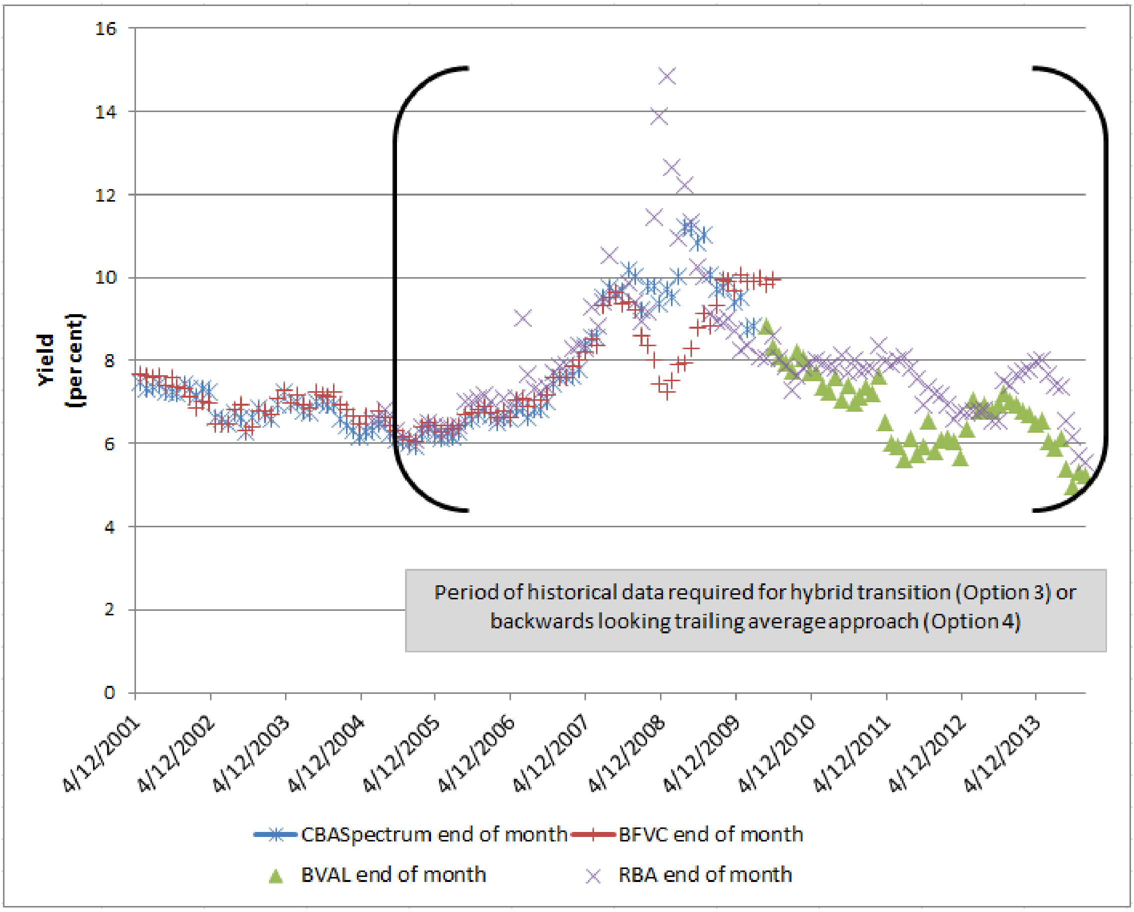
635 CEG contended that while the different data series differ from one another over time, the historical average of each data series is comparable. However, CEG analysis overlooks that under the backwards looking trailing average approach the impact on the allowed return on debt of each historical year is different. For example, for the NSW service providers the historical return on debt from 2005–06 would appear in the calculation of the allowed return on debt for regulatory year 2014–15 only. After this year, it would drop out of the trailing average and not appear in the calculation of the allowed return on debt for 2015–16 or future regulatory years. Whereas, the historical return on debt from 2013–14 would appear in the calculation of the allowed return on debt for both regulatory year 2014–15 and the next eight regulatory years. Accordingly, the impact on the allowed return on debt of the historical return on debt from 2013–14 is nine times greater than the impact of the historical data from 2013–14. A similar situation arises with JGN's revised proposal approach (Option 3). The difference is that the transition period starts a year later (2015–16) and the historical data used relates to the DRP component of the return on debt.

636 Lally, M, *Transitional arrangements for the cost of debt*, November 2014, p. 15.

It is not clear whether each data series is of comparable quality, and whether the quality has changed over time. The RBA series, for example, used a small sample in the first several years, but then a larger sample in more recent years.[637]

Figure 3-16 contains the available BBB rated data from the RBA curve, Bloomberg Valuation Service curve (BVAL), Bloomberg fair value curve (BFVC) and CBA Spectrum curve over time.

Figure 3-16 Comparison of BBB rated return on debt data series over time



Source: CBA Spectrum, Bloomberg, RBA, AER analysis

In contrast, either continuing with the on-the-day approach (Option 1) or gradually transitioning from the on-the-day to the trailing average approach (Option 2) does not use any data from before 2015. We have been able to assess the data series that are currently available, and to consider how to combine the series. Accordingly, we have a better understanding of the reliability of the return on debt resulting from our combination of those data series. We do not have the same understanding of the reliability of a historical return on debt, for reasons stated above.

637 The number of bonds in the sample for any monthly estimate is published on the RBA's website.

The choice of data series to calculate the return on debt has been considerably less contentious in the current regulatory processes, than in previous regulatory processes. For Options 1 or 2, data is only required for the 2015–16 or 2016 regulatory year onwards, depending on the service provider. For these years, most service providers agree with our position of taking a simple average of the RBA and BVAL data series.

Whereas, for Option 3 or 4, data is required for a long historical period, which includes the global financial crisis. During previous regulatory processes that covered this period, the method to estimate the return on debt was highly contentious, and frequently resulted in service providers seeking review of our decisions by the Tribunal. The choice of data series (or other sources of data) adopted by us, service providers and the Tribunal also changed over time, and often resulted in very different estimates. Accordingly, estimating the long historical data series needed to implement Options 3 or 4 is a difficult and contentious exercise.

Table 3.27 Option analysis—Avoids practical difficulties with the use of historical data?

Option		Assessment
1	Maintain on-the-day	Yes
2	Gradually transition from on-the-day to trailing average	Yes
3	Hybrid transition	Yes: Base rate No: DRP
4	Backwards looking trailing average approach	No

Source: AER analysis

In the next section, we consider whether we should apply annual updates to the allowed return on debt.

Annual updates to the return on debt

Our final decision is to update the return on debt each year. This position is consistent with our approach proposed in the Guideline and adopted in the draft decision.[638] All service providers with current regulatory proposals also proposed to update annually the return on debt.[639] We agree with this component of their proposals.

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638 AER, *Explanatory statement—rate of return guideline*, December 2013, pp. 111–15; AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, section 3.4.2. Analogous reasons were includes in our April 2014 decisions for ActewAGL, TransGrid, Endeavour Energy, Essential Energy, Directlink, Energex, Ergon Energy and SAPN as well as our May 2015 decision for JGN.

639 Some service providers have not directly addressed the question of whether or not to update the return annually, however it is implied by the lack of a proposed departure from the Guideline approach on this point.

The rules state that the return on debt may be estimated using a methodology which results in either:

- the return on debt for each regulatory year of the access arrangement period being the same, or
- the return on debt (and consequently the allowed rate of return) being, or potentially being, different for different regulatory years in the access arrangement period.[640]

Annually updating is a methodology which results in the return on debt being, or potentially being, different for different regulatory years.

We are satisfied that annual updates contribute towards the achievement of the allowed rate of return objective. This is because annual updates:

- reduce the potential mismatch between the allowed return on debt and the actual cost of debt of a benchmark efficient entity, and
- reduce the potential for large price shocks or volatility for consumers between access arrangement periods (by introducing a smaller degree of price volatility within the access arrangement period).

By the end of the Guideline development, the majority of stakeholders (including both service providers and consumer representatives) supported updating the return on debt each year.[641]

As set out in the explanatory statement to the Guideline, we acknowledge the implementation of annual updates would be moderately complex. The rules require the change in revenue from the annual debt update to be effected through the automatic application of formula that is specified in the decision on the access arrangement for that access arrangement period. [642] To facilitate the requirement for automatic updating, our decision is to:

- Use a third party data provider to estimate the allowed return on debt. Our decision on the choice of third party data provider is set out later in this attachment.
- Require service providers to nominate averaging periods for each regulatory year upfront in their access arrangement proposal (rather than during the access arrangement period). Our decision on averaging periods and the annual update process is set out later in this attachment.
- Implement the annual updates in accordance with the process for annual updating set out in Appendix I of this decision.

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640 NER clause 6.5.2(i) and clause 6A.6.2(i); NGR, r.87(9).

641 Consumer representatives such as COSBOA, EUAA and MEU supported annual updating. Service providers (and their representatives) such as APA Group, the ENA, Envestra, Ergon Energy, QTC and AusNet Services supported annual updating. On the other hand, consumer representatives such as the NSW Irrigators' Council did not support annual updating, and PIAC did not express a strong preference either way. See AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2014, p. 196.

642 NER clause 6.5.2(l) and clause 6A.6.2(l); NGR, r.87(12).

As set out in the explanatory statement to the Guideline, we consider the advantages of annual updates outweigh the resource requirement and other potential disadvantages (such as potentially higher price volatility in an access arrangement period).[643] At this point in time, we maintain that view. However, this position is premised on our decision to adopt a third party data series and to require service providers to nominate averaging periods upfront.

The CCP disagrees with our adoption of a third party data series, and instead considers we should use actual debt costs such as constructing our own index of actual industry borrowing costs. Further:

- Some service providers proposed to depart from the Guideline in relation to nominating all averaging periods before the start of the access arrangement period. Instead, these service providers proposed to nominate their averaging periods in a separate process each year. Within this, the service providers proposed different annual processes to nominate their averaging periods each year.
- AGN proposed separate averaging periods for the base rate and DRP components of the return on debt.
- Several service providers propose to undertake a complex annual testing exercise to determine the choice of data series and/or extrapolation approach for that data series

We do not agree with the CCP's submission or the service providers' proposals for the reasons set out later in this attachment. At this point, we note that adopting any of these approaches would significantly increase the complexity of annual updating and may result in annual updating being impractical. Accordingly, if we accepted either proposed approach in the future then we would need to reassess our position on whether the advantages of annual updating continue to exceed the disadvantages.

In the next section, we consider whether the allowed return on debt should be a simple or weighted average.

Response to key issues raised by stakeholders

While all service providers proposed to update the return on debt annually, United Energy, ActewAGL and JEN proposed a lagged implementation of the annual update.[644] We do not approve this aspect of these proposals. We have discussed in greater detail the implementation of annual updates in appendix I of this attachment.

[643] AER, *Explanatory statement—rate of return guideline*, December 2013, pp. 111–15.

[644] United Energy, *Regulatory proposal—Rate of return on debt attachment*, 30 April 2015, p. 31; JEN*, Regulatory proposal—Attachment 9-2: Rate of return proposal*, 30 April 2015, pp. 101–102; ActewAGL, *Access arrangement proposal—Appendix 8.01: Detailed return on debt proposal*, 1 July 2015, pp. 15–17.

Simple or weighted averaging

In order to implement a portfolio approach to the return on debt, we must decide on a weighting approach. This determines the extent to which prevailing rates in any one year will influence the allowed return on debt estimate.

In the Guideline, and in all decisions since the Guideline was published, we have adopted a simple average weighting approach. Under this approach, we update the return on debt portfolio each year so that 10 per cent of the portfolio reflects the prevailing return debt for that year. ActewAGL Distribution, Amadeus Gas Pipeline, AusNet Services, CitiPower, JEN, Powercor, SA Power Networks and United Energy proposed to adopt the simple weighted average approach. [645] We accept these proposals on the weighting approach.

However, despite adopting the simple weighting approach, United Energy submitted that:[646]

> We have developed and analysed a varying weights trailing average model in order to better understand how the scheme would work. The model took into account the expected increase in the Regulatory Asset Base, and the issuance and retirement of debt with a 10-year term to maturity. At this juncture, we consider that the hybrid form of the transition to a trailing average rate of return on debt is already sufficiently advanced. The calculation methods and data sources have been documented by CEG. A varying weights trailing average method would result in an additional overlay of detail in the hybrid calculation. We are not arguing for the adoption of the varying weights approach at this stage. However, we reserve the right to put forward a varying weights model in our Revised Regulatory Proposal.

In contrast, Energex and Ergon Energy proposed to adopt an approach where the weighting each year is determined by forecast RAB growth in the PTRM (the PTRM-weighted approach).[647] Under this approach, the weight on debt in a given year depends on the forecast growth in the regulatory asset base for that year.[648] Unlike the simple average approach, this means that the weights on debt over time can be lumpy, and depend on the specific service provider's forecast RAB growth.

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[645] ActewAGL Distribution, *2016 – 21 Access arrangement information— Attachment 8: Rate of return, gamma and inflation*, June 2015, p. 14; Amadeus Gas Pipeline, *Access arrangement revision proposal—Submission*, August 2015, p. 140; AusNet Services, *Regulatory proposal*, April 2015, p. 337; CitiPower, *Regulatory proposal*, April 2015, p. 228; Jemena Electricity Network, *Attachment 9–02: Rate of return proposal*, April 2015, p. 90; Powercor, *Regulatory proposal*, April 2015, p. 236; SA Power Networks, *Revised regulatory proposal*, July 2015, p. 393; United Energy, *Regulatory proposal*, April 2015, p. 112.

[646] United Energy, *Regulatory proposal*, April 2015, p. 112.

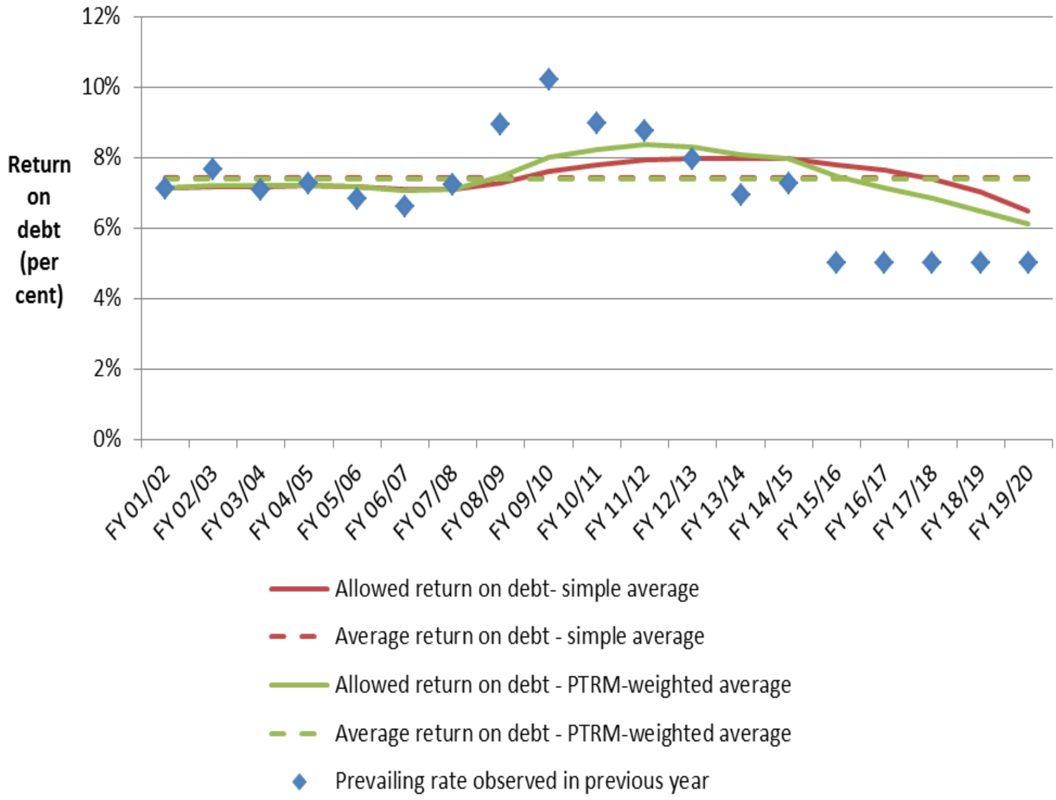
[647] Energex, *Revised regulatory proposal*, July 2015, pp. 112–114; Ergon Energy, *Appendix C: Rate of return, July 2015*, p. 143.

[648] We described the operation of this approach in detail in AER, *Preliminary decision: Attachment 3- Rate of return*, April 2015, pp. 437–442.

Using data and calculations undertaken by QTC and submitted by Energex,[649] Figure 3-17 illustrates how the simple average approach and the PTRM-weighted approach reflect the prevailing weights observed in the previous year. Broadly, it shows that the PTRM-weighted average more quickly reflects prevailing rates. However, it also illustrates the difference between the allowed return on debt under two approaches is minimal over time. As illustrated in the chart:

- the average return on debt for the simple average approach is 7.42 per cent
- the average return on debt for the PTRM-weighted average is 7.39 per cent.

Figure 3-17 Average allowed return on debt—Energex example



Source: AER analysis (averages), Energex, *Appendix 7.10 Materiality analysis spreadsheet—QTC*, July 2015.

We do not accept the proposals of Energex and Ergon Energy. Had United Energy adopted its PTRM-weighted approach we would not have accepted this approach.

[649] Ergon Energy provided a model from QTC with consistent underlying calculations, and the results are similar. We have presented only the Energex example for illustrative purposes. See: Energex, *Appendix 7.10 Materiality analysis—QTC*, July 2015.

Energex and Ergon Energy made similar though less detailed submissions in support of this approach in their initial proposals.[650] We did not accept these proposals in our preliminary decisions.[651] We consider that our reasons in these decisions remain valid and largely applicable.[652] However, Energex and Ergon Energy submitted further detailed analysis in response to our preliminary decision. In particular, both service providers submitted a report by QTC addressing our reasons. This report supports Energex and Ergon Energy's submission that the PTRM-weighted approach has some advantages. However, we are not persuaded that the PTRM-weighted approach is preferable to the simple average. We have reached our decision because

- Overall, we are satisfied that the simple average weighted approach will contribute to achievement of the allowed rate of return objective. In some years it may result in an allowed return on debt that exceeds the actual costs of a benchmark efficient service provider. In other years it may result in an allowed return on debt that is less the actual costs of a benchmark efficient service provider. However, over time we are satisfied that this approach will allow the benchmark efficient entity the reasonable opportunity to recover its efficient costs, and will promote incentives for efficient investment. Our decision is to adopt a simple average approach for the following reasons:
- The PTRM-weighted average may reflect the service provider's forecast costs more closely than the simple average approach in a range of plausible circumstances. However, we are not satisfied that the advantages of this closer match, in particular circumstances, outweigh the disadvantages. In particular:
    - the PTRM-weighted approach can still result in sizeable mismatches when compared against the benchmark efficient service provider's actual (as opposed to forecast) costs. For example, the benchmark efficient entity might defer or accelerate capex, issue shorter term debt, raise debt in other markets or through private placements. Any departure from the simplified assumptions used to estimate the return on debt will result in a deviation between allowed and actual costs. This is more than a theoretical possibility. Energex and Ergon Energy underspent capex compared to forecast by approximately 30 per cent over the last regulatory period.[653] This would have resulted in the PTRM-weighted approach substantially overestimating the amount of debt raised over a period of high interest rates, leading to an over-recovery.

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[650] Energex, *Regulatory proposal 2015–2020*, October 2014, pp. 167–171; Ergon Energy, *Regulatory proposal 2015–2020*, October 2014, pp. 142–143.

[651] AER, *Energex preliminary decision: Rate of return attachment*, April 2015, p. 138 ; AER, *Ergon preliminary decision: Rate of return attachment*, April 2015, pp. 138–139.

[652] AER, *Energex preliminary decision: Rate of return attachment*, April 2015, pp. 436–438; AER, *Ergon preliminary decision: Rate of return attachment*, April 2015, pp. 437–439.

[653] AER, *Final decision post-tax revenue model: Energex 2010–11 to 2014–15*, May 2010; AER, *Final decision roll-forward model: Energex 2010–11 to 2014–15*, October 2015; AER, *Final decision post-tax revenue model: Ergon 2010–11 to 2014–15*, May 2010; AER, *Final decision roll-forward model: Ergon 2010–11 to 2014–15*, October 2015.

- We are not satisfied that the choice of approach is material on average over time. In particular, we are not persuaded by QTC's materiality analysis. We are satisfied that QTC's materiality analysis suggests that the choice of approach may be material in a year or a period of years. In particular, the average materiality across QTC's analysis is 0.4 per cent. This is less than the commonly accepted use of 1 per cent of revenue to define materiality. This suggests that the choice of approach is not material on average over time.
- To the extent that the choice of weighting approach influences capex incentives, we are satisfied that the simple average approach will promote efficient capex incentives that are as good as those of the PTRM-weighted approach.

Further, it is desirable from a regulatory policy perspective that all service providers face the same weighting scheme. This is both more practical to apply, and limits the risk of our approach creating investment distortions between service providers. All other service providers to date have adopted the simple average approach. We are satisfied that that the sector perceives this approach as being a reasonable assumption for the benchmark efficient entity.

Response to key issues raised by stakeholders

Energex and Ergon submitted a report by QTC in support of the PTRM-weighted approach.[654]

This report included arguments in relation to:

- Which approach will minimise to a greater extent the difference between allowed and actual costs
- Whether the choice of approach is material
- Which approach will produce better capex incentives.

We were not persuaded by Energex or Ergon Energy's proposals. Our detailed analysis of the QTC report is set out in our final decisions for Energex and Ergon Energy.[655]

New issue premium

We are satisfied our current approach, without the provision of any uplift for the new issue premium, contributes to the achievement of the allowed rate of return objective. In particular, we are satisfied it is commensurate with the efficient financing costs of the benchmark efficient entity.[656]

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654 QTC, *PTRM-weighted trailing average approach*, June 2015.

655 See for example: AER, *Ergon Energy final decision—Attachment 3: Rate of return*, October 2015, appendix G.2.

656 NER, rules 6.5.2(c) and 6.5.2(h); NGR, rules 87(3) and 87(10).

We do not accept United Energy's or Australian Gas Networks' proposals to include a new issue premium of 27 basis points in the return on debt calculation.[657] We accept the proposals of the other service providers that did not propose to include an explicit allowance for the new issue premium. However, we do not agree with the commentary by some service providers that the exclusion of a new issue premium makes their proposed return on debt 'conservative'.

The effective cost of debt faced by an issuer is related to the yields at which its bonds are issued on the primary market. We estimate our return on debt allowance using third party yield curves. These provide an estimate of yields on bonds traded on the secondary market. The service providers' submissions on this topic suggest that the new issue premium is a systematic difference between these two measures and that, as a result, it is undercompensated for its cost of debt under our current approach. We do not agree with the proposition that our current approach leads to under-compensation.

We consider our current approach, without the provision of any uplift for the new issue premium, contributes to the achievement of the allowed rate of return objective by being commensurate with the efficient financing costs of the benchmark efficient entity. Our main reasons for our position are as follows:

- Conceptually, we are not satisfied that the benchmark efficient entity would face a new issue premium as part of its efficient financing costs.
- Even if we were to consider the new issue premium could be consistent with efficient financing practices, we consider that the empirical evidence on the new issue premium is inconclusive. Moreover, the applicability of this evidence to the benchmark efficient entity appears to be limited.
- There also does not appear to be a consensus among experts on how the new issue premium should be measured generally. Moreover, we have some specific concerns about the methodology CEG used to estimate the new issue premium in its report.
- We are not satisfied the evidence before us indicates that our return on debt allowance undercompensates the benchmark efficient entity overall for its efficient financing costs.

In a recent decision, we considered in detail the material submitted to us in support of the inclusion of a new issue premium allowance.[658] The main piece of information submitted this topic was a report by CEG which SA Power Networks had jointly commissioned with AusNet Services, CitiPower, Jemena, Powercor and United Energy.[659] In our current regulatory processes, the service providers have not substantively added to this information. Service providers continued to rely on the

[657] United Energy, *Regulatory proposal,* April 2015, p. 104*; Australian Gas Networks, Access arrangement information*, July 2015, p. 175.

[658] AER, *SA Power Networks Preliminary decision: Attachment 3 Rate of return*, April 2015, pp. 169–171, 470–483.

[659] CEG, *The new issue premium*, October 2014.

same CEG report we addressed in the SA Power Networks preliminary determination.[660] In addition, some service providers have referred to market data on a single bond (the Asciano bond). We are not persuaded by this new material, for the reasons set out in the following section.

In August 2015, we collected information on the actual costs of debt and financing practices from private sector service providers with regulatory proposals currently before the AER.[661] Since this time, we have begun the process of evaluating this information. In particular, we engaged Chairmont to aggregate the responses and to consider whether those responses could inform our analysis. In an aggregated form, we consider this information may help us to form conclusions on, amongst other things, whether there is evidence of a new issue premium.

Nonetheless, as we collected this information following Energex, Ergon Energy and SAPN's revised proposals, these service providers have not had an opportunity to consult on how this information could be used in our analysis. Therefore, we have not relied on this analysis in reaching our conclusions in this decision. We will consult more broadly with stakeholders on any future use of this information.

Response to key issues raised by stakeholders

While only United Energy and Australian Gas Networks proposed to apply a 27 basis point margin for the new issue premium, most service providers made submissions supporting the existence of a positive new issue premium and referenced the same CEG report in support of this. Specifically:

- AusNet Services,[662] CitiPower,[663] Powercor[664] and ActewAGL Gas[665] submitted that their proposals were 'conservative' as a result of including no allowance for the new issue premium.
- AGN,[666] SA Power Networks,[667] Multinet Gas,[668] and United Energy[669] submitted that we should have accepted CEG's analysis until we had done detailed conceptual and empirical analysis.

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660 Specifically, AGN, AusNet Services, CitiPower, JEN, Multinet Gas, Powercor, SA Power Networks and United Energy submitted the CEG report.

661 Specifically: AusNet Services, Australia Gas Networks, CitiPower, JEN, Powercor, SAPN and United Energy.

662 AusNet Services, *Regulatory proposal*, April 2015, p. 347.

663 CitiPower, Regulatory proposal, April 2015, p. 238.

664 CitiPower, Regulatory proposal, April 2015, p. 246.

665 ActewAGL Gas, *Attachment 8-01: Detailed return on debt proposal*, June 2015, p. 10.

666 Australian Gas Networks, *Access Arrangement information: Attachment 10–1 Rate of return*, July 2015, p. 53.

667 SA Power Networks, *Revised regulatory proposal*, April 2015, p. 392.

668 Multinet Gas, *Submission in relation to the current regulatory determination processes for SAPN, AGN, Energex and Ergon Energy*, July 2015, p. 20.

669 United Energy, *Submission in relation to the current regulatory determination processes for SAPN, AGN, Energex and Ergon Energy*, July 2015, p. 20.

- JEN and United Energy referred specifically to an academic paper by Ronn and Goldberg (2013) which suggests a 22.5 basis point new issue premium for non-finance investment grade bonds.[670]
- JEN[671] and AusNet Services[672] submitted that if they were to propose allowances for the new issue premium, this may not be a departure from the rate of return guideline as the issue was not raised during the guideline development process
- CitiPower and Powercor submitted that a recent Asciano debt issuance was evidence of a new issue premium.[673] This bond was issued in the primary market at 215 basis points and lowered to 205 basis points on Bloomberg's data service.
- Energex, Ergon Energy and Amadeus Gas Pipeline do not appear to have raised the issue of a new issue premium or included it in their proposed debt allowances.

We respond to each of these submissions as follows:

- We are not satisfied that the service providers' proposals are conservatively low. For the reasons set out in our draft decision for SA Power Networks, we are not satisfied there exists a conceptual or empirical basis to conclude that a positive new issue premium would affect the benchmark efficient service provider. Further, even if such a premium exists, we consider service providers have not demonstrated that the benchmark efficient entity is undercompensated by our approach to estimating the return on debt.
- In forming our view on SA Power Networks' proposed new issue premium in our preliminary decision, we assessed CEG's report.[674] Based on our assessment, we identified a series of concerns with the report and therefore were not satisfied that it supported the inclusion of a separate allowance for the new issue premium. Further, we are satisfied that our approach to estimating the return on debt contributes to achievement of the allowed rate of return objective. Therefore, we do not agree that it is appropriate to rely on CEG's estimate unless we determine an alternative estimate. In contrast, we are not satisfied the service providers have submitted evidence to indicate the benchmark efficient service provider is undercompensated under the AER's approach.
- The CEG report referred to the academic paper by Ronn and Goldberg (2013) which has been specifically referred to by several service providers. Our analysis of CEG's report in the SA Power Networks preliminary determination similarly addressed the findings in this paper.[675] In particular, we observed that:

[670] Jemena Electricity Networks, *Regulatory proposal: Attachment 9–02: Rate of return proposal*, April 2015, p. 103; United Energy, *Submission in relation to the current regulatory determination processes for SAPN, AGN, Energex and Ergon Energy*, July 2015, p. 20.

[671] Jemena Electricity Networks, *Regulatory proposal: Attachment 9–02: Rate of return proposal*, April 2015, p. 103.

[672] AusNet Services, *Regulatory proposal*, April 2015, p. 347.

[673] CitiPower and Powercor, *Submission in relation to the current regulatory determination processes for SAPN, Energex, Ergon Energy, AGN and ActewAGL*, July 2015, p. 18.

[674] AER, *SA Power Networks Preliminary decision: Attachment 3 Rate of return*, April 2015, pp. 470–483.

[675] AER, *SA Power Networks Preliminary decision: Attachment 3 Rate of return*, April 2015, pp. 476–477.

> …we do not consider this evidence to be particularly strong. Ronn and Goldberg were only able to examine 32 new bond issues by Australian companies in the US over the period from January 2005 to June 2013.[1850] This is a small sample given the time period, and this could be distorted by the effects of the global financial crisis.

- We are not persuaded that the Asciano debt issuance indicates that the benchmark efficient service provider is systematically undercompensated under the AER's approach to estimating the return on debt. The Asciano debt observation identified by CitiPower and Powercor is a single example of a bond trading at a higher yield in the primary market compared to the secondary market. Therefore, we are not satisfied that this is sufficient to demonstrate a systematic tendency for bonds to trade more expensively in the primary market. Further, the margin between primary and secondary issuance in this case is 10 basis points, which is substantially less than the 27 basis points margin estimated in the CEG report. Then, even if the margin on the Asciano bond between primary and secondary markets is representative of bonds more widely, this does not indicate that the benchmark efficient service provider is undercompensated under the AER's approach.

Implementing the return on debt approach

In the previous section, we set out our approach to estimating the allowed return on debt. This approach involves estimating an on-the-day rate (i.e. based on prevailing market conditions) in the first regulatory year of the new period. It also involves gradually transitioning this rate into a trailing average approach (i.e. a moving historical average) over 10 years. This gradual transition will occur through updating 10 per cent of the allowed return on debt each year to reflect prevailing market conditions during the particular service provider's averaging period for that year.

In this section, we set out our considerations on the implementation issues associated with estimating the allowed return on debt approach. These issues are:

- the term of debt issued by a benchmark efficient entity
- the credit rating of a benchmark efficient entity
- whether to use an independent third party data series or to construct our own data series (for example, based on an index of actual industry borrowing costs)
- the choice of third party data series (or combination of data series) to estimate the efficient debt financing costs of a benchmark efficient entity, based on the benchmark debt term and benchmark credit rating
- extrapolation and interpolation issues with adjusting our choice of data series
- contingencies associated with implementing our choice of data series, if the data series we have chosen to estimate the return on debt are unavailable or change in future regulatory years during the regulatory control period
- the averaging period used to estimate the return on debt for each regulatory year

- the annual process to update the return on debt, and

Consistent with the Guideline, we are satisfied that a return on debt estimated based on a 10 year benchmark debt term, BBB+ benchmark credit rating, and using an independent third party data series is commensurate with the efficient financing costs of a benchmark efficient entity.

In choosing that third party series (or combination of series), we are satisfied that adopting a simple average of the broad BBB rated Reserve Bank of Australia (RBA) and Bloomberg Valuation Service (BVAL) curves, with the RBA data series extrapolated to a 10 year term, is commensurate with the efficient financing costs of a benchmark efficient entity.

Term

Our decision is to adopt a ten year term for the return on debt. This position is the same as we adopted in the Guideline.[676]

In the regulatory proposals before us, all service providers proposed a ten year term for the return on debt.[677] We agree with this aspect of their proposals. This position is also consistent with advice from NERA and CEG (commissioned by service providers in recent regulatory processes).[678] However, the Consumer Challenge Panel (CCP) submitted that a seven year term was more suitable, given the AER's evidence on the weighted average bond tenor of service providers.[679]

We are satisfied that measuring the allowed return on debt by reference to a 10 year benchmark term is commensurate with the efficient financing costs of a benchmark efficient entity. Though if anything we consider a 10 year term is more likely to

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[676] AER, *Better regulation—Rate of return guideline*, December 2013, p.21; AER, *Better regulation—Explanatory statement to the rate of return guideline*, December 2013, pp.135–147.

[677] Qld/SA electricity revised proposals—Energex, *Revised regulatory proposal*, June 2015, p.103 (Energex stated it proposed to depart from the Guideline on only two debt matters, neither of them being the benchmark debt term. Accordingly, implicitly we understand Energex proposed a 10 year benchmark debt term); Ergon Energy, *Revised regulatory proposal—Appendix C: Rate of return*, June 2015, p.149; SA Power Networks, *Revised regulatory proposal*, June 2015, pp.381, 389-391 (SA Power Networks does not appear to have explicitly proposed a 10 year debt term, however, it is implicit in SA Power Networks' discussion of third party curves and extrapolation methods that it proposed a 10 year term. This is also consistent with SA Power Networks statement that it has not discussed issues where it agrees with the AER);
Victorian electricity initial proposals—AusNet Services, *Initial regulatory proposal,* April 2015, pp.335–336; CitiPower, *Initial regulatory proposal*, April 2015, p.227; JEN, *Initial regulatory proposal—Attachment 9.2: Rate of return proposal,* April 2015, pp.88–89; Powercor, *Initial regulatory proposal*, April 2015, pp.235-236; United Energy, *Initial regulatory proposal—Attachment: Rate of return on debt*, April 2015, pp.4–6;
Gas initial access arrangement proposals—ActewAGL, *Initial proposal—Appendix 8.01: Detailed return on debt proposal*, June 2015, pp.1,6; AGN, *Initial proposal—Attachment 10.1: Rate of return*, July 2015, pp.51–52; Amadeus, *Initial proposal—Access arrangement information*, August 2015, pp.28–33.

[678] NERA, *Return on capital of a regulated electricity network,* May 2014, p. ii; CEG*, WACC estimates, a report for NSW DNSPs*. May 2014, pp. 48–49.

[679] CCP, *Bruce Mountain: Comments on the AER's Preliminary Decision on the Weighted Average Cost of Capital (WACC) for Energex, Ergon and SA Power Networks,* July 2015, p. 8.

overstate than understate the debt term of a benchmark efficient entity. Our reasons for adopting a 10 year benchmark debt term are:

- A long debt tenor is consistent with the long lived assets of a benchmark efficient entity and reduces refinancing risk.
- A 10 year term is similar to (though somewhat longer than) the industry average term at issuance of a sample of firms that are comparable to the benchmark efficient entity.

Regulated network assets are long lived, and have asset lives that are longer than the terms commonly available for debt. Refinancing risk is the risk that a firm would not be able to refinance its debt at a given point in time due to this mismatch in terms. While conceptually we agree that businesses will seek to issue longer term debt to lower their refinancing risk, generally the cost of long term debt is higher than shorter term debt. This is because debt holders require compensation for the risks associated with holding debt over a longer time period. We consider a benchmark efficient entity would have regard to the trade-off between the higher cost of long term debt and the risk associated with refinancing and structure their debt holdings accordingly. Overall, these considerations suggest the average debt term of a benchmark efficient entity would be long term, but they do not provide clear guidance on what exactly that term should be.

For that reason, in our Guideline, we requested information from a range of privately owned service providers on the amount, type, term and credit rating of their debt issuances.[680] These service providers are comparable to our definition of the benchmark efficient entity which is a 'pure play' regulated energy network business operating within Australia. Based on observed practice, the weighted average term at issuance of the debt portfolio of these service providers was 8.7 years at the time of the Guideline. We observed that service providers are securing bank debt with an average term at issuance of 4.3 years, issuing Australian bonds with an average term at issuance of 9.6 years, and issuing offshore bonds with an average term of 9.7 years.[681]

However, as we discussed above in relation to the return on debt approach, we consider that under the on-the-day approach, a benchmark efficient entity would have issued interest rate swaps to closely match the base rate component of its actual return on debt with the allowed return on debt. We also note that Lally explained how this lowers the effective debt term below the term at issuance, and thereby would reduce the cost of debt (as shorter term debt is typically cheaper than longer term debt).[682] In this decision, we are gradually transitioning from the on-the-day approach to the trailing average approach. The effect of this is that the on-the-day approach

[680] Information was received from APA Group, AusNet Services, CitiPower, Dampier to Bunbury Pipeline, ElectraNet, Envestra, Jemena, Multinet, Powercor, SA Power Networks and United Energy.

[681] AER, *Better regulation—Explanatory statement to the rate of return guideline*, December 2013, p.136.

[682] Lally, *Transitional arrangements for the cost of debt*, 24 November 2014, p. 30.

continues to be applied to existing debt. Accordingly, for existing debt, the benchmark efficient entity could be expected to continue to use interest rate swaps and this would reduce the effective term on the base component of its debt, lowering the cost of that debt to below the cost of 10 year debt.[683]

In summary, we are satisfied that a 10 year term is a reasonable view as to the benchmark debt term. We also consider that, if anything, this assumption is more likely to overstate than understate the debt term (and therefore, the efficient financing costs) of a benchmark efficient entity. This is because the most recent industry average term we have calculated (at the time of the Guideline) was less than 10 years, and the benchmark efficient entity may have an incentive to enter into interest rate swaps on its existing debt, the effect of which would further lower the effective term of that debt.

As stated in the explanatory statement to the Guideline, we will monitor the average term of debt at issuance of service providers against the benchmark term. We may also consider this information when we are assessing proposals for transactions costs, and any proposed adjustment to the foundation model estimate of the return on equity.[684]

Response to key issues raised by stakeholders

As noted above, the CCP submitted that a seven year term was more suitable, given the AER's evidence on the weighted average bond tenor of service providers.[685] It's not clear which 'AER evidence' the CCP was referring to, as this was not clearly identified in the CCP's advice. However, it appears to us that the CCP was referring to the industry average debt term we calculated during the 2009 WACC review—which was 7.4 years. However, the more recent industry average debt term we calculated during the 2013 Guideline process was 8.7 years. Accordingly, based on this more recent evidence we are not persuaded by the CCP's advice that the benchmark term should be 7 years, as this would be too low.

However, given the 8.7 year industry average term, we consider our 10 year benchmark debt term assumption is more likely to overstate than understate the debt term of a benchmark efficient entity.

AusNet Services, JEN and United Energy agreed with a 10 year debt term, but they did not agree with what they labelled the AER's 'caveats' around adopting a 10 year benchmark debt term. The three services providers' comments in this regard were

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683 As we explain in the section on the debt transition, we expect a benchmark efficient entity would continue to enter into interest rate swaps, though using a different strategy (issuing a series of 1 to 10 year interest rate swaps, rather than only 5 year swaps at, or around, the time of the averaging period for the first regulatory year of the new period).

684 In section G.1.6 of appendix G, we explain that our adoption of a 10 year debt term implicitly compensates a benchmark efficient entity for the efficient cost of interest rate swaps. Accordingly, an additional explicit allowance for these transaction costs is not necessary.

685 CCP, *Bruce Mountain: Comments on the AER's Preliminary Decision on the Weighted Average Cost of Capital (WACC) for Energex, Ergon and SA Power Networks,* July 2015, p. 8.

consistent, with the text of their proposals for the most part verbatim the same. The service providers submitted:[686]

- They did not agree with the AER's assessment that a 10 year term was more likely to overstate than understate the benchmark term of a benchmark efficient entity.[687] This is because the service providers considered (based on advice from CEG) that the AER's industry average estimate of 8.7 years includes bank debt. They considered that bank debt should not be, or should not fully be, included in establishing the benchmark debt term because bank debt, at least in part, in used to fund working capital which is excluded from the RAB. Alternatively, they submitted that, if bank debt is included in the benchmark debt term than working capital should be included in the RAB for consistency.
- They submitted any consideration of transaction costs should be consistent with the principle that debt is raised on a long term basis.
- They submitted the AER has not explained the conceptual linkage between the debt term and any adjustments to the foundation model for equity.

Our consideration of these arguments is as follows.

Firstly, it appears that the service providers and CEG have misunderstood our reason for not providing an explicit allowance for working capital. It is correct that the RAB does not include an asset class for working capital. However, this is because we consider an allowance for working capital is already implicitly provided through the cashflow timing assumptions in the PTRM which are applied to the RAB.[688] Accordingly, the building block framework we apply does include compensation for working capital. When this is taken into account, we do not see any inconsistency with including bank debt within the industry average debt term that we use to inform the benchmark debt term.

Secondly, even if the service providers were correct on their inconsistency point (which we do not accept), their argument is contingent on bank debt being used to fund working capital. Working capital is generally accepted to be related to assets and liabilities which have a maturity of less than one year. The industry average maturity of bank debt is 4.3 years. Accordingly, it appears to us that most of this bank debt would therefore not be considered to be used for working capital purposes, at any rate.

Thirdly, our consideration of transaction costs is consistent with the principle that debt is raised on a long term basis. In considering the need for a transaction cost allowance

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686 AusNet Services, *Initial regulatory proposal,* April 2015, pp.335–336; JEN, *Initial regulatory proposal—Attachment 9.2: Rate of return proposal,* April 2015, pp.88–89; and United Energy, *Initial regulatory proposal—Attachment: Rate of return on debt*, April 2015, pp.4–6.

687 SA Power Networks also stated it did not agree with the AER that the true benchmark debt term was likely to be less than 10 years, however, SA Power Networks did not appear to present any supporting reasons for this view. SA Power Networks, *Revised regulatory proposal*, June 2015, p.381.

688 Allen Consulting Group, *Report to the ACCC, Working capital: Relevance for the assessment of reference tariffs*, March 2002.

for interest rate swaps, we have taken into account how interest rate swaps change the effective term of the underlying debt issuance.[689]

Fourthly, the rules provide that the allowed return on debt and the allowed return on equity must each be estimated, individually, such that they *contribute* to the achievement of the allowed rate of return objective.[690] However, it is the overall rate of return that must be determined such that it *achieves* the allowed rate of return objective.[691] Accordingly, to the extent that one element of the allowed rate of return may be over or under-estimated, the rules permit this to be considered in relation other elements of the rate of return, so long as these considerations lead to an overall rate of return that achieves the allowed rate of return objective.

Credit rating

Our decision is to adopt a BBB+ credit rating to estimate the return on debt. This credit rating is the same rating we proposed in the Guideline.[692]

In our current regulatory processes, different service providers, consultants and other stakeholders have proposed different credit ratings for the benchmark efficient entity. In particular:

- In the regulatory proposals currently before us, most service providers proposed a BBB credit rating.[693] Service providers disputed the median credit rating as determined by the AER. Some service providers submitted we should have regard to the individual circumstances of service providers that risk having their indicative credit rating downgraded to be below our benchmark credit rating. Other service providers submitted that gas distribution businesses faced greater risks and therefore would have a lower benchmark credit rating.
- Consultants' positions were mixed. For instance, NERA and Houston Kemp (commissioned by TransGrid in a recent regulatory process) recommended a BBB+ credit rating. NERA stated 'in our opinion a BBB+ credit rating is the best estimate of the benchmark credit rating'. In contrast, CEG (commissioned by several service providers) recommended a BBB credit rating. Further, Lally (commissioned by us) recommended a credit rating for energy networks of BBB to BBB+, both at the present time and as an estimate of the benchmark credit rating over the next five years. Similarly, the South Australian Centre for Economic

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689 See discussion in section G.1.6 of appendix G.

690 NER, cll 6.5.2(f) and 6.5.2(h); NGR, r.87(6) and (8).

691 NER, cl. 6.5.2(b); NGR, r.87(2).

692 AER, *Better regulation—Rate of return guideline*, December 2013, p.21; AER, *Better regulation—Explanatory statement to the rate of return guideline*, December 2013, pp.152–157.

693 AusNet Services, *Initial Regulatory Proposal, April 2015*, p. 335; CitiPower, *Initial Regulatory Proposal*, April 2015, pp. 227-228; Jemena, *Initial Regulatory Proposal*, April 2015, p. 103; Powercor, *Initial Regulatory Proposal*, April 2015, pp. 235-236; United Energy*, Initial Regulatory Proposal*, April 2015, p.106; Energex, regulatory proposal, June 2015, p.153 ; Ergon Energy, Appendix C: Rate of return, Revised regulatory proposal, June 2015, pp. 25-26; SAPN, Revised regulatory proposal 2015–20, June 2015, pp. 388-389; ActewAGL, Regulatory Proposal, Appendix 8.01: Detailed return on debt proposal, June 2015, pp. 6-9.

Studies (SACES) also recommended a credit rating of BBB to BBB+. This was in its report for the South Australian Council for Social Services (SACOSS).

- Consumer groups generally submitted using a benchmark credit rating of BBB+ or higher, submitted to highlight that the AER had been conservative in its parameter estimates, or submitted placing less reliance on credit ratings in general. For instance:
    - Several consumer groups and an energy retailer advised against lowering the benchmark credit rating from BBB+ to BBB. Some consumer groups also submitted the benchmark credit rating of BBB+ was too low. For instance, the Chamber of Commerce and Industry Queensland (CCIQ) state that the credit ratings of BBB and BBB+ are too low and do not reflect network businesses low cash flow volatility.[694]
    - Several consumer groups indicated we should recognise or have regard to service providers' actual credit ratings - particularly those that are government owned. The Victorian Consumer and User Alliance (VECUA) submitted that the AER has provided significantly higher cost of debt allowances than appropriate through the use of credit ratings lower than service providers' actual credit ratings. This has meant proposed debt allowances are well in excess of the actual cost of debt service providers will incur.[695] VECUA refers to an analysis by the Energy Users Rule Change Committee (EURCC) in 2011 to support their view.[696]
    - Energy Consumers Coalition of South Australia (ECCSA) submitted that further analysis could be undertaken between service providers gearing and credit rating, as well as, regulated and unregulated networks. The purpose of ECCSA submission was to highlight that the AER had been conservative in its estimation of a BBB+ credit rating.[697]
    - The CCP submitted that we should account for the difference between service providers actual cost of debt and the BBB benchmark so the allowance better reflects service providers' actual debt costs. The CCP noted that, 'Energex and Ergon's actual borrowing costs are much lower than the costs implied by their credit ratings'. The CCP also indicated that they would like us to consider how the allowed return on debt based on the broad BBB selection of bonds can be reduced to better reflect the BBB+ benchmark credit rating.[698] Further, the Energy Users Association of Australia (EUAA) supported using market information, benchmarking and

[694] CCIQ, *Submission to the Australian Energy Regulator on Energex's regulatory proposal for the 2015-20 revenue determination*, January 2015

[695] VECUA, *Submission to the AER: Victorian Distribution Networks' 2016-20 revenue proposals*

[696] EURCC, *Proposal to change the National Electricity Rules in respect to the calculation of the return on debt*, October 2011

[697] ECCSA, *AER review of SAPN application 2014: ECCSA response to AER's preliminary decision*, June 2015

[698] CCP, *Bruce Mountain: Comments on the AER's Preliminary Decision on the Weighted Average Cost of Capital (WACC) for Energex, Ergon and SA Power Networks,* July 2015, p. 8.

investment returns to inform our rate of return allowance for network businesses.

While we see some merit in these consumer submissions, at this stage, we consider it is a practical necessity to predominately estimate the allowed return on debt on a benchmark credit rating and term.

In appendix H on the return on debt, we respond to the key issues that different service providers and consumer groups raised in relation to the benchmark credit rating.

We are satisfied that BBB+ is the appropriate credit rating for a benchmark efficient entity facing a similar degree of risk as the service providers will current regulatory processes. This is because:

- the conceptual position that the benchmark efficient entity is likely to face low credit risk;
- the industry median credit rating of a sample of firms that are comparable to the benchmark efficient entity.

We consider a BBB+ credit rating is consistent with the conceptual position that the benchmark efficient entity is likely to face low credit risk. McKenzie and Partington found credit risk for regulated utilities is likely to be relatively small because their default risk is low and the risk of credit migrations for utilities is low and stable.[699] Moody's observed that Australian networks are under high quality regulatory regimes, which reduces their overall business risk.[700] We note that Standard and Poor's have previously considered the regulatory framework a critical aspect underlying regulated utilities' creditworthiness.[701] Moody's also recently commented that the AER's regulatory regime continues to be transparent and predictable, and that recent revenue reductions are the result of lower interest rates, rather than changes in regulatory intent. Moody's commented that the AER's continuance of its long-standing approach to the rate of return provides services providers with predictability of their cashflows, and this helps service providers implement countermeasures to manage revenue reductions, if required. Overall, Moody's commented that its central scenario is that networks will implement the necessary countermeasures to preserve their credit profiles given lower regulatory returns.[702]

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699 McKenzie, *Partington, Risk, asset pricing models and WACC*, June 2013, p. 15.

700 Moody's, *Rating methodology: Regulated electric and gas networks*, 25 November 2014, p. 34

701 Standard and Poor's, *Key credit factors: Business and financial risks in the investor–owned utilities industry*, November 2008, p. 8.

702 Moody's, *Transparency in regulatory framework supports stable outlook, but countermeasures required to offset declining returns*, 29 June 2015, pp.1–3.

Further, a BBB+ credit rating is consistent with the industry median credit rating of a sample of firms that are comparable to the benchmark efficient entity.[703] The median credit rating is currently BBB+.[704] For historical periods of progressively longer length (starting with the current year, then the last two years and etcetera, up to the last 10 years), the median credit rating has been BBB+ in three out of ten cases, BBB+/BBB in six cases, and BBB in one case. While some evidence supports a BBB credit rating (for example, the median over 2009– 2015), we are satisfied that, on balance, the evidence supports a BBB+ credit rating (for example, the median over the periods 2013–2015, 2014–2015 and 2015). We also note that this estimate entails taking the median from the yearly medians. We could also take the median of all credit rating observations over these time periods. This is BBB+ for the five most recent periods, BBB/BBB+ for the period 2010–2015 and BBB for the longer averaging periods (2006–2015 to 2009–15). We also note that this estimate entails taking the median from the yearly medians . We could also take the median of all credit rating observations over these time periods. This is BBB+ for the five most recent periods, BBB/BBB+ for the period 2010–2015 and BBB for the longer averaging periods (2006–2015 to 2009–15).

We have regard to both short term and longer term medians. This recognises there is a trade-off between using shorter term or longer term historical data. On the one hand, shorter term data is more likely to reflect current expectations. On the other hand, longer term data may reduce the influence on the median from firm specific or idiosyncratic factors that are unrelated to the benchmark efficient entity.[705] Table 3-28 sets out the median credit rating over progressively longer averaging periods.

Table 3-28 Median credit rating—Comparator set of firms

Time period	Median credit rating	Time period	Median credit rating
2015 (to date)	BBB+	2010–2015	BBB/BBB+
2014–2015	BBB+	2009–2015	BBB
2013–2015	BBB+	2008–2015	BBB+/BBB
2012–2015	BBB/BBB+	2007–2015	BBB/BBB+
2011–2015	BBB/BBB+	2006–2015	BBB/BBB+

Source: Bloomberg, AER analysis

While Table 3-28 shows some support for a credit rating of BBB, we consider it shows stronger support for a credit rating of BBB+.

703 We draw our comparator set for estimating the benchmark credit rating from Standard and Poor's industry report cards, with the exclusion of a firm that is government owned (Ergon Energy Corp Ltd.). We set our comparator set out in the return on debt appendix. These credit ratings were updated in August 2015

704 Data are subject to updates and were last checked 3 August 2015

705 Lally, *Implementation issues for the cost of debt,* November 2014, p .29.

We also note that the available third party data series currently available from the RBA and Bloomberg are both broad BBB rated data series. That is, both data series incorporate data from bonds which are rated BBB+, BBB and BBB-. Accordingly, adopting either a BBB+ or BBB benchmark credit rating is unlikely to have a practical impact on the estimation of the return on debt at this time. It also means that our use of the RBA's and BVAL's broad BBB rated data series is more likely to overstate, than understate, the efficient financing costs of a benchmark efficient entity (which we consider would be rated BBB+).

Use of independent third party data series

Our decision is to estimate the return on debt by reference to an independent third party data series. Using third party data series is the same approach we proposed in the Guideline.[706]

Service providers with proposals currently before us all proposed using independent third party data series to estimate the return on debt, with the exception of United Energy. While United Energy stated its proposal is based only on independent third party data series, an examination of United Energy's proposed method reveals that this is not the case.[707]

We agree with the service providers that proposed to use independent third party data series to estimate the return on debt. We do not agree with United Energy's proposal which would require the AER to empirically derive its own yield curves, based on United Energy's proposed method of estimation, rather than using only yield curves sourced from independent third party providers.

The CCP and several other consumer groups raised our use of third party data service providers as an issue in several of the current or recent regulatory processes. For instance, the CCP recommended using service providers' actual borrowing costs as a reasonableness check and/or using an industry index based on actual borrowing costs.[708]

We are satisfied that using a third party data series (or multiple series), appropriately chosen, is commensurate with the efficient debt financing costs of a benchmark efficient entity. It is also consistent with the rule requirement that the change in revenue (resulting from the annual debt update) is effected through the automatic application of a formula that is specified in the determination. This is because:

- A third party data series can be practically applied in the annual debt update process—We discuss this point further below.

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706 AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 126–130.

707 We explain this in the 'Response to key issues raised by stakeholders' section below.

708 CCP, *Smelling the roses and escaping the rabbit holes: the value of looking at actual outcomes in deciding WACC*, July 2014, pp. 4, 12.

- A third party data series is independent information developed by finance experts with access to financial datasets—These experts develop this independently from the regulatory process and for the use of market practitioners.
- Using a third party data series also reduces the scope for debate on debt instrument selection and curve fitting—For instance, independent data service providers have already exercised their judgement on bond selection, curve fitting and adjusting yields. However, we still must exercise our regulatory judgement to assess which third party data series (or combination of series) is better suited for contributing to the achievement of the allowed rate of return objective.
- There is no consensus among Australian regulators on the best method to estimate the return on debt—Some regulators use independent third party data series while others use their own data series (with or without it being cross checked against a third party data series).[709] The Australian Competition Tribunal has found both approaches reasonable.[710]

We explain our first reason listed above in more detail here. The rules require that if we apply annual updating (or any other approach that could result in a different return on debt each year), then the change in revenue must be effected through the automatic application of a formula that is specified in the determination. Even if this were not a rule requirement, we consider using a third party data series is likely to be the only practical option to update the return on debt annually. This position is supported by NERA (commissioned by TransGrid in a recent decision process), who advised that:

> …a third party data service provider is essential to allow the return on debt to be updated automatically'.[711]

Alternatives, such as calculating and implementing our own data series, would likely require us to apply a greater element of judgement and involve far greater complexity of calculations. For example, we may need to exercise judgement over whether we should exclude certain bonds as outliers. Consultation on these matters, and the complexity of calculations, would be impractical to achieve during the annual debt update process. The annual debt update we propose is set out below after the section on the averaging period. This process needs to occur relatively quickly and without

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709 IPART has switched from having its own approach to using an independent data service provider (the RBA). The ERA has developed its own bond yield approach and the QCA engaged PwC to develop its own econometrically derived approach (and combines this with using a third party data series as a cross check). The ESCV and ESCOSA have been using an independent data service provider (Bloomberg). See IPART, *New approach to estimating the costs of debt: use of the RBA's corporate credit spreads*, February 2014; QCA, *Final decision: Cost of debt estimation methodology*, August 2014, p. ii; ESC, *Price review 2013: Greater metropolitan water businesses - Final decision*, June 2013, p. 108; ESCOSA, *SA Water's water and sewerage revenues 2013/14-2015/16: Final determination statement of* reasons, May 2013, p. 140.

710 The Tribunal largely upheld the ERA's own bond-yield approach. See Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, Para 620. Similarly, the Tribunal has endorsed proposals to rely on an independent data service provider alone. See Australian Competition Tribunal, *Application by United Energy Distribution Pty Limited [2012] ACompT 1*, 6 January 2012, para 462.

711 NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 10.

consultation. Using a third party data series enables this. This is because we can consult on the choice of the data series and any implementation issues (for example, weighting of data series, extrapolation, or interpolation issues) when making the determination. We can then add a formula to the determination and apply it mechanistically during the annual debt update process.

Response to key issues raised by stakeholders

During the Guideline development process, we considered the use of a third party data series, in consultation with stakeholders.[712] Service providers tended to support using a third party data series.[713] While consumer representatives tended to consider we should develop our own data series.[714] We acknowledge these views. However, our decision is to use a third party data series, in the context of annual updating. This is for the reasons set out above.

As noted above, United Energy's proposed method does not use only third party data series. United Energy's proposal is for the AER to compare a range of data series each year against observed bond yields based on United Energy's particular method for choosing those bond yields. The data series that United Energy proposed be compared includes third party data series, but also includes two yield curves that the AER would be required to estimate itself each year. United Energy's proposed method for the AER to follow in this estimation involves bond selection criteria and the Nelson-Siegel curve fitting methodology for one curve, and a par yield curve fitting methodology for the second curve, which were recommended by Esquant, who is a consultant commissioned by United Energy.[715]

United Energy's proposed method is contrary to several of the benefits of adopting an independent third party data series. These benefits are:

- An independent third party data series is already calculated by another party, and can be used directly by the AER (with the exception of adjustments concerning extrapolation, interpolation and/or annualisation). The use of third party data series is therefore a practical choice that facilitates the annual debt update process. In contrast, United Energy's proposed method involves complex empirical estimation processes that would need to be performed every year, for every service provider (if applied more broadly), and in very short timeframes. It is therefore not a practical choice where the return on debt is being updated each year.

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[712] See AER, *Explanatory statement to the rate of return guideline*, December 2014, pp. 126–130; AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2014, pp. 199–200.

[713] ENA supported using Bloomberg FVC and APA also supported the continued reliance on Bloomberg. ENA, *Response to the draft guideline*, October 2013, p. 56; APA, *Submission to the draft guideline*, October 2013, p. 35.

[714] PIAC, *Submission to the draft guideline*, October 2013, pp. 45–46; MEU, *Comments on the draft guideline*, October 2013, pp. 29–33; EUAA, *Submission to the draft guideline*, October 2013, p. 6. COSBOA, *Comments–draft guideline*, October 2013, p. 4.

[715] United Energy, *Initial regulatory proposal—Attachment: Rate of return on debt*, April 2015, pp.25–28; Esquant, *The development of yield curves, zero coupon yields, and par value yields for corporate bonds—A report prepared for United Energy and Multinet Gas in response to the AER's draft rate of return guideline*, 17 October 2013.

- An independent third party data series is developed by experts who are independent of the regulatory process. In contrast, United Energy's proposed data series is not independent of the regulatory process. This position is supported by Lally, who stated:

> UED is clearly alive to the possibility that Esquant's work might not be viewed as that of an independent provider and states that this work "…should be regarded as an independent and credible data source..". However, in my view, an entity hired by a regulated business is not an independent provider and UED cannot turn black into white merely by saying that it should be regarded as white. Thus, Esquant's work is not that of an independent provider, and therefore fails a test that is imposed by UED.[716]

For these reasons, and the reasons set out in the next section, we therefore do not agree with United Energy's proposal which includes the use of non-third party independent data series.

Choice of third party data series (including adjustments)

In the previous section, we explained our decision is to use third party published data series to estimate the allowed return on debt, rather than deriving our own data series. In this section, we explain our choice of third party data series, including adjustments we have decided to make to those data series.

Our decision is to adopt a simple average of the debt data series published by the Reserve Bank of Australia (RBA) and Bloomberg that match, as close as available, our benchmarks of a BBB+ credit rating and a 10 year debt term. Specifically, our decision is to adopt a simple average of:

- the10 year estimate from the non-financial corporate BBB rated data series published by the RBA (the RBA curve),[717] and
- the 10 year yield estimate from the Australian corporate BBB rated Bloomberg Valuation Service (BVAL) data series published by Bloomberg (the BVAL curve).[718]

The RBA and BVAL curves are both 'broad BBB' rated data series in that they reflect bond pricing generally across the BBB+, BBB and BBB- rated spectrum of bonds.

Our decision is also to make certain adjustments to the RBA and BVAL curves so these rates are consistent with our 10 year benchmark debt term and also so they can be applied across the dates of a service provider's averaging periods. Those adjustments are:

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[716] Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, p.23.

[717] The RBA data series is available on the RBA's website in Statistical Table F3: http://www.rba.gov.au/statistics/tables/index.html#interest-rates

[718] The BVAL data series is available through a licence service from Bloomberg under the code 'BVCSAB10 index'. As of 14 April 2015, Bloomberg had revised its methodology for the BVAL curve and had recommenced publishing a 10 year yield estimate.

- For the RBA curve, to extrapolate the data series from a 'target' 10 year term to an 'effective' 10 year term using the method recommended by Dr Lally (the Lally method),[719] to interpolate the monthly data points to produce daily estimates, and to convert the estimates from a semi-annual to an effective annual rate.
- For the BVAL curve, to convert the estimates from a semi-annual to an effective annual rate.[720]

The above positions are consistent with the approach we adopted in the first round of decisions since the publication of the Guideline, the most recent decision being our final decision for Jemena Gas Networks (JGN).[721]

In the current round of proposals before the AER, there was a wide range of proposed methodologies to select and adjust the debt data series. Indeed, apart from where service providers had the same owner, it appears that no two proposed methodologies were exactly alike.[722] We consider this wide range of views on the appropriate methodology is indicative of there being no one 'correct' way to estimate the allowed return on debt.

This range of proposed methodologies can be loosely grouped into four broad categories, though there are generally variations between proposals in the same broad category. Those four categories, and the AER's position on those proposals, are summarised as follows:

- Some service providers (Energex and Ergon Energy) proposed a simple average between the RBA and BVAL curves, and adopted the Lally method for curve extrapolation.[723] We accept this aspect of those proposals.

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719 While the RBA publishes an estimate for a 10 year 'target' term, the 'effective' term of the RBA's estimate is commonly less than 10 years, and so requires extrapolation to produce a 10 year term. This is because the RBA's method involves weighting bonds with less weight placed on bonds the further the term to maturity of the bond is from the 10 year target term. There are commonly more bonds with terms to maturity of less than 10 years than there are bonds with terms to maturity greater of than 10 years. As a result, the RBA's methodology places greater weight on the collective pool of bonds with terms of less than 10 years, which results in the 'effective' (or average) term being less than the 10 year 'target' term of the RBA curve: see ACCC Regulatory Economic Unit, *Return on debt estimation: A review of the alternative third party data series*, August 2014, pages 34–40. The Lally method of extrapolation is set out in Lally, *Implementation issues for the cost of debt*, 20 November 2014, pp.38–44.

720 As of 14 April 2015, Bloomberg revised its methodology for the BVAL curve and has recommenced publishing a 10 year yield estimate. In the current round of decisions, only Energex and Ergon Energy have averaging periods which commenced before 14 April 2015. Before 14 April 2015, the longest tenor estimate published by Bloomberg was either 5 or 7 years, depending on the dates, and therefore required extrapolation to produce a 10 year estimate. Accordingly, for Energex and Ergon Energy we have also applied an extrapolation adjustment to the Bloomberg data before 14 April 2015.

721 AER, *Final decision—JGN access arrangement 2015-20—Attachment 3—Rate of return*, June 2015, pp.3-201 to 3-216.

722 For example, CitiPower and Powercor have the same owners (CKI Group and Spark Infrastructure) and proposed the same methodology.

723 Energex, *Revised regulatory proposal*, June 2015, p.103 (Energex stated it had two main issues in relation to the return on debt estimated by the AER in the preliminary decision. Neither of these two issues were the choice of data series or extrapolation adjustment. Accordingly, we understand that Energex has not maintained its initial proposal position on these matters. Our understanding that Energex has not maintained its initial proposal position

- Some service providers (AusNet Services, CitiPower, Powercor, SA Power Networks) proposed a simple average between RBA and BVAL curves, but with changes to the extrapolation and/or interpolation adjustments adopted by the AER in recent decisions.[724] For example, some service providers proposed an alternative extrapolation approach initially proposed by SA Power Networks, or that the extrapolation approach should be tested each year against a sample of bonds, or that manually extrapolating the BVAL 7 year estimate to 10 years is better than using the BVAL published 10 year estimate. We do not accept this aspect of those proposals.
- Some service providers (ActewAGL, AGN, JEN, United Energy) proposed an annual process to choose the data series and the extrapolation methodology.[725] For example, some service providers proposed rather than deciding the data series upfront, an annual testing process should be used to identify which data series 'best fits' a sample of bonds selected on certain criteria. The particular data series to be tested, differs between each service providers' proposals. The particular test to be applied also differs between some service providers. These service providers also proposed that the choice of extrapolation method should be selected annually in a similar way. We do not accept this aspect of those proposals.
- One service provider (Amadeus) proposed sole reliance should be placed on the RBA curve.[726] We do not accept this aspect of that proposal.

On the other hand, the Alliance of Electricity Consumers (AEC) submitted that Energex and Ergon Energy should receive an allowed return on debt that reflects the Queensland government's actual financing costs, due to their government ownership.[727]

The RBA and BVAL curves are a function of two components. Firstly, the selection criteria the organisations have adopted to determine which bonds are used to construct their curves, including the methodology for identifying and removing outliers, where applicable. And secondly, the curve fitting (or averaging) methodology the

is also informed by the following. Energex proposed to use only the RBA curve in its initial proposal. However, in a later submission, after considering our position and reasons in the November 2014 draft decision for other service providers, Energex stated it was also supportive of using a simple average of the RBA and BVAL curves. Energex, *Response to AER issues paper—Qld electricity distribution regulatory proposals*, January 2015, p. 24.; Ergon Energy, *Revised regulatory proposal—Appendix C: Rate of return*, June 2015, pp.143,151.

724 AusNet Services, *Initial regulatory proposal,* April 2015, pp.343–345; CitiPower, *Initial regulatory proposal*, April 2015, pp.234–235; Powercor, *Initial regulatory proposal*, April 2015, pp.242–243; and SA Power Networks, *Revised regulatory proposal*, June 2015, pp.389–391.

725 ActewAGL, *Initial proposal—Appendix 8.01: Detailed return on debt proposal*, June 2015, pp.1–2, 18–24; AGN, *Initial proposal—Attachment 10.1: Rate of return*, July 2015, pp.51–52; JEN, *Initial regulatory proposal—Attachment 9.2: Rate of return proposal,* April 2015, pp.96–101; and United Energy, *Initial regulatory proposal—Attachment: Rate of return on debt*, April 2015, pp.24–30.

726 Amadeus, *Initial proposal—Access arrangement information*, August 2015, pp.30–31.

727 Alliance of Electricity Consumers, *Submission to the Australian Energy Regulator's Preliminary Decision (Queensland)*, 3 July 2015, p.25..

organisations have adopted to synthesise the selected bonds and produce estimates for bond yields are various maturities, including for a 10 year term.

In the context of the first round of decisions under the Guideline, we commissioned expert reports from Dr Lally and the Regulatory Economic Unit to assess the methodologies underlying the RBA and BVAL curves.[728] We have also commissioned a follow-up report from Dr Lally which we publish with this decision.[729]

We are satisfied that a simple average of the two curves will result in a return on debt that contributes to the achievement of the allowed rate of return objective. This is because:

- Based on analysis of the bond selection criteria (including approach for identifying outliers), we consider that both approaches employed by the RBA and Bloomberg have their unique strengths and weaknesses, but we are not satisfied that either is clearly superior.
- Based on analysis of the curve fitting (or averaging) methodologies, we consider that both approaches have their unique strengths and weaknesses, but we are not satisfied that either is clearly superior.
- Both curves require adjustments from their published form to make them fit-for-purpose, and we are not satisfied that either can be more simply or reliably adjusted to estimate the annual return on debt.[730]
- A simple average is consistent with expert advice from Dr Lally that we adopt a simple average of the BVAL curve and the RBA curve, subject to the necessary adjustments to each curve. [731] In particular, Lally concluded that based on analysis of the curves, it was reasonably likely that a simple average of the two curves would produce an estimator with a lower mean squared error (MSE) than using either curve in isolation. Lally also advised:

  > …on the question of which index better reflects the cost of debt for the efficient benchmark entity, there is no clear winner.[732]

- The two curves have regularly produced materially different results at particular points in time. Both curves have their strengths, but it is not clear to us that one approach is clearly superior. Consequently, when the curves depart, we do not consider it is easily discernible which curve produces estimates that better reflect

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728 Lally, *Implementation issues for the cost of debt*, 20 November 2014; ACCC Regulatory Economic Unit, *Return on debt estimation—A review of the alternative third party data series*, August 2014

729 Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015.

730 As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate. Therefore, in applying this curve it only requires an adjustment to convert it into an effective annual rate, as set out in the formula for automatic application. However, the RBA curve requires several adjustments from its published form.

731 Lally, *Implementation issues for the cost of debt*, 20 November 2014, p.3; Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, 5.

732 Lally, *Implementation issues for the cost of debt*, 20 November 2014, p. 5.

the efficient financing costs of a benchmark efficient entity. We also note that the BVAL curve has produced estimates both higher than, lower than, and similar to, the RBA curve, depending on the particular point in time. So there is no clear indication that one curve produces systematically higher or lower estimates than the other.

- A simple average of two curves, in these circumstances, is consistent with the Tribunal's decision in the ActewAGL matter where the Tribunal concluded that:

> …if the AER cannot find a basis upon which to distinguish between the published curves, it is appropriate to average the yields provided by each curve, so long as the published curves are widely used and market respected.[733]

- A simple average of the two curves will reduce the likely price shock if either curve becomes unavailable or produces erroneous estimates during the period.

In our draft decision for JGN, we explained each of these reasons in more detail.[734] This analysis included the following evidence.

Dr Lally used the report of the Regulatory Economic Unit to identify 11 points of distinction between the RBA and BVAL curves. Lally analysed each of those differences and concluded:

> In summary, eleven points of distinction have been identified between the BVAL and RBA indexes. Point (11) is irrelevant in view of the AER not requiring historical data. In respect of points (3), (4), (6), (7) and (8), it is not possible to express a preference for one of the two indexes. The BVAL is favoured in respect of points (1) and (9), but the advantage in respect of point (9) is small. The RBA is favoured in respect of points (2), (5) and (10), but the advantage in respect of point (5) is small. The most that can be said here is that neither index is clearly superior to the other.[735]

Based on this analysis, Lally recommended using a simple average of the two curves. Lally advised:

> Firstly, on the question of which independent third-party data service provider should be used to estimate the cost of debt … I … recommend that a combined estimator be used. Since the standard deviations of these estimators are similar and it is not possible to quantify any biases in these two indexes, I recommend that the two indexes be equally weighted. This will lower the Mean Squared

[733] In this decision, the issue before the Australian Competition Tribunal was the choice between the Bloomberg fair value curve (BFVC) and the CBASpectrum curve, neither of which are currently published. See: *Application by ActewAGL Distribution [2010] ACompT4*, 17 September 2010, paragraph 78.

[734] AER, *Draft decision—JGN access arrangement 2015-20—Attachment 3—Rate of return*, November 2014, pp.3-134 to 3-158, 3-301 to 3-308.

[735] Lally, *Implementation issues for the cost of debt*, 20 November 2014, p.19.

Error (MSE) of the estimator relative to using only one of the indexes, and significantly so if the correlation between the indexes is low.[736]

Those 11 points of distinction, and Lally's assessment of those differences between the RBA and BVAL curves, are summarised in the following table.

Table 3-29 Dr Lally's advice of the differences between the RBA and BVAL curves

No.	Points of distinction identified by REU[737]	Advice from Dr Lally[738]
1	The BVAL is available daily whilst the RBA is only available monthly.	BVAL favoured.
2	The BVAL is only available for terms up to seven years, and therefore would have to be extrapolated out to the desired ten years, whilst the RBA is at least notionally available for the desired ten year term.	RBA favoured. *Note: From April 2015, this point would have changed to "BVAL favoured" as Bloomberg commenced publication of a 10 year BVAL curve, which no longer requires any extrapolation adjustment.*
3	The BVAL sample of bonds is limited to those with a minimum pricing quality (liquidity measure), at least two months to maturity, and above retail size ($10m: see REU, 2014, page 20), whilst the RBA sample is limited to bond issues of at least $100mAUD and at least one year to maturity.	Not possible to express preference for one over the other.
4	The BVAL sample does not exclude financial corporations whilst the RBA's does.	Not possible to express preference for one over the other.
5	The BVAL sample is limited to unsecured bonds whilst the RBA's sample includes both secured and unsecured bonds.	RBA favoured, but advantage is small.
6	The BVAL sample is limited to bonds rated by either S&P or Moody's, whilst the RBA sample is limited to bonds rated by S&P or issued by a firm with an S&P rating.	Not possible to express preference for one over the other.
7	The BVAL sample is limited to AUD denominated bonds whilst the RBA sample also includes USD and Euro	Not possible to express preference for one over the other.

[736] Lally, *Implementation issues for the cost of debt*, 20 November 2014, p.3.

[737] Identified by REU, *Return on debt estimation: A review of the alternative third party data series: Report for the AER*, August 2014; and summarised by Lally, *Implementation issues with the cost of debt*, November 2014, pp. 7-8.

[738] Set out by Lally, *Implementation issues with the cost of debt*, November 2014, pp. 8 to 19, and summarised on p. 19.

No.	Points of distinction identified by REU[737]	Advice from Dr Lally[738]
	denominated bonds.	
8	The BVAL sample excludes bonds with call, put and conversion options, whilst the RBA sample does not exclude them.	Not possible to express preference for one over the other.
9	The BVAL methodology involves a par yield curve whilst the RBA's does not.	BVAL favoured, but advantage is small.
10	The BVAL methodology for curve fitting is (in large part) not disclosed whilst the RBA's methodology is disclosed.	RBA favoured.
11	The BVAL is only available back to February 2011 (continuously) whilst the RBA is available back to January 2005, and therefore there will be more problems obtaining a ten-year trailing average when using the BVAL.	Not relevant, as AER does not require historical data.

Source: Advice from Dr Lally[739]

We have assessed the new information received in current proposals from service providers who recommend that we depart from our previous position of adopting a simple average of the RBA and BVAL curves. That new information does not persuade us to depart from our position or reasons from the JGN draft and final decisions. We explain why below.

We also requested Dr Lally review the recommendations from his previous report in light of the material submitted by service providers with current proposals. As part of that analysis, we requested Dr Lally review both the AER's approach and the various approaches proposed by service providers with current proposals against a set of criteria drawn from the requirements of the law and the rules, including the allowed rate of return objective. After reviewing that material, Dr Lally concluded:

> …the AER's proposed approach satisfies the criteria and these criteria are not satisfied by any other proposed approach.
>
> Finally, I have previously provided advice on these implementation issues to the AER and nothing in these submissions warrants any change in that advice.[740]

In the next section, we respond to key aspect of the service providers' proposals.

739 Lally, *Implementation issues for the cost of debt*, 20 November 2014.

740 Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, p.5.

Response to key issues raised by stakeholders

As noted above, there was a wide range of methods proposed by service providers in proposals currently before the AER. Each of the proposals is outlined in Table 3-30 below. The following table covers the choice of data series proposed by service providers which is relevant to our gradual transition from the on-the-day approach to the trailing average approach. It does not cover the historical data series proposed by service providers to implement their backwards looking hybrid transition approach.

Table 3-30 Choice of data series and adjustments: Summary of current service provider proposals

Service provider	Choice of data series	Extrapolation/interpolation adjustments
VIC electricity distribution initial proposals		
AusNet Services	Proposed simple average of RBA and Bloomberg BVAL curves, consistent with recent AER decisions.	Departed from recent AER decisions on curve extrapolation. Proposed the SAPN method.
CitiPower and Powercor	Proposed simple average of RBA and Bloomberg BVAL curves, consistent with recent AER decisions.	Departed from recent AER decisions on curve extrapolation. Proposed an annual 'best fit' test process to select between the Lally and SAPN methods. Adopted interpolation method for RBA data, consistent with recent AER decisions.
Jemena Electricity Networks (JEN)	For the first averaging period, because it is before the final decision, JEN submitted this permitted a 'more detailed bespoke' analysis to choose between the RBA and BVAL curves. For subsequent averaging periods, proposed a simple average of four data points (RBA curve with Lally extrapolation, RBA curve with SAPN extrapolation, BVAL curve with Lally extrapolation, and BVAL curve with SAPN extrapolation), unless there is a material (60 basis point) difference between the highest and lowest of the four estimates. In which case a 'best fit' process is used to select between all available third party data series (not restricted to the RBA and Bloomberg), or an average of all available third party data series. JEN proposed that all BBB rated third party data series with published yields of seven years or greater, and a simple average of all such data series, be tested.	See description in 'choice of data series' column.
United Energy	Proposed that a range of third party data series and other information be	United Energy also departed from recent AER decisions on

Service provider	Choice of data series	Extrapolation/interpolation adjustments
	tested each year against observed bond yields using United Energy's proposed 'best fit' approach. The data series that United Energy proposed be tested each year are the RBA data series, the Bloomberg BVAL data series, an empirically derived Nelson-Siegel yield curve estimated following United Energy's proposed method, an empirically derived par yield curve estimated following United Energy's proposed method, and any other sources of published yield information on A and BBB rated corporate bonds with yields of seven years and greater.	data series extrapolation. Proposed an annual 'best fit' test process to select between the Lally and SAPN methods.
SA and Qld electricity distribution revised proposals		
Energex	Did not maintain initial proposal position to place sole reliance on the RBA curve, and therefore appears to accept AER's position in the preliminary decision.	Did not maintain initial proposal position on extrapolation method, and therefore appears to accept AER's position in the preliminary decision (the Lally method).
Ergon Energy	Adopted AER's preliminary decision position (simple average of RBA and BVAL curves).	Adopted AER's preliminary decision method (the Lally method).
SA Power Networks	Proposed simple average of RBA and BVAL curves.	BVAL curve should be extrapolated from 7 to 10 years, rather than using BVAL's published 10 year estimate. If there is a single extrapolation method, proposed SAPN approach. Otherwise, supported annual testing in principle.
Gas initial proposals		
ActewAGL	Accepted AER's position from recent decisions (simple average of RBA and BVAL curves extrapolated using Lally method), unless the difference between the highest and lowest of four data points (RBA curve with Lally extrapolation, RBA curve with SAPN extrapolation, BVAL curve with Lally extrapolation, and BVAL curve with SAPN extrapolation) is greater than 20 basis points. In which case, a 'best fit' process is used to select the data series and extrapolation method.	See description in 'choice of data series' column.
Australian Gas Networks (AGN)	Proposed an annual 'best fit' test process to choose between the RBA and BVAL curves.	Proposed an annual 'best fit' test to choose between the Lally and SAPN methods.

Service provider	Choice of data series	Extrapolation/interpolation adjustments
Amadeus	Proposed sole reliance on RBA curve.	Position unclear.

Source: Regulatory proposals.[741]

As noted above, ActewAGL's, AGN's, JEN's and United Energy's proposals involve an annual process to test which of various curves, or averages of curves, 'best fit' a sample of bond yields during the particular service provider's averaging period in a particular year. ActewAGL's, AGN's JEN's and United Energy's proposed method apply this annual testing methodology to select both the choice of data series and the extrapolation method. On the other hand, CitiPower and Powercor proposed a similar annual testing process be applied only to select the extrapolation method.

We are not satisfied that the proposed methods of these service providers to test which curve or extrapolation method 'best fit' a sample of bonds based on the service providers' nominated bond selection criteria is a robust way to determine which of the curves or extrapolation methods is more 'accurate' at a point in time. The concept of 'accuracy' in this context is somewhat misplaced. The RBA and BVAL curves are a function of their underlying bond selection criteria and curve fitting (or averaging) methodologies. As a result, when the estimates of the curves differ from each other, or differ from the estimate that would be derived from the service providers' selection of bonds, it is because the underlying methodologies differ.

We are not persuaded to adopt an annual 'best fit' testing method for the following reasons:

- The premise of the 'best fit' method is that it assumes, by definition, that this test better reflects efficient financing costs than the either the RBA or BVAL method, and we are not persuaded this is the case.

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[741] Qld/SA electricity revised proposals—Energex, *Revised regulatory proposal*, June 2015, p.103 (Energex stated it had two main issues in relation to the return on debt estimated by the AER in the preliminary decision. Neither of these two issues were the choice of data series or extrapolation adjustment. Accordingly, we understand that Energex has not maintained its initial proposal position on these matters. Our understanding that Energex has not maintained its initial proposal position is also informed by the following. Energex proposed to use only the RBA curve in its initial proposal. However, in a later submission, after considering our position and reasons in the November 2014 draft decision for other service providers, Energex stated it was also supportive of using a simple average of the RBA and BVAL curves. Energex, *Response to AER issues paper—Qld electricity distribution regulatory proposals*, January 2015, p. 24.; Ergon Energy, *Revised regulatory proposal—Appendix C: Rate of return*, June 2015, pp.143,151; SA Power Networks, *Revised regulatory proposal*, June 2015, pp.389–391, 393;
Victorian electricity initial proposals—AusNet Services, *Initial regulatory proposal,* April 2015, pp.343–345; CitiPower, *Initial regulatory proposal*, April 2015, pp.234–235; JEN, *Initial regulatory proposal—Attachment 9.2: Rate of return proposal,* April 2015, pp.96–101; Powercor, *Initial regulatory proposal*, April 2015, pp.242–243; United Energy, *Initial regulatory proposal—Attachment: Rate of return on debt*, April 2015, pp.24–30;
Gas initial access arrangement proposals—ActewAGL, *Initial proposal—Appendix 8.01: Detailed return on debt proposal*, June 2015, pp.1–2, 18–24; AGN, *Initial proposal—Attachment 10.1: Rate of return*, July 2015, pp.51–52; Amadeus, *Initial proposal—Access arrangement information*, August 2015, pp.30–31.

- Placing sole weight on the 'best fit' method ignores useful information that can be gathered from examining and analysing the underlying bond selection criteria and curve fitting methodologies of the RBA and BVAL methods.
- The particular 'best fit' methods that have been proposed to us by service providers are inconsistent with the rules requirement for a change in revenue from the annual debt update to be from an automatic application of a formula in the decision.[742]

We explain each of these reasons below.

Firstly, the following is a simplified explanation of the range of annual testing methods proposed by various service providers, which is helpful to illustrate our objection to its core premise:

- Assume there are three sets of bonds labelled Group A, Group B and Group C. The selection criteria for each group is different, but partially overlapping, meaning there is some commonality of the bonds in each group.
- Group A bonds are used to construct Curve A, Group B bonds are used to construct Curve B, and Group C bonds are used as a ‘test group’.
- The test is applied as follows—Curve A and Curve B are tested to assess which curve better fits the bonds in Group C, the test group.
- Assume Group A bonds and Curve A represent the BVAL methodology, Group B bonds and Curve B represent the RBA methodology, and Group C bonds represent the test group of bonds proposed by service providers (based on either the CEG or Esquant methodology).
- The underlying premise of this test is that Group C bonds are a better reflection of the efficient financing costs of a benchmark efficient entity than Group A (BVAL) bonds or Group B (RBA) bonds. Unless this underlying premise is established then the fact that the Group C bonds might be a better fit to Curve A or Curve B in a particular year says nothing about which curve is a better reflection of the efficient financing costs of a benchmark efficient entity.

The service providers have not established that the test group of bonds they proposed (the 'Group C bonds' in the above illustration) are a better reflection of the efficient financing costs of the benchmark efficient entity than were the Group A bonds (based on Bloomberg’s nominated selection criteria) or the Group B bonds (based on the RBA’s nominated selection criteria). Rather, the proposals generally rely on an assumption that because the test group of bonds is large, it is therefore a good test group. Further, their proposed test group of bonds—which differed between the CEG and Esquant methodology—includes bonds that both the RBA and Bloomberg have excluded without explaining why both the RBA and Bloomberg were wrong to exclude these bonds.

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[742] NER cl. 6.5.2(l) and cl. 6A.6.2(l), NGR, r.87(12).

Our adoption of a simple average of the RBA and BVAL curves was informed by the analysis from Lally, the REU and our own analysis. That analysis established that there were strengths and weaknesses with the RBA's and BVAL's bond selection criteria in relation to reflecting the efficient financing costs of a benchmark efficient entity, however, neither was clearly superior to the other.

The above simplified explanation is similar to the testing approach proposed by ActewAGL, AGN and JEN. United Energy proposed a similar though vastly more complex version of ActewAGL's, AGN's and JEN's approach. United Energy's approach is considerably more complex because, along with testing the available third party published data series, United Energy also proposed the AER empirically derive its own data series using two separate complex methodologies and add these into the mix of curves to be tested. However, despite this additional complexity, we are not satisfied United Energy's approach adds to the accuracy of this annual testing process, because of the reasons set out in this section that apply to any such annual testing approach. These reasons also apply to CitiPower's and Powercor's proposed method which uses annual testing to select the extrapolation method.

Secondly, we consider it is appropriate to select a data series (or average of data series) 'up-front' in circumstances where there is detailed information available to us at the time of the decision about both the RBA curve and BVAL curve and that information did not disclose that one was superior to the other.

In contrast, the annual testing approach treats each curve as a 'black box', when they are not. We might adopt an approach like that if we were unable to analyse the underlying characteristics of the curves (that is, the bond selection criteria and curve fitting methodology). However, this is not the case. The RBA and BVAL have applied their expertise to assess debt market information. Each determined a distinct approach to synthesize the available corporate bond data into yield curves. We have a fair degree of available information on the bond selection criteria of both curves. Further, we have a fair degree of available information on the curve fitting (or averaging) methodology used by the RBA, and some available information on Bloomberg's curve fitting methodology. We have assessed that available information. Based on our assessment of the underlying characteristics of the RBA and BVAL curves we consider both curves have strengths, but neither curve is clearly superior to the other.

Some service providers have stated this reasoning is inconsistent with the principles articulated by the Tribunal in *Application by Jemena Gas Networks (NSW) Ltd (No 5) [2011] ACompT 10*, in which the Tribunal determined to use a particular curve over another on the basis that it provided a better fit to the available data.[743] We disagree. In the JGN matter, the Tribunal said:

> In ActewAGL averaging of rival fair value curves was undertaken because there was no clear basis to justify a preference for one curve over the other. Here, by way of contrast, Professor Handley was somewhat equivocal in his

[743] *Application by Jemena Gas Networks (NSW) Ltd (No 5) [2011] ACompT 10*

> support for the CBA Spectrum curve; Dr Hird meticulously evaluated different groupings of bonds and made many adjustments to allow for non-standard bond features, and his tests clearly pointed to the superiority of the Bloomberg curve over many different iterations; and the publishers of the CBASpectrum curve have stopped producing it, citing lack of relevance to the market.[744]

The Tribunal was thus persuaded by expert evidence favouring one curve over another; which included the fact that one of the curves in contention had ceased to be produced. In contrast, both the RBA and BVAL curves continue to be produced and there is strong expert support for each data source. We consider our proposed approach to averaging the BVAL and RBA curves is thus entirely consistent with the Tribunal's decision in Application by Jemena Gas Networks (NSW) Ltd (No 5), and also with the endorsement given by the Tribunal to curve averaging in *Application by ActewAGL Distribution [2010] ACompT 4*.[745]

We further note that both the ActewAGL and JGN matters appeared before the Tribunal before the change to the rules that permits annual updating of the allowed return on debt. In the ActewAGL matter, the Tribunal cautioned against any sort of 'best fit' testing that did not use judgement and a qualitative approach to check for outliers in the sample of bonds used as the test group.[746] However, the new rules that permit annual updating also require for a change in revenue from the annual debt update to be from an automatic application of a formula in the decision.[747] Accordingly, the rules no not permit the sort of qualitative approach to checking for outliers that the Tribunal considers important if an annual testing approach was adopted.

Thirdly, and most significantly, following on from the last point, we consider the annual 'best fit' test to curve and extrapolation method selection is inconsistent with the rules. The rules provides that if the return on debt is to be estimated using a methodology which results in (potentially) different returns for different regulatory years, then "a resulting change to the service provider's total revenue must be effected through the automatic application of a formula that is specified in the determination".[748] In the 2012 rule determination, the AEMC said in relation to this rule that "the formula for calculating the updated return on debt must be specified in the regulatory determination or access arrangement and must be capable of applying automatically".[749] We are not satisfied that proposed approaches to estimating return on debt by reason to a 'best fit' data source could be formulaically applied as required by this rule.

744 *Application by Jemena Gas Networks (NSW) Ltd (No 5) [2011] ACompT 10* at [83].

745 Application by ActewAGL Distribution [2010] ACompT 4 at [78].

746 Application by ActewAGL Distribution [2010] ACompT 4 at [67–68].

747 NER cl. 6.5.2(l) and cl. 6A.6.2(l), NGR, r.87(12).

748 NER cl. 6.5.2(l) and cl. 6A.6.2(l), NGR, r.87(12).

749 AEMC, *Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper*, 29 November 2012, p 91.

The annual 'best fit' test that was initially proposed by JGN forms the basis for the annual 'best fit' test proposed by a number of service providers with current proposals. This process entails the use from year to year not only of the RBA curve and/or the BVAL curve, but “any other sources of published yield information for corporate bonds which are well recognised and used by market practitioners”. Further, for the purpose of ascertaining yields from the observed foreign currency bond data, this approach includes a conversion to Australian dollar equivalents by use of swaps “in a methodology that is well accepted in the finance industry”.

However, the rules do not permit the calculation of return on debt from year to year by reference to qualitative assessments of whether a particular data source is “well-accepted”. In this regard, rule 87 of the NGR formerly provided that in determining a rate of return on capital, a “well accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital” and a “well accepted financial model, such as the Capital Asset Pricing Model”, are to be used. However, this criterion was deleted following the 2012 rule change The NER and NGR now specifically require debt allowances to be updated “through the automatic application of a formula that is specified” in the final decision, and have eliminated the difficulties involved in subjective determinations of what “well accepted” means.

We consider both of these steps (i.e. determination of a well-accepted or well-recognised methodology) requires extensive use of judgement, as there is no objective standard for wide use, recognition or acceptance of a method within the finance industry. For example, in relation to:

- The identification of relevant yield curves—How would the AER determine if a yield curve was 'well recognised' and 'used' by market practitioners? Would the AER be required to conduct a survey of market practitioners each year to determine which yield curves were 'well recognised' and 'used' by market practitioners in that particular year? Which market practitioners would the AER need to survey to construct a representative sample? What proportion of that sample would need to use the yield curve for it to be considered 'well recognised'? And 'used' for what purpose or purposes by market practitioners?
- The selection of the cross-currency conversion methodology—How would the AER determine if a cross currency conversion formula was 'well accepted' within the finance industry? Would the AER be required to conduct a survey of the finance industry each year to determine which conversion methodologies were 'well accepted' that year? Who in the finance industry would the AER need to approach? What proportion of that sample would need to use the cross-currency conversion methodology for it to be considered 'well accepted'? What if no particular methodology had wide acceptance? What if multiple methodologies had wide acceptance?

Accordingly, the JGN method, which has been adopted by a number of service providers leaves many questions unanswered. Answering these questions would involve, each year, considerable amounts of analysis, judgement and possibly consultation. We are not satisfied this proposed formula can be 'automatically applied', as required by the rules.

We are also not satisfied that United Energy's proposed method meets the rules requirement for automatic application. This is because, on the one hand, United Energy proposed an annual 'best fit' method, based on a report from Esquant. However, among the data series to be tested, United Energy proposed the AER should empirically derive its own yield curves based on the Nelson-Siegel and pay yield curve fitting methodologies. In addition to the practical difficulties involved with using non-third party data series, as explained in the previous section, there is a further problem with United Energy's approach which means it cannot be automatically applied. This further problem is explained by Lally, who stated:

> UED (2015, pp. 24-30) favours a similar process to that of JEN, in choosing between independent providers of DRP curves according to their goodness-of-fit to data collected in accordance with particular criteria, but subject to dispensing with the preliminary test of materiality in differences and also augmenting the set of independent providers by the results from Nelson-Siegel and par yield curves (applied to bond yields on bonds selected in accordance with criteria determined by Esquant (2013)). In addition, UED (2015, page 29) also states that, "notwithstanding the goodness-of-fit tests…precedence will be given to the results from the Nelson-Siegel yield curves and from par yield curves…".
>
> This approach has the following drawbacks. Firstly, the requirement to annually determine the set of independent data providers violates the requirement in Rule 6.5.2 (1) of the NER and Rule 87 (12) of the NGR for the annual updating of the cost of debt to be formulaic. Secondly, the process involved in testing for goodness of fit also violates the formulaic requirement in the NER and NGR. Thirdly, the requirement to give precedence to the results from the Nelson-Siegel yield curves and from par yield curves requires judgement over when these results would supplant all others, and therefore also violates the formulaic requirement of the NER and NGR.[750]

In contrast to most other proposals, Amadeus proposed sole use of the RBA curve. However, as set out above, we are not satisfied that either the RBA or BVAL curve is clearly superior to the other, hence we've adopted an average.

The Alliance of Electricity Consumers (AEC) submitted:

> Due to the public ownership of Energex and Ergon Energy, as well as their utility function within the economy, Energex and Ergon Energy should receive a return on capital that reflects the Queensland Government's actual financing costs.
>
> The difference between Energex and Ergon Energy's actual financing costs, through QTC and the AER's revenue allowances for inflated hypothetical financing costs, provides substantial financial gain to the Queensland

[750] Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, p.23.

> Government. This is at the exclusive expense of electricity consumers, through higher electricity prices.[751]

We estimate the return on debt of a benchmark efficient entity, rather than the return on debt of the actual service provider. Among other characteristics, we consider the benchmark efficient entity is a privately owned entity and has a credit rating of BBB+, which is lower than the credit rating of the Queensland government. Accordingly, we select the third party data series by reference to a private sector BBB+ credit rating.

In essence, the AEC is proposing we adopt different benchmarks—a higher benchmark for privately owned networks and a lower benchmark for government owned networks. The question of whether government and privately owned networks should be treated differently has been carefully and extensively considered by the AEMC during the 2012 rule change process and by us during the Guideline development process.[752] We maintain our view that a privately owned benchmark should be adopted for all service providers (regardless of actual ownership) for the reasons we outlined during the Guideline development process.[753]

Choice of data series—Extrapolation and interpolation issues

Our decision on extrapolation and interpolation issues is to broadly maintain the approach set out in our recent decisions. This refers to:

- Extrapolation—where we need to extend a curve beyond its observed or published range. For example, before April 2015, Bloomberg publishes its BVAL curve to a maximum term of 7 years, whereas we require an estimate for a 10 year term.
- Interpolation—where we need a value for which there is no published estimate but it lies between two published estimates. For example, the RBA only publishes its curve estimates for one day each month, but we require estimates for each business day.

Specifically, we will make the following adjustments as set out in Table 3-31 and Table 3-32. The impact of these adjustments is set out in Figure 3.18 and Figure 3.19.

Table 3-31 Adjustments to the RBA curve

Adjustment Type	Amendment made?	Comments
Interpolation to construct daily estimates.	Yes	The RBA curve only provides an estimate for one business day at the end of each month. In our experience, averaging periods commonly start and/or end on dates during the month. We will address this issue by linearly interpolating between month end

[751] Alliance of Electricity Consumers, *Submission to the Australian Energy Regulator's Preliminary Decision (Queensland)*, 3 July 2015, p.25.

[752] AEMC, *Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper*, 29 November 2012, pp.86–89.

[753] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 44–45.

Adjustment Type	Amendment made?	Comments
		values where possible. While we are satisfied that interpolation over business days is also reasonable, we will interpolate over all days because: • this is consistent with our widely accepted approach to interpolate estimates of the risk free rate using CGS • interpolating over all days is simpler to implement • it is impractical to interpolate over business days for estimating the risk free rate, as this would require calculations relative to specific trading days 10 years in advance • the difference to the estimates between interpolating over business days or interpolating over all days is immaterial.[754] Where this is not practical due to timing, we will hold the last available RBA monthly estimate constant until the end of the averaging period. It would not be practical to linearly interpolate between two RBA monthly estimates where the allowed return on debt must be estimated and incorporated into the annual debt update process before the publication of the next RBA monthly estimate after the end of the averaging period. Our final decision on the annual debt update process is set out in the annual debt update process later in this attachment.
Extrapolation to target term.	Yes	The 'effective term' of the RBA bond sample is commonly less than 10 years. For this reason, Lally recommended that the spread component of the yield should be extrapolated from its effective term at publication to the benchmark term (10 years).[755] We agree with Lally's recommendation to extrapolate the spread component of the RBA's published yield in order to match it with the benchmark term of debt. Further, while the benchmark term of debt is 10 years, this benchmark was based on analysis of debt issuance that indicated a weighted average of 8.7 years amongst the benchmark sample.[756] Our benchmark sample consisted of service providers that were comparable to our definition of the benchmark efficient entity. We were therefore satisfied the average term at issuance for this sample was reflective of efficient financing costs. Similarly, from its earliest available publication to February 2015, the average effective term of the RBA's bond sample for its 10 year estimate is also 8.7 years.[757] We recognise that the effective term of the RBA's sample may change each month. In some months, the effective term may be above or below its long term average. However, the long term average effective term to maturity is similar to the average term at issuance of our underlying benchmark sample. Therefore, while this average effective term is less than our stated benchmark term, it is consistent with the evidence of efficient financing practices that the benchmark term was based on. As such, extrapolation to match the benchmark term may result in overcompensation on average compared to the efficient financing costs of the benchmark efficient entity. In this decision, we have maintained our position from recent decisions to extrapolate the RBA curve. However, we may revisit this in in future decisions or the next Guideline review.

[754] For example, the difference between approaches over 2 June 2014 to 30 June 2014 was 0.22 basis points, or 0.0022 per cent.

[755] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

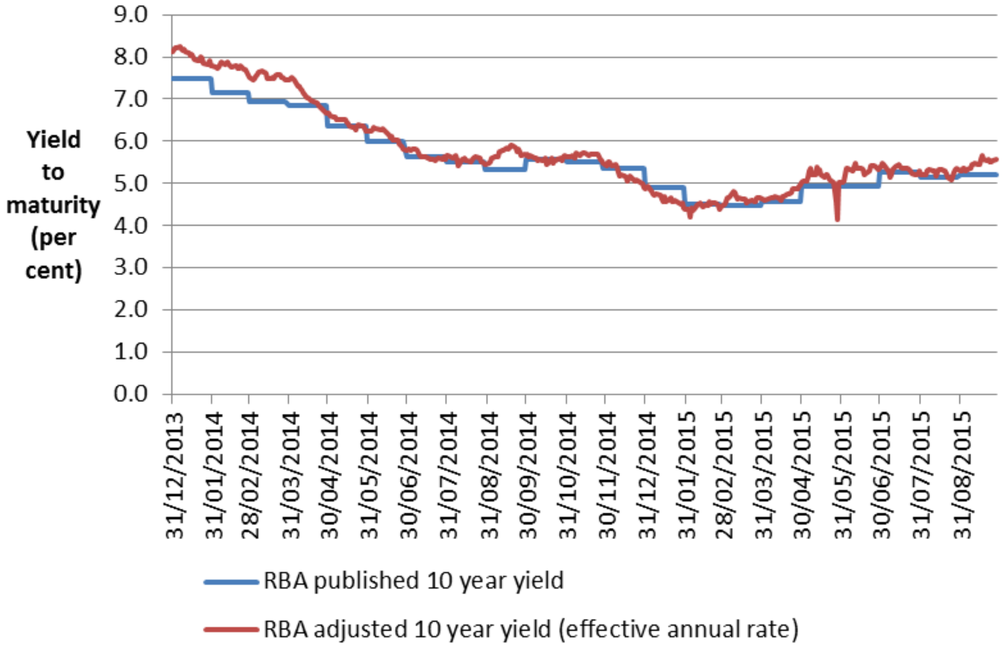
[756] AER, *Rate of return guideline—Explanatory statement*, December 2013, p. 136.

[757] RBA, *Aggregate measures of Australia corporate bond spreads and yields*, available at: http://www.rba.gov.au/statistics/tables/xls/f03hist.xls.

Adjustment Type	Amendment made?	Comments
Conversion to effective annual rate	Yes	The RBA's published methodology does not explicitly specify whether the published yields should be interpreted as effective annual rates. Effective annual rates are a consistent basis on which to compare bond rates and imply that the coupon payments compound during the year. We therefore consulted the RBA, who informed us that 'the spreads and yields in F3 can be best thought of as annual rates with semi-annual compounding'.[758] Therefore, this would require conversion into an effective annual rate, using the same approach as is applied to the BVAL yield estimate. However, we understand that the bonds in the RBA's sample are a mix of bonds with annual, semi-annual, and quarterly coupon frequencies. At this stage, there remains some uncertainty whether in all cases the bond yields and credit spreads are converted into comparable terms (i.e., annual rates with semi-annual compounding) prior to combining them into the published credit spread estimates for the target tenors (such as 7 and 10 year estimates in table F3). We may further investigate this issue in the future. The materiality of this issue is also currently unclear.

Source: AER analysis

Figure 3.18 Impact of adjustments to the published 10 year RBA yields



Source: AER analysis, RBA

758 RBA, *Email in response to: AER follow up question on the basis of YTM quotations in RBA statistical table F3*, 16 October 2014.

Table 3-32 Adjustments to the BVAL curve

Adjustment Type	Amendment made?	Comments
Interpolation to construct daily estimates	No	Bloomberg publishes daily estimates.
Extrapolation to target term	Depends on maximum term published by Bloomberg	For most of the time that the BVAL curve has been published, it has had a maximum term of 7 years. However, between September 2014 and November 2014, it was published to a maximum 5 year term.[759] In April 2015, Bloomberg revised its methodology for the BVAL curve (BVCSAB10) and it now publishes a 10 year estimate.[760] For the periods where 7 years is the maximum term, we extrapolate the spread component of the 7 year yield estimate to the 10 year target term. We have done so using the margin between the spread components of the extrapolated RBA 7 and 10 year yield estimates, converted to effective annual rates. We add to this extrapolation the difference between the base CGS estimates from 7 to 10 years. That is: BVAL yield 10 years = BVAL yield 7 years + difference in CGS from 7 to 10 years + difference in RBA extrapolated spread to CGS from 7 to 10 years As recommended by Lally,[761] we are satisfied this approach is comparably reliable to the more complex approaches submitted by other stakeholders,[762] but is simpler to implement and based on publicly available data. For a period of time in 2014, the maximum published BVAL term was 5 years. Accordingly, we extrapolate the spread component of the 5 year yield estimate to the 10 year target term using an analogous methodology to that used to extrapolate from 7 to 10 years. Additionally, as of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate. Data from 14 April 2015 onwards, therefore does not require any extrapolation adjustment. In our current round of decisions, only Energex and Ergon Energy have averaging periods that commenced before 14 April 2015.
Conversion to effective annual rate	Yes	Bloomberg publishes its yield as annual rates with semi-annual compounding. This needs to be converted into an effective annual rate.

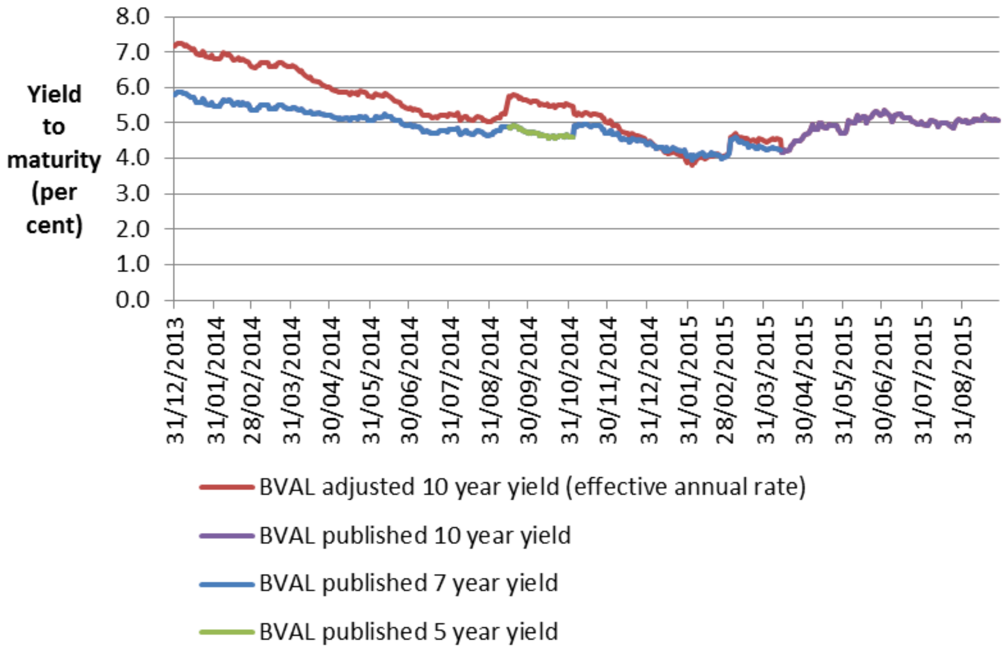
759 Specifically, from 15 September 2014 to 3 November 2014.

760 Specifically, 14 April 2015.

761 Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

762 Incenta, *Methodology for extrapolating the debt risk premium*, June 2014, pp. 2–3.

Figure 3.19 Impact of adjustments to the published 7 and 5 year BVAL yields



Source: AER Analysis, Bloomberg.

As noted above, a range of service providers proposed an annual testing approach to choose between the Lally and SAPN extrapolation methods. We have not adopted an annual testing approach for the reasons set out above.

AusNet Services and SA Power Networks proposed that if one method was adopted, it should be the SAPN method.[763] SA Power Networks proposed the SAPN method on the basis that it derives a slope over a longer portion of the yield curve, whereas the Lally method is sensitive to the slope at the long end of the yield curve, and therefore can produce a negative slope if the long end of the yield curve is downwards sloping.[764] On the other hand, AusNet proposed the SAPN method because during the indicative placeholder averaging period it used for its proposal (January 2015), the SAPN method best fitted a sample of bond data, in that instance.[765]

Further, SA Power Networks proposed that the BVAL curve should be manually extrapolated from 7 to 10 years, rather than using the newly published 10 year BVAL estimate. SA Power Networks proposed this approach because it considered the AER

763 AusNet Services, *Initial regulatory proposal,* April 2015, pp.343–345; SA Power Networks, *Revised regulatory proposal*, June 2015, p.391.

764 SA Power Networks, *Revised regulatory proposal*, June 2015, p.391.

765 AusNet Services, *Initial regulatory proposal,* April 2015, pp.343–345.

had not yet tested the 10 year Bloomberg estimate, and because CEG had identified significant issues with the Bloomberg 10 year estimate.[766]

Dr Lally examined the proposals from AusNet Services and SA Power Networks. In relation to AusNet Services, Dr Lally advised:

> AusNet (2015, pp. 343-344) favours the SAPN extrapolation methodology in general on the basis of CEG's (2015a, sections 5.2-5.4) analysis of data in January 2015. However, as discussed in section 2.1, CEG's analysis conflates the merits of curve fitting/extrapolation methods with the merits of competing criteria for selecting bonds, and its conclusions (even if valid for the period examined) should not be extrapolated to other periods because the period examined is too short.[767]

Similarly, in related to SA Power Networks' proposal, Dr Lally advised:

> SAPN (2015, pp. 389-391) favours a simple average of the extrapolated RBA curve and the extrapolated BVAL seven year curve rather than the extrapolated RBA curve and the BVAL ten-year curve, on the same grounds argued by CEG (2015b, section 7). However, as discussed in section 2.2, CEG's arguments for rejecting the BVAL curve are unwarranted. SAPN also favours the SAPN extrapolation method applied to the RBA and seven-year BVAL curves, for all periods, on the basis of the analysis by CEG (2015b, section 5) over the period 9 February 2015 to 6 March 2015. However, as discussed in section 2.1, CEG's analysis conflates the merits of curve fitting/extrapolation methods with the merits of competing criteria for selecting bonds, and its conclusions (even if valid for the period examined) should not be extrapolated to other periods because the period examined is too short.[768]

We agree with Dr Lally's assessment. In relation to the SAPN extrapolation method, we are not satisfied that there is a compelling conceptual or practical basis to assume that yield curves should conform to a straight line along their entire length. In contrast, our approach relies only on the shape of the yield curve from 7 to 10 years as published by the RBA. We are satisfied that this is likely to be informative about the appropriate shape for the yield curve from 7 to 10 years. Therefore, we have adopted the same position in as from our recent decisions on preferring the Lally method of extrapolation.

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[766] SA Power Networks, *Revised regulatory proposal*, June 2015, pp.389–391. AusNet Services encouraged the AER to examine whether the new 10 year Bloomberg estimate was fit-for-purpose. It also noted recent correspondence it had with Bloomberg over an adjustment concerning Asciano. However, AusNet did not provide that correspondence to the AER. Further, Lally has examined the new 10 year estimate and concluded it is fit for the AER's purposes. AusNet, *Rate of return averaging periods for the 2016–20 regulatory control period*, letter to AER, 17 July 2015

[767] Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, p.21.

[768] Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, p.24.

Further, SA Power Networks preference for manually extrapolating the BVAL curve from 7 to 10 years, rather than adopting the published BVAL 10 year estimate was based on advice from CEG. We approached Bloomberg to check CEG's understanding of the BVAL methodology. Bloomberg confirmed that CEG has not correctly understood its methodology. Dr Lally also examined CEG's report and found further errors in CEG's analysis.[769] Dr Lally's report also sets out Bloomberg's response to us, which we provided to Dr Lally to assist his analysis.

Choice of data series—Contingencies

Our decision is to largely maintain the set of contingencies as set out in our recent decisions.

We have made our decision based on the information and third party data that is currently available.[770] Nonetheless, in our experience it is common that the availability of third party data changes. Our decision is to annually update the trailing average portfolio return on debt. Under the rules, the change in revenue resulting from the annual update must occur by automatic application of a formula that is specified in the decision.[771] This means that our decision on how to apply these third party data sources must be fully specified upfront in the determination, and must be capable of application over the regulatory control period without the use of subsequent judgement or discretion. For this reason, we have set out a series of contingencies in Table 3-33, below. These describe how we propose to estimate the annual return on debt in the event of revisions in the RBA's or Bloomberg's methodologies or other changes to data availability.

Table 3-33 Contingency approaches to choice of data series

Event	Changes to approach
Either the RBA or Bloomberg ceases publication of Australian yield curves that reflect a broad BBB rating.	We will estimate the annual return on debt using the remaining curve.
A different third party commences publication of a 10 year yield estimate.	We will not apply estimates from a third party data provider that we have not evaluated and included in our final decision approach. We will consider any new data sources in future determinations.
Either Bloomberg or RBA substitutes its current methodology for a revised or updated methodology.	We will adopt the revised or updated methodology. Then, at the next regulatory determination, we will review this updated methodology. As noted above, we would also review any new data sources. However, if Bloomberg or the RBA backcasts or replaces data using a revised or updated methodology we will not use the backcasted data to re-estimate our estimates of the prevailing return on debt for previous years. This would be impractical and would create regulatory uncertainty over whether the allowed

769 Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, pp.13–15.

770 As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate.

771 NER cl. 6.5.2(l) and cl. 6A.6.2(l), NGR, r.87(12).

Event	Changes to approach
	return on debt would at some point in the future be re-opened. Instead, we will continue to use the Bloomberg or RBA data that we downloaded at the time of estimating the prevailing return on debt for that point in time.[772]
Bloomberg reduces the maximum published BVAL term from 10 years	If Bloomberg still publishes the BVAL curve to 5 or more years, we will extrapolate the BVAL curve from the longest published term using the 5 to 10 year yield margin from the RBA curve. If Bloomberg no longer publishes the BVAL curve to 5 years, we will rely entirely on the RBA curve.
The RBA ceases publication of a 10 year yield estimate.	If the RBA ceases publication of a 10 year yield estimate, we will extrapolate the RBA estimate to 10 years using: • if available, the margin between spreads in the Bloomberg curve,[773] from the RBA's longest published target term to 10 years • otherwise, the actual CGS margin from the RBA's longest published estimate to 10 years, plus the average DRP spread for the same term margin over the last month prior to the end of its publication.
The RBA commences publication of daily estimates.	We will cease interpolating the RBA monthly yields. Instead, we will estimate both the RBA yield and the RBA year extrapolation margin (used with the BVAL curve) using these daily estimates.
Either Bloomberg or the RBA publishes a BBB+ or utilities specific yield curve.	We will adopt the BBB+ or utilities curve in place of the provider's existing curve, on the basis that it is a closer fit to our benchmark efficient entity.

Source: AER analysis

In general, we have decided on these contingencies based on a series of guiding principles. These are that the contingency must:

- Be practically implementable—the rules require the automatic application of a formula to update the trailing average portfolio return on debt. As a result, we will be unable to analyse changes to the approaches or new approaches during the regulatory control period. Therefore, it is important that any contingency be practical and easily implementable.

772 For example, for the current decisions we downloaded the RBA monthly data observation for August 2015 shortly after it was published (in September), and incorporated this data point into our prevailing return on debt estimates. After the RBA published its monthly observation for September (in October), we downloaded this data point too. This final data point is only relevant for estimation of AusNet's placeholder averaging period. In doing so, we noticed that it appears the RBA has revised its methodology (though does not appear to have explained this change), and has backcast its monthly observations for the entire data series which starts in January 2005. However, we have not incorporated this backcasted RBA data into our return on debt estimates. Instead, we have continued to use the data we downloaded at the time of estimation. We note that if we had incorporated the backdated RBA data this would have decreased the allowed return on debt for the Queensland, SA and Victorian electricity distributors by between approximately 1-2 basis points. Accordingly, in this instance, our approach of not using the backdated data is in this group of service providers' interests. Our approach will be symmetrical and consistent over time, so we will not use backcast data that results from a change in the RBA or Bloomberg's methodology regardless of whether it is in or against the interests of particular groups of service providers or particular groups of consumers.

773 Specifically, the spread to CGS.

- Use the curve in a form as close as possible to its published form—for example, in April 2015 Bloomberg commenced publication of a 10 year BVAL curve. Accordingly, for averaging periods where the 10 year estimate is available, we will adopt this estimate rather than the 7 year BVAL curve extrapolated with RBA data.

Where necessary, rely on the independent expert judgement of the RBA and Bloomberg—In particular, where the RBA or Bloomberg makes changes to its methodology, we would prefer to evaluate these changes before concluding we are satisfied the curve still meets the criteria set out in the Guideline.[774] However, this is not possible during the regulatory control period. In these circumstances, we therefore are faced with the two alternatives of ceasing to rely on the updated curve, or temporarily relying on the updated curve on the basis that we have assessed the data provider as credible. As we are satisfied that both the RBA and Bloomberg are credible and independent, but not that either curve is clearly superior, we consider it is preferable that we adopt the updated curve to limit stakeholders' exposure to the distinct characteristics of a single curve. This is consistent with our position of placing weight on both curves to minimise the mean squared error

Averaging periods

Our decision is to adopt the debt averaging periods for 2015–16 to 2019–20 set out in SA Power Networks' confidential letter to the AER dated 4 February 2015.[775] This is consistent with our preliminary decision.[776]

We specify these averaging periods for the 2015–16 to 2019–20 regulatory years in confidential appendix K. This is because our practice is to keep the dates of averaging periods confidential until they have expired.

In the preliminary decision for SA Power Networks, we used a placeholder averaging period of 9 February 2015 to 6 March 2015 to estimate the allowed return on debt for regulatory year 2015–16. At that time, we also stated we would update this averaging period for the final decision and stated, in a confidential appendix, the dates we would use for this updating. In this final decision, we have updated SA Power Networks' allowed return on debt based on this averaging period, which was 20 business days commencing 1 July 2015 and ending 28 July 2015. We can specify this averaging period now because it has expired. We have used this averaging period to true up the preliminary estimate of allowed revenue for regulatory year 2015–16 that we determined in the preliminary decision.

In the preliminary decision, we estimated a placeholder allowed return on debt for SA Power Networks of 4.35 per cent for regulatory year 2015–16. Whereas in this final

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[774] AER, *Explanatory statement–Rate of return guideline*, December 2013, pp. 23–24.

[775] SAPN (General Manager Corporate Strategy), *Letter to the AER General Manager: Rate of return averaging periods*, 4 February 2015 (Confidential).

[776] AER, *Preliminary decision: SAPN determination 2015–16 to 2019–20: Confidential appendix K—Rate of return—equity and debt averaging periods*, April 2015, pp. 6–7.

decision we estimate a final allowed return on debt for SA Power Networks of 5.28 per cent for regulatory year 2015–16. The return on debt methodology we apply in this final decision is the same methodology we applied in the preliminary decision. The difference in rates is due to the movement in interest rates between February and July 2015.

In the Guideline, we proposed that service providers could nominate averaging periods of 10 or more consecutive business days up to a maximum of 12 months.[777] We also proposed that an averaging period should satisfy certain conditions. We developed these conditions so that the application of the averaging period contributes to the achievement of the allowed rate of return objective.[778]

In assessing the service providers' proposed averaging periods, we applied the conditions we proposed in the Guideline, with one exception. We are persuaded by the proposals from AusNet and some other service providers that one of the conditions we proposed is not necessary to achieve the allowed rate of return objective. That condition was that averaging periods should be as close as practical to the commencement of each regulatory year. We remain of the view that the remaining Guideline conditions are important and necessary to promote the allowed rate of return objective. Those conditions include that at the time the period is nominated all dates in the averaging period must take place in the future, and that all averaging periods should be specified prior to the commencement of the regulatory control period. These conditions, respectively, help to ensure that the return on debt resulting from the averaging period is unbiased and the annual debt update can be practically and automatically applied (as required by the rules).

Table 3-34 sets out why we consider an averaging period that meets the remaining conditions in the Guideline contributes to the achievement of the allowed rate of return objective. It also summarises our assessment of SA Power Networks' averaging periods against these conditions.

Table 3-34 Assessment of proposed averaging periods against Guideline

Condition	Reasons for condition	Condition met?
Observed over a period of 10 or more consecutive business days up to a maximum of 12 months	Averaging daily estimates over a number of days smooths out short term volatility in the annually updated return on debt allowance.	Yes
It should be specified prior to the commencement of the	This allows us to substantively assess the service provider's proposal. This avoids the practical difficulties with either (1) creating a new process for	Yes

777 AER, *Rate of return guideline*, December 2013, p. 21.

778 NER, cl. 6.5.2(c) and 6A.6.2(c); NGR, r. 87(3).

Condition	Reasons for condition	Condition met?
regulatory control period.	approving averaging period proposals or (2) assessing averaging period proposals during the annual pricing process, which is meant to be a compliance check that takes place over a short time frame.	
At the time it is nominated, all dates in the averaging period must take place in the future.	If a regulated service provider can select an averaging period by looking at historical yields, it may introduce an upward bias.[779]	Yes
An averaging period needs to be specified for each regulatory year within a regulatory control period.	This allows for the annual debt update. The annual debt update reduces the potential for a mismatch between the allowed and actual return on debt for the benchmark efficient entity.	Yes
The proposed averaging periods for different regulatory years are not required to be identical but should not overlap.	This avoids double counting averaging periods. This would detract from our specification of the trailing average, which weights periods equally. Not requiring periods to be identical helps preserve confidentiality and provide service providers with a degree of flexibility.	Yes
The nominal return on debt is to be updated annually using the agreed averaging period for the relevant regulatory year.	This prevents a service provider from introducing bias by only updating annually using the agreed averaging period when it is advantageous for it to do so.	Yes
Each agreed averaging period is to be confidential.	This facilitates service providers organising their financing arrangements without market participants being aware of the averaging periods. Accordingly, in practice we keep averaging periods confidential until they expire.	Yes

Source: AER, *Rate of return guideline*, December 2013, pp. 21-22; AER analysis.

In assessing the service providers' (including SA Power Networks') debt averaging period proposals, we have considered the timeframe within which each period should occur. In the Guideline, we proposed that service providers could nominate averaging periods of 10 or more consecutive business days up to a maximum of 12 months. However, the timing of the annual price/tariff variation process creates practical

[779] Lally, *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

difficulties in implementing a 12 month averaging period that falls within a regulatory year. Therefore, we consider an averaging period for estimating the return on debt for regulatory year t should fall within the following timeframe:[780]

- end no later than 25 business days before a service provider submits its annual pricing proposal or reference tariff variation proposal for year t to the AER[781]
- commence no earlier than 12 months plus 25 business days before a service provider submits its annual pricing proposal or reference tariff variation proposal for year t to the AER.

We discuss this in detail in the 'Annual debt update process' section.

Annual debt update process

Our decision is that an averaging period should occur within a timeframe of 10 business days to 12 months. This is consistent with the position we proposed in the Guideline.[782] We have considered how the process to annually update the return on debt would align with the publication of distribution prices.[783] The timing of publishing distribution prices affects how late an averaging period can end and still be implemented in practice.

Table 3-35 outlines the general process we propose to adopt for the annual debt update for distribution network service providers (distributors). Our assessment of the proposed averaging periods for distributors with current regulatory proposals or revised proposals has taken this process into account. We also propose to adopt this process for assessing the proposed averaging periods of other distributors in the future. We encourage submissions from stakeholders on this process, including from distributors with future regulatory determinations.

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780 This preferred timeframe does not apply to the first regulatory year in the regulatory control period. This is because the distribution determination will include the X factor for the first year, which will already incorporate the first year return on debt. Therefore, the annual debt update process will generally apply to the subsequent years of a regulatory control period.

781 However, we are open to individual distributors requiring a longer period (or requesting a shorter period) than 25 business days to accommodate their internal processes.

782 AER, *Better regulation—Rate of return guideline*, December 2013, p.21.

783 The electricity distribution service providers are required to submit to the AER a pricing proposal for each regulatory year of the regulatory control period. The gas distribution and transmission service providers are also required to submit to us an annual reference tariff variation proposal to meet the requirements of their specific access arrangements. As we are proposing to update service providers' allowed return on debt estimates on an annual basis, the updated annual return on debt estimates should be submitted and approved by us in advance of a service providers' annual pricing/tariff proposals. See: AER, *Explanatory statement to the draft rate of return guideline*, August 2013, p.103.

Table 3-35 Annual distribution debt update process

Step	Timing	Description of step	Reasons for timing
1	25 business days before a distributor submits its pricing proposal to us.	Averaging period ends on or before this date.	We determine the maximum practical end date of the averaging period from the timing of steps 2 and 3.
2	10 business days before a distributor submits its pricing proposal to us.	So the distributor can factor this into its annual pricing proposal, we inform it of updates on the return on debt, annual building block revenue requirement and X factor that incorporates the updated return on debt.	15 business days between steps 1 and 2 provides sufficient time for us to calculate (and provide quality assurance checks on the updated return on debt, revenue and X factor.
3	A distributor submits its pricing proposal to us on the date determined by the rules.	The distributor submits its pricing proposal to us for the relevant year.	10 business days between steps 2 and 3 is based on a service provider's advice regarding the minimum period it would require to factor the updated information into its prices. We are open to individual distributors requiring a longer period (or requesting a shorter period) to accommodate their internal processes. [784]

Source: AER analysis.

On the basis of the process outlined in Table 3-35, we consider an averaging period for estimating the return on debt for regulatory year t should fall within the following timeframe:

- end no later than 25 business days before a distributor submits its annual pricing proposal for year t to the AER
- commence no earlier than 12 months plus 25 business days before a distributor submits its annual pricing proposal for year t to the AER.[785]

However, as set out in Table 3-35, we are open to individual distributors requiring a longer period (or requesting a shorter period) between steps 2 and 3 to accommodate their internal processes. We note that a longer (or shorter) time period would move back (or forward) the maximum practical end date of the averaging period by the same

[784] We note that a longer (or shorter) time period would move back (or forward) the maximum practical end date of the averaging period by the same timeframe.

[785] A further possible constraint on the start date is, as set out in the previous section, one of our conditions is at the time it is nominated all dates in the averaging period must take place in the future.

timeframe. For example, if a service provider requested 15 business days (instead of 10) for its internal processes, then its averaging period would need to end 30 business days (instead of 25) before the date the distributor must submit its annual pricing proposal to us.

The process outlined in Table 3-35 does not apply to the first regulatory year in the regulatory control period. This is because the distribution determination will include the X factor for the first year, which will already incorporate the first year return on debt. Therefore, this process will generally apply to the subsequent years of a regulatory control period.

In Table 3-35, we propose calculating the return on debt, annual building block revenue requirement, and X factor in accordance with the formula in the distribution determination. And we propose informing the distributor of our calculations before it submits its annual pricing proposal. We consider this preferable to the alternative approach, where we would assess updates the distributor calculated itself and submitted with its annual pricing proposal. This alternative approach could significantly complicate the annual pricing approval process if we identify calculation errors and require the distributor to revise all its proposed prices. On the other hand, our approach focusses the annual pricing approval process on how the distributor has incorporated the revised X factor into its prices, rather than also assessing the revised X factor itself.

The above process factors in the date that the rules require distributors to submit their annual pricing proposals to us.[786] In November 2014, the AEMC made a rule determination that affected this date.[787] The AEMC determined that:

- From 2017—distributors will be required to submit their annual pricing proposal to us by:[788]
    - 31 March each year (non-Victorian distributors)
    - 30 September each year (Victorian distributors).
- Before 2017—transitional arrangements will maintain the current date by which distributors must submit their annual pricing proposals.[789] This is by 1 May each year (non-Victorian distributors).[790] For Victorian distributors, the new rules apply

786 Clause 6.18.2(a)(2) of the NER requires electricity distributors to submit their annual pricing proposals to us at least 2 months before the commencement of the second and each subsequent regulatory year of the regulatory control period. For the Victorian distributors, each regulatory year commences at the start of the calendar year (1 January). For non-Victorian distributors, each regulatory year commences at the start of the financial year (1 July).

787 AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014.

788 See AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014, pp. 57, 95, 103. Victorian distributors will be required to submit their annual pricing proposals to us no later than 30 September. This is because the pricing process in Victoria operates on calendar years, rather than financial years.

789 AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014, p. 103.

790 AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014, pp. 103, 110–112 (transitional arrangements for Victorian distributors), 112–113 (transitional arrangements for non-Victorian distributors).

from the second regulatory year (2017) of the 2016–2020 regulatory control period, accordingly there are no transitional arrangements that affect the timing of the annual debt update process.[791]

3.4.3 Gearing

Our decision is to adopt a 60 per cent gearing ratio. A 60 per cent gearing ratio is the same as the gearing ratio we proposed in the Guideline and adopted in the draft decision.

In the proposals currently before us, all service providers proposed a 60 per cent gearing ratio. We agree with that component of those proposals. On the other hand, the Energy Consumers Coalition of South Australia (ECCSA) submitted that that we 'should have increased the gearing' to above 60 per cent.[792]

We are satisfied that a 60 per cent gearing ratio is commensurate with the efficient financing costs of a benchmark efficient entity. This is because a 60 per cent gearing ratio is supported by the industry average of a sample of firms that are comparable to the benchmark efficient entity.

Gearing is defined as the ratio of the value of debt to total capital (that is, debt and equity). There are benefits in using debt to fund investment. Debt is usually cheaper than equity and the use of debt also has tax advantages because borrowing costs are tax deductible. However, increased use of debt also increases the possibility that a business will experience financial distress, and in the worst case, bankruptcy. In theory, the optimal debt to equity ratio is the point at which business value is maximised, where the marginal benefits just offset the marginal cost of debt. While an optimal capital structure theoretically exists, the actual optimal value of debt and equity for any given business is dynamic and dependent on a number of business specific factors. Because of this uncertainty around the theoretically optimal gearing ratio, we primary rely on the average of a sample of firms that are comparable to the benchmark efficient entity. In other words, we assume that the industry is, on average, efficient and therefore use the industry average to guide our regulatory benchmark.

We consider that the empirical evidence supports a gearing of 60 per cent. Average gearing levels from the 2009 WACC review are presented in the following table, as are the Bloomberg market valuations using the more recent data and Standard and Poor's book valuations. We observe that the average level of gearing across the four different approaches has a range of 59 to 66 per cent. Accordingly, we propose to maintain the currently adopted benchmark efficient level of gearing of 60 per cent.

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[791] NER, transitional clause 11.76.1(c).

Table 3-36 Averaging gearing ratio—Comparator set of firms

Year	2009 WACC review 2002–2007a	Bloomberg (market value) 2002–2012b (full sample)	Bloomberg (market value) 2002–2012 (refined sample)c	Standard and Poor's (book value) 2008–2012d
2002	65.1	54.5	65.8	N/A
2003	64.8	51.8	60.5	N/A
2004	61.7	51.2	55.1	N/A
2005	64.6	51.2	62.6	N/A
2006	63.0	56.6	61.9	N/A
2007	60.5	57.6	57.6	N/A
2008	N/A	68.3	68.3	70
2009	N/A	68.8	68.8	69
2010	N/A	65.5	65.5	66
2011	N/A	63.2	63.2	62
2012	N/A	60.6	60.6	65
Average	63.3	59.0	63.1	66

Source: AER analysis.

Notes: (a) AER, Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, 1 May 2009, p. 124

(b) Analysis including full sample of businesses

(c) AGL, Alinta and GasNet excluded from the analysis

(d) ERA, Explanatory statement for the draft rate of return guidelines, 6 August 2013, p. 49.

The benchmark gearing ratio is used:

- to weight the expected required return on debt and equity to derive a WACC
- to re-lever the asset betas for the purposes of comparing the levels of systematic risk across businesses, and
- as a factor in estimating the benchmark credit rating[793]

3.4.4 Expected inflation rate

Our expected inflation rate is set out in Table 3-37. We base our approach on an average of the RBA's short term inflation forecasts and the mid-point of the RBA's

[793] That is, if a service provider had a gearing ratio that was significantly different to the benchmark gearing ratio, then we would consider any implications of this for including that service provider within the sample used to estimate the industry median credit rating.

inflation targeting band. This method is consistent with what we have previously adopted and applied since 2008, and SA Power Networks' regulatory proposal and our preliminary determination (the current method).

Table 3-37 AER inflation forecast (per cent)

Forecast inflation	2015–16	2016–17	2017–18 to 2024–25	Geometric average
AER preliminary determination	2.75 [a]	2.75 [a]	2.5	2.55
AER final decision update	2.5 [b]	2.5 [b]	2.5	2.5

Source: RBA, *Statement on Monetary Policy*, February 2015, p. 71; RBA, *Statement on Monetary Policy*, August 2015, p. 67

(a) In February 2015, the RBA published a range of 2.25–3.25 per cent and a range of 2.25–3.25 per cent for its June 2016 and June 2017 CPI inflation forecasts respectively. Where the RBA published ranges, we select the mid-points. In the preliminary determinations we noted our expectation that the RBA will publish a more recent inflation forecast before our final decision, and that we will update the value of the expected inflation rate accordingly in the.[794]

(b) In August 2015, the RBA published a range of 2–3 per cent for its June 2016 and June 2017 CPI inflation forecasts respectively. We select the mid-point from this range.

SA Power Networks' proposal, consistent with our current method for forecasting inflation, was accepted in our preliminary decision. We have applied the most recent RBA forecast which results in an updated inflation forecast of 2.5 per cent per annum.

In SA Power Networks' revised regulatory proposal a new method was proposed which resulted in a lower inflation forecast (2.06 per cent). Of the service providers that submitted regulatory and revised regulatory proposals currently under consideration by us,[795] only SA Power Networks proposed a new method.

We do not accept SA Power Networks' new method for the following reasons:

- Changing the method after we accepted the original proposal in the preliminary determination is inconsistent with the intent of the regulatory process. Stakeholder submissions on our preliminary determination were made on the basis that the inflation estimation method is not under consideration in the final decision.
- The rules mandate a nominal vanilla WACC.[796] Consequently, the inflation estimate is not a direct input parameter for deriving the rate of return that contributes to the achievement of the allowed rate of return objective. This is consistent with a

[794] AER, *Preliminary decision SA Power Networks distribution determination, Attachment 3 Rate of return*, April 2015, p. 211.

[795] The service providers are: SA Power Networks, Energex, Ergon Energy, United Energy, Jemena Electricity Networks, AusNet Services, CitiPower, Powercor, ActewAGL, Australian Gas Networks and APTNT.

[796] NER, cl.6.5.2(d)(2).

broader reading of the NER, and in particular the express requirement for inflation and taxation to be addressed through the PTRM.[797]

- An amendment to the PTRM is a distinct and separate process to the assessment of an NSP's proposal. It must follow the specific timeframes set out by the distribution consultation procedures. Moreover, good regulatory practice requires a comprehensive consultation process as a prerequisite before changing the method for estimating a parameter that impacts all NSPs and users across multiple building blocks thereby affecting total revenue estimates.

Generally, a network regulatory determination process has defined milestones and engagement steps. This enables stakeholders to effectively engage in the regulatory process and for service providers to clearly articulate original proposals and revised proposals to the extent necessary to respond to our draft decisions.

SA Power Networks' new inflation forecast method is based on the Fisher equation.[798] Additionally, the estimate is a weighted average of 5 and 10 year breakeven inflation estimates based on the proposition that 5 year estimates are more appropriate for debt and 10 year estimates are more appropriate for equity. This resulted in an inflation estimate of 2.06 per cent p.a. which is around 50 basis points different (lower) compared with the method used in its original proposal (and accepted in the preliminary decision).[799] This difference is made up of 27 and 22 basis points relating to the use of the market based information and weighted average of 5 and 10 year bond yields.

SA Power Networks stated that recent analysis done by CEG for SA Power Networks indicated that the current method significantly undercompensates in the prevailing economic conditions.[800] The rules require us to maintain the regulated asset base in real terms by adding inflation.[801] As noted above, the rules also require us to determine a nominal rate of return. Consequently, to remove double counting for inflation, the PTRM adjusts the regulatory depreciation allowance. Therefore, the inflation estimate impacts the depreciation allowance and thereby the allowed revenues.

CEG's analysis and reasoning raise a number of matters that require robust testing including the appropriate inflation estimation horizon and consistency of approach between debt, equity and expenditure forecasts. We consider the research, analysis and reasoning submitted to us should be subject to review through a comprehensive process allowing effective engagement with all stakeholders.

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797 NER, cl.6.4.2(b)(1) and (4).

798 This is also referred to as “breakeven” inflation estimate and is the rate implied by the difference between the nominal CGS bond rate and the inflation indexed CGS bond rate.

799 CEG, *Measuring expected inflation for the PTRM*, June 2015, p.4 (estimated over a place holder period of 9 February to 6 March 2015).

800 CEG, *Measuring expected inflation for the PTRM*, June 2015.

801 NER, cl.6.5.1(e)3

Under both the NER and NGR, an inflation forecast is required for modelling revenue over the next regulatory control period. The NER mandates the use of the AER's Post tax revenue model (PTRM).[802] The NGR does not mandate the use of the PTRM, but requires service providers to provide financial information on a nominal basis or real basis or some other recognised basis for dealing with the effects of inflation.[803] Under the NER, the AER's published PTRM must include a method the AER determines is likely to result in the best estimate of inflation.[804] Under the NGR, a service provider must propose an estimate on a reasonable basis which is the best forecast or estimate possible in the circumstances.[805] United Energy stated that the appropriate approach to address concerns with our current method was to undertake an amendment to the PTRM.[806]

Any changes/amendments to the PTRM must be done in accordance with the distribution consultation procedures.[807]

We are cognisant of the importance of a robust inflation forecast estimation method and its impact on revenues. We recognise that a poor inflation forecast impacts the annual revenue requirement for the regulatory control period and opens up the possibility of under/over compensation. Therefore, the best estimate of inflation depends on the robustness of the forecasting methodology. Once there is a robust accepted method known to all in advance and applied ex ante, then the ex post outcome over the regulatory control period is free of bias. Such an outcome is consistent with the efficiency principles of the NEL.

As per clause 6.5.2(d)(2) of the NER, subject to achieving the rate of return objective, we are required to determine a rate of return on a nominal vanilla weighted average cost of capital basis. This approach was confirmed in the AEMC's 2012 Economic Regulation of Network Service Providers rule determination.[808] Under the nominal vanilla approach an inflation forecast is not a direct input in determining the allowed rate of return. Given that under the NER inflation is expressly required to be dealt with in the PTRM, it is both consistent with, and unsurprising that, the NER mandates a nominal basis for determining rate of return. The various provisions of the NER have to be read together in a logical manner that recognises the interrelationships between the different components of the AER's determination. For similar reasons, it is not surprising that the rate of return is required to be determined on a vanilla basis, consistent with the fact that taxation is assessed separately under the NER.[809]

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802 NER, cl 6.3.1(c) (1) & 6A.4.1(b)(1).

803 NGR, r 73(c).

804 NER, cl 6.4.2(b) (1) & 6A.5.2(b)(1).

805 NGR, r 74(2).

806 United Energy, *Regulatory proposal*, April 2015, pp.105-106.

807 NER, cl 6.4.1(b) & 6A.5.1(b).

808 AEMC, Rule Determination, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, p.64.

809 NER cll. 6.5.3 and 6.4.2(b)(4).

In our recent rate of return guideline development consultation process we raised the inflation method as an issue for potential review. We noted that the indexed bond market had changed since we departed from the Fisher equation, and asked for submissions on whether we should change the approach. We also noted different methods and what other regulators were adopting.[810] In response, stakeholders endorsed the continuation of the current approach.[811] We therefore are satisfied that the current approach is the appropriate approach for this determination.

Going forward, the AER would consider a change to inflation forecasting in accordance with the consultation processes mandated by the NER. The next rate of return guideline review may be a suitable process for also reviewing the inflation forecasting method.[812]

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[810] AER, *Consultation Paper, Rate of Return Guideline*, May 2013, pp. 65-67.

[811] AER, *Draft Rate of Return Guideline, Explanatory Statement*, August 2103, p.152.

[812] NER, 6.5.2 (p).

A Equity models

As part of the rate of return guideline (the Guideline) process, we focused on four key models that may be used to estimate the return on equity, or to inform the implementation of our foundation model approach:

1. The Sharpe–Lintner Capital Asset Pricing Model (SLCAPM)
2. The Black Capital Asset Pricing model (Black CAPM)
3. The Fama French Three Factor Model (FFM)
4. The Dividend Growth Model (DGM)

We have considered all models that have been proposed. In this sense, all of the models are relevant. Combined with this appendix, we also consider the proposed models under step two of section 3.4.1 in attachment three.

While we have considered all proposed models, we are not persuaded that they are all of equal value. In addition to these models, we have considered information submitted in relation to non-standard versions of the SLCAPM — the Wright specification. Section A.3 discusses the role we assign to each of these models, and our reasons for assigning these roles.

We consider SA Power Networks' revised regulatory proposal largely reiterated positions set out in its initial proposal.[813] In response to our April and June 2015 decisions, several service providers expressed preferences towards using models differently to how we have in the foundation model approach. Consultants retained by the service providers also submitted:

- If the SLCAPM, Black CAPM, FFM and DGM are relevant material, then we should estimate the required return on equity using each of these models to give them real weight.[814]
- The Black CAPM, DGM and FFM address limitations of the SLCAPM. Therefore, they (along with the SLCAPM) should be used to estimate the return on equity.[815]
- The AER has not substantively changed its approach for estimating the return on equity under the new rules (amended by the AEMC in 2012) because we have regard to other evidence in a way that has no material impact on our estimate.[816]

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813 For SAPN's position, see: *Revised Regulatory Proposal 2015-20*, July 2015.

814 NERA, *The cost of equity: response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 7 & 25;

815 Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, p. 8 & 9; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 25; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015, p. 3;

816 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 26, 39 & 52.

- The AER's approach for estimating the return on equity results in movements in the risk-free rate having an unreasonably large impact on the estimate.[817]

We are not persuaded that we need to derive four distinct estimates of the return on equity using the SLCAPM, Black CAPM, FFM and DGM to have regard to these models. Further, we consider service providers and their consultants have mischaracterised our foundation model approach. For the reasons discussed throughout this decision, we do not consider the use of a multi model approach to estimate the return on equity as preferred and implemented by the service providers and their consultants will lead to a rate of return that meets the rate of return objective. We note in relation to the appropriateness of estimating the return on equity from an average of the empirical results of the multiple models as proposed by the service providers and their consultants, Partington and Satchell have previously stated:[818]

> We first note that a portfolio (weighted sum whose weights add up to one) of estimators will provide a worse estimator under a number of conditions. These conditions can often occur in practical circumstances…. Typical conditions that may well lead to increased MSE are when the weights are chosen non-optimally, when the individual estimators are strongly positively correlated and/or when one or more of the estimators are biased and highly volatile…. Whilst it would take considerably more research to assess the accuracy of the hybrid estimator proposed for the cost of equity by SFG and JGN, it seems to us that the three conditions we mention above occur here.

We elaborate on these considerations below.

A.1 Estimating models

In their recent submissions, service providers continue to express preferences towards estimating the return on equity using four models—SLCAPM, Black CAPM, FFM and DGM.[819] These service providers considered these four models to be relevant information that should be given substantial weight.

We do not agree. These submissions appear to be motivated by an interpretation of the following:

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817 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 28–29& 30.

818 Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, pp. 15–16.

819 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 1; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 137; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 8; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 223; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 231; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 102; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 350; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 84.

- NER clause 6.5.2(e) and NGR rule 87 (5) (a), which state:[820]

  In determining the *allowed rate of return*, regard must be had to:

  (1) Relevant estimation methods, financial models, market data and other evidence

- NER clauses 6A.6.2 (g) and 6.5.2(g) and NGR rule 87 (7), which state:

  regard must be had to the prevailing conditions in the market for equity funds.[821]

We consider that, through our foundation model approach, we have regard to relevant estimation methods, financial models, market data and other evidence in a way that contributes to the achievement of the allowed rate of return objective. Given that under the NER and NGR, we must estimate a return on equity that contributes to the achievement of the allowed rate of return objective, we are satisfied with this approach.[822]

We do not use each of these models to provide four distinct estimates of the return on equity for the benchmark efficient entity. We are not persuaded that combining return on equity estimates using these four models (the multi-model approach) would contribute to the achievement of the allowed rate of return objective.

We provide our reasons for these positions in the sections below.

A.1.1 The multi-model approach

The current service providers generally expressed preferences towards estimating the return on equity by combining four estimates from the SLCAPM, Black CAPM, FFM and DGM (the multi-model approach).[823] As we explain below, we consider the multi-model approaches before us do not adequately consider the relative merits of each model. We also consider the high degree of complexity does not provide benefits, but

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820 Provisions in the NGR mirror this. See NGR rule 87 (5)(a). NER 6A.6.2(e)(1) mirrors this for transmission service providers.

821 NER clauses 6A.6.2 (g) and 6.5.2(g) and NGR rule 87 (7).

822 NER, cl. 6.5.2(b); NER, cl. 6A.6.2(b); NGR, r. 87(6) and 87(2).

823 AusNet Services, CitiPower/Powercor, JGN, SAPN, United Energy submitted this in, *Submission in relation to the first round of regulatory determinations under the new rules*, 6 February 2015. Also see ActewAGL, *Revised regulatory proposal 2015–19*, January 2015, p. 433; SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, p. 5; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 1; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposa*l, August 2015, p. 137; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 8; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331; United Energy, *2016 to 2020 Regulatory Proposal*, April 2015, p. 121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 223; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 231; Energex, *2015-20 revised regulatory proposa*l, July 2015, p. 102; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 350; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 84.

rather reduces the transparency of these approaches. The evidence before us has not satisfied us that an approach with these features would contribute to the achievement of the allowed rate of return objective.

In the Guideline development process, we consulted on the approaches we could use to estimate the return on equity. We explored adopting the following options:[824]

- a primary model
- a primary model with reasonableness checks,
- several primary models with fixed weights or a multi-model approach.

We found there was broad support from stakeholders for the second and fourth options—which are consistent with the foundation model approach and multi-model approach respectively. Consumer groups broadly favoured the foundation model approach.[825] Service providers broadly preferred a multi-model approach.[826]

In the Guideline, we adopted a foundation model approach over a multi-model approach.[827] This was for the following reasons:

- The reliance placed on material in multi-model approaches is not supported by the merits of that material. For example, we consider these approaches rely on the empirical estimates under the FFM and Black CAPM. However, there is substantial evidence illustrating the limitations with deriving estimates of expected returns using these models (see sections A.3.2 and A.3.3). Also, the multi-model approaches proposed to us give more weight to DGMs than what we consider should be warranted given their limitations (see section A.3.4).
- The increased complexity of multi-model approaches is not justified. This requires the full parameterisation of the SLCAPM, FFM, Black CAPM and a DGM. Some of these models (particularly the FFM and SFG's version of the DGM) are complex (see section A.3.2 and appendix B—DGM). In contrast, the SLCAPM and simpler DGM specifications are more intuitive, and are more amenable to robust and coherent analysis.[828] The multi-model approach is further complicated by quantifying and assigning weights to each return on equity estimate to derive a single point estimate. We do not consider this level of complexity fit for purpose for

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[824] AER, *Explanatory statement to the draft rate of return guideline*, pp. 99–100.

[825] COSBOA, *Comments – draft guideline*, October 2013; Ethnic Communities' Council of NSW, *Submission to Better Regulation: Draft rate of return guidelines*, 10 October 2013; EUAA, *Submission to the draft guideline*, October 2013, p. 2; MEU, *Comments on the draft guideline*, October 2013, p. 25; PIAC, *Submission to the draft guideline*, October 2013, p. 29

[826] See for example, APIA, *Submission to the draft guideline*, October 2013; ENA, *Response to the draft guideline*, October 2013.

[827] For more discussion, see AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 54–72.

[828] See, for example: S. Myers, *Estimating the cost of equity: Introduction and overview*, 17 February 2013; APA Group, *Submission on the draft guideline*, October 2013, p. 22.

a variety of reasons.[829] In particular, this could make it difficult for stakeholders to engage with the regulatory process. For example:

- This limits the ability to understand the variables driving the models' outputs and to assess the reasonableness of these outputs.
- This could limit stakeholders' ability to estimate the returns they expect to be determined (in advance of a determination). For example, it may be difficult for stakeholders to form a view on the impact of prevailing market conditions on the factors required to implement the FFM.[830]
- Given the amount of material involved, this could increase the administrative burden on all stakeholders.

- Given required equity returns can only be estimated with a limited level of precision, greater reliance on complex econometric models may not be justified. In particular, there is often no consensus among experts on the appropriate method or assumptions to use in estimating the return on equity.[831] A similar observation can be made about the level of precision implied by applying quantitative weights. Quantitative weights add further to the level of complexity.
- The volume and nature of the material required to be considered in multi-model approaches limits their transparency. We consider this allows for material to be used multiple times in an opaque fashion, making it difficult to discern the impact of any one model. For example, in the draft Guideline, we observed that the ENA's proposed multi-model approach explicitly assigned one third weight to DGM estimates. However, it then assigned one third weight to the estimate of the average firm (which was derived by DGM estimates). While it assigned one sixth weight to each the SLCAPM and FFM, these models incorporated DGM estimates of the return on the market. We have seen this occur to a more moderate degree in regulatory proposals. For instance, Gray and Hall (previously SFG, now Frontier) currently a place 25 per cent weight on its DGM estimate, but incorporate DGMs into the other models by giving it 50 per cent weight in its MRP estimates that are used in other models.[832]

A.1.2 Our use of models in the foundation model approach

We have taken the position that all material submitted must be considered by us and in that sense it is relevant material that we must have regard to. As such, in forming our

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829 For a discussion, see AER, *Explanatory statement to the draft rate of return guideline*, pp. 101–102.

830 AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 71.

831 Academic literature and reports submitted by service providers recognise that the available evidence for estimating the expected return on equity is imprecise and subject to varied interpretations. See for example R. Mehra and E. C. Prescott, The equity premium, A puzzle, *Journal of Monetary Economics*, 15, 1985, pp. 145–161; A. Damodaran, *Equity Risk Premiums (ERP), Determinants, Estimation and Implications*, September 2008, p. 1; J. S. Doran, E. I. Ronn and R. S. Goldberg, *A simple model for time–varying expected returns on the S&P 500 Index*, August 2005, pp. 2–3. For an example report from regulated entities, see: Officer and Bishop, *Market risk premium, a review paper*, August 2008, pp. 3–4.

832 For example, see Frontier Economics, *An updated estimate of the required return on equity*, June 2015.

estimate of the allowed return on equity, we have had regard to all the models that service providers have submitted to us. These include the SLCAPM, Black CAPM, FFM and DGM. These also include two alternative implementations of the SLCAPM (the Wright CAPM and a CAPM that uses long term historical parameter estimates). We have regard to these models section A.3 below.

When having regard to relevant evidence, we use our judgement to determine how we can best incorporate this evidence into our return on equity estimate. We do not consider this requires running all the equity models put before us. Rather, the need to run these models depends on how valuable we consider they are in estimating a return on equity that contributes to the achievement of the allowed rate of return objective. Having had regard to the SLCAPM, Black CAPM, FFM and DGM, and their respective strengths and limitations, we consider we can best incorporate this information in the following ways:

- While we recognise all models have strengths and weaknesses, we consider the SLCAPM to be the superior model before us for the purpose of estimating the allowed return on equity (see section A.3.1). Given this, we estimate the overall return on equity using the SLCAPM. However, recognising that all models have strengths and weaknesses, we use a wide range of evidence to carefully estimate its parameters. We also use a range of additional information to check if our return on equity estimate makes sense or requires adjustment.
- Having had regard to the material put before us on the Black CAPM, we are not satisfied that we would produce a robust estimate of the return on equity using this model. We formed this position recognising the additional practical difficulties in implementing this model–relative to the SLCAPM (see section A.3.3). Having had regard to material on the Black CAPM, we have also formed the view that there are merits in the theory underpinning the model. In particular, we consider this supports considering an adjustment to the SLCAPM return on equity estimate in relation to the equity beta to account for market imperfections.[833] We have had regard to this theory in choosing to take a conservative point estimate of the equity beta. Given our judgement was to incorporate the model's theoretical underpinnings rather than its estimates into our return on equity, we do not consider it necessary (or beneficial) to derive return on equity estimates using this model.
- Having had regard to the material put before us on the FFM, we do not consider this model would produce return on equity estimates that would contribute to the achievement of the allowed rate of return objective (see section A.3.2). Given this, we do not see merit in deriving return on equity estimates using a FFM. Further, there is no agreed best methodology for running the FFM or factor models in general.[834] Given this, there would be little point in attempting to run the model.

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833 AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 86.

834 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 15–17; Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6

Rather, this could potentially mislead stakeholders into considering we held a view (that we do not necessarily hold) on how the FFM should be parameterised.

- Having had regard to the strengths and limitations of DGMs, we consider DGM estimates of the MRP to be more robust than DGM estimates of the return on equity for energy networks (see section A.3.4). As such, we consider that our decision to apply DGMs to estimate the return on market is reasonable. It does not appear to us that NER clause 6.5.2(e) and NGR clause 87(5)(a) indicate regard must be had to financial models for specifically estimating the overall return on equity. Where applicable (and depending on the model), it appears that financial models could be used at the parameter level or at the overall return on equity, return on debt or rate of return level. Further, we recognise our approach of using a DGM to estimate the return on the market is similar to how Gray and Hall (previously SFG, now Frontier) used its DGM in its reports for several service providers.[835]

Moreover, Partington and Satchell have also considered the proposed multi-model approach. In their advice they: [836]

- advised of the problems with the alternative models
- discussed the conditions under which a weighted average across models can result in a worse estimate than a single model, the risks of cherry picking and the problems in adding more models to the regulatory menu.

Further, there are a range of issues with the other models that makes their application for our purposes inappropriate at this time. These are comprehensively discussed throughout this appendix (also see discussion in appendix B—DGM).

A.2 Characterisation of the foundation model approach

Service providers appeared to submit that our foundation model approach simply entailed applying the SLCAPM as a single formula without considering whether the final output was commercially realistic or commensurate with the prevailing condition in the market for equity funds.[837] For instance, this opinion appeared to be expressed in a short response by Grant Samuel.[838]

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835 That is, both approaches use DGMs to directly estimate the return on the market, to use as an input for estimating the return on equity for the benchmark efficient entity. For SFG's approach, see SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, February 2015; SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 48; SFG, *Reconciliation of dividend discount model estimates with those compiled by the AER*, October 2013; SFG, *Dividend discount model estimates of the cost of equity*, June 2013, SFG, *Cost of equity estimates over time*, June 2015; Frontier Economics, *An updated estimate of the required return on equity*, June 2015

836 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, pp. 23 & 15–26.

837 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*,

Also, SFG submitted that our foundation model approach did not capture the AEMC's intent under the new rules. Specifically, SFG considered we did not have real regard to evidence that we treated as 'secondary'.[839]

Similarly, submissions from infrastructure investment groups considered our decisions placed too much reliance on the SLCAPM.[840]

These views mischaracterise our foundation model approach. As such, we provide clarification on how a range of material informed our return on equity estimate:

- We found that most equity beta estimates clustered around 0.5.[841] If we were to have applied the SLCAPM mechanistically, 0.5 would have been a reasonable equity beta estimate to have adopted. However, international estimates and the theory of the Black CAPM informed our selection of a point estimate of 0.7.
- If we were to have dismissed evidence from the DGM, the evidence before us would indicate choosing an MRP no greater than 6.0 per cent (see appendix C—MRP). Having relied on evidence from DGMs, we applied an MRP that was greater (50 basis points) than indicated by the other evidence before us. While SFG observed we have previously applied an MRP of 6.5 per cent under the old rules, this was only when there was heightened risk relating to the GFC. In the current market, all other information is indicating that GFC-related risk levels have, at least to some extent, subsided. Therefore, there would be no reason to expect we would apply an MRP any higher than 6.0 per cent if we were still applying the old approach.
- Given the parameters above, if we were to have applied the SLCAPM mechanistically, this would have produced an indicative return on equity of 6.55 per

June 2015, p. 2; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposa*l, August 2015, p. 115; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 39; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331; United Energy, *2016 to 2020 Regulatory Proposal*, April 2015, p. 113; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 211; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 219; Energex, *2015-20 revised regulatory proposa*l, July 2015, p. 101; Ergon Energy, *Submission to the AER on its Preliminary Determination, Rate of Return–Cost of Equity*, July 2015, p. 7; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 358; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, pp. 56–57.

838 Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015.

839 SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 5; SFG, Energex proposal attachment 39, p. 15; SFG, Ausgrid revised proposal attachment 7.04, pp. 27-40; SFG, *Estimating the required return on equity: Report for ENERGEX*, August 2014, p. 15; SFG, The foundation model approach of the Australian Energy Regulator to estimating the cost of equity, March 2015, p. 8.

840 Spark Infrastructure, *Appropriate rate of return for electricity distribution businesses*, 3 July 2015, p.2; RARE, *Submission to the AER on the NSW draft determinations*, 13 February 2015; Spark Infrastructure, *Submission on the AER's draft decision for NSEW electricity distributors*, 13 February 2015.

841 See appendix D—Equity beta; Henry, *Estimating β: An update*, April 2014.

cent at the time of our draft decision for JGN.[842] As it was, we applied an indicative return on equity of 8.1 per cent in our draft decision for JGN.[843]

- We adopt a SLCAPM point estimate in this decision because we consider other information under the foundation model approach supported this point estimate. After applying the foundation model, and incorporating a range of information into it, we relied on a range of information to check that the final output would contribute to the achievement of the allowed rate of return objective. This information included
  - comparisons to the Wright approach,
  - return on debt,
  - independent valuation reports,
  - broker reports and other regulators' estimates (see step four in section 3.4.1 of attachment three).
- Given we formed the view that this information supported our final return on equity estimate, we had no reason to expect that adjusting our return on equity point estimate would better contribute to the achievement of the allowed rate of return objective. If we had formed a different view, we would have adjusted our estimate appropriately. For the avoidance of doubt, we note that:
  - Categorisation of material in and of itself does not imply the relative weight afforded to the material. Categorising material as:
    - material considered at step three (material with a role of informing foundation model parameters), and
    - material considered at step four (material with a role of informing overall return on equity);
  - does not imply that one category of material is afforded more weight than the other in informing our final return on equity estimate. Rather, categorising material into step three or step four reflects our consideration of the role for the material that would best contribute to the achievement of the allowed rate of return objective given the relative merits of the material.
  - Sequential consideration of material does not imply the relative weight afforded to the material. In any process there must be a first step. The consideration of material at step three does not, simply by occurring earlier, limit the weight that can be placed on material subsequently considered at step four. Similarly, this does not bind the manner in which material can be considered at step four.

We are satisfied with the return on equity estimated under the foundation model approach. We recognise this is lower that what we applied in the previous regulatory period. SFG observed that this lower estimate was driven by currently low risk free

[842] 3.55% + 0.5 × 6.0% = 6.55%.

[843] 3.55% + 0.7 × 6.5% = 8.1%.

rates. We are satisfied with the risk free rate used in our foundation model. While the risk free rate varies over time, it indicates the rate that other investments must beat because this compensates investors for the time value of money.[844] If required equity returns do not move with the risk free rate, this implies investors require a change in the risk premium to offset this effect. We do not consider that such a definitive relationship is supported by evidence (see section C.7 of appendix C—MRP).[845] Further, market evidence like conditioning variables and debt market movements indicate that market conditions have been stabilising since the GFC.

In forming our final decision, we have recognised that the SLCAPM has strengths and limitations (as do other models, like DGMs). These are highlighted in step two under section 3.4.1 of attachment three. After our detailed assessment, we decided to use the SLCAPM as our foundation model (section A.3 sets this out in detail). Given the information before us, we consider this to be reasonable and the choice of using the SLCAPM as the foundation model to be open to us. It appears that Grant Samuel considered that our draft decision ignored many of the SLCAPM's shortcomings.[846] However, we also note that Grant Samuel acknowledged, 'we appreciate that, in the final analysis, the AER may consider the SLCAPM to provide a superior foundation model for regulatory purposes'.[847] We hold this view for the reasons set out in this appendix (in particular, see section A.3.1).

The service providers whose proposals (and revised proposals) we are currently assessing have raised similar issues. In particular, they have submitted a number of reports which discuss the following considerations:[848]

- we have placed inappropriate reliance on the SLCAPM given its limitations
- there has been no change in our approach under the new rules and this results in a return on equity that is not reflective of prevailing market conditions
- we do not give appropriate weight to certain sources of relevant information, either by imposing arbitrary binding constraints or inappropriately widening ranges.

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844 McKenzie, Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, pp. 11–12.

845 For example, see Partington, *Report to the AER: Return on equity (updated)*, April 2015, pp. 72–75; AER, *Access arrangement final decision Envestra Ltd 2013-17,Ppart 3,* March 2013, pp. 30–31.

846 Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 2.

847 Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 4.

848 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 7–10; NERA, *The cost of equity: Response to the AER's final decisions for the NSW and ACT electricity distributors, and for Jemena Gas Networks*, June 2015, pp. i–viii; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, pp. 9–11; Ronald L. Knecht, *Witness statement: Ronald L. Knecht*, June 2015; Frontier Economics, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015, pp. 28–29; CEG, *Measuring risk free rates and expected inflation*, April 2015, pp. 1–8; NERA, *The relation between the market risk premium and risk-free rate: Evidence from independent expert reports*, April 2015, pp. iv–v, 10–11; NERA, *Energy regulation insights: European regulators' WACC decisions risk undermining investment decisions*, Issue 41, February 2015; RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015; RBA (Glenn Stevens), *Speech: The world economy and Australia*, 21 April 2015.

We considered and responded to many of these views in our April and June 2015 decisions, and this material remains relevant (see above).[849] However, given the new material submitted by the current service providers, we have reconsidered each issue below.

Reliance on the SLCAPM

We have reviewed the material before us and continue to disagree with the view that we have placed inappropriate reliance on the SLCAPM. We also disagree with Gray and Hall's (previously SFG, now Frontier) submission that the SLCAPM is the only model we use to estimate the return on equity for a benchmark efficient entity.[850] Our reasoning is set out in detail in step two of section 3.4.1 and this appendix (appendix A—Equity Models). The service providers and their consultants maintained concerns that there are limitations with the SLCAPM. In particular, they consider the SLCAPM produces downward biased return on equity estimates and our foundation model approach does not correct for this.[851] We disagree with these submissions for the reasons set out in section A.3.1 of this appendix.

Prevailing market conditions

We are satisfied that we have had appropriate regard to prevailing market conditions in estimating the return on equity for a benchmark efficient entity as required by the NER/NGR.[852] This is evident throughout the implementation of our six step foundation model approach.

The service providers and their consultants submitted that:

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849 See, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, pp. 236–239.

850 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 13.

851 See, for example, Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 14–25; NERA, *The cost of equity: Response to the AER's final decisions for the NSW and ACT electricity distributors, and for Jemena Gas Networks*, June 2015, pp. ii–iii; SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, March 2015, pp. 5–10; ActewAGL, *Access arrangement information for the 2016-21 ACT, Queanbeyan and Palerang access arrangement: Appendix 8.02—Return on equity detailed proposal*, June 2015, pp. 2, 4, 24–26; AGN, *2016/17 to 2020/21 access arrangement information: Attachment 10.1—Rate of return*, July 2015, p. 29; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, pp. 312–313; United Energy, *2016 to 2020 regulatory proposal: Attachment—Return on equity*, April 2015, pp. 4, 60–61; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 210 (Powercor's regulatory proposal on the return on equity appears to be identical in substance to CitiPower's); Jemena Electricity Networks, *2016-20 electricity distribution price review regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, pp. 54–55, 62; Energex, *2015-20 revised regulatory proposa*l, July 2015, pp. 82, 90; Ergon Energy, *Regulatory proposal 2015-20 (revised): Appendix C—Rate of return*, July 2015, p. 146; SAPN, *Revised regulatory proposal*, July 2015, pp. 361–364.

852 NER, cll. 6.5.2(g); NER, cll. 6A.6.2(g); NGR, rr. 87(7).

- our approach leads to a return on equity that moves in lockstep with the risk free rate which is not supported by current market evidence[853]
- our equity beta estimate does not reflect the increased risk to service providers from the development of disruptive technologies such as solar panels and battery storage.[854]

The service providers appear to consider there is no reason to expect the required return on equity to have decreased with recent decreases in the risk free rate. If required equity returns do not move with the risk free rate, this implies investors require a change in the risk premium to offset this effect. We do not consider this is supported by the evidence. In particular, as set out above:

- We estimate the equity beta and MRP in step three by considering a broad range of evidence. This evidence suggests that an equity beta of 0.7 and an MRP of 6.5 per cent respectively are commensurate with the efficient financing costs of a benchmark efficient entity and reflective of prevailing market conditions.
- In steps four and five we consider a range of other information against the return on equity estimate generated from step three. This allows us to assess the reasonableness of our foundation model estimate from step three, and make

853 For example, see ActewAGL, *Access arrangement information for the 2016-21 ACT, Queanbeyan and Palerang access arrangement: Appendix 8.02—Return on equity detailed proposal*, June 2015, pp. 4, 14, 42–43; AGN, *2016/17 to 2020/21 access arrangement information: Attachment 10.1—Rate of return*, July 2015, pp. 11–12, 33–37; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, pp. 274–275, 281, 286, 312, 314–315; United Energy, *2016 to 2020 regulatory proposal: Attachment—Return on equity*, April 2015, pp. 2–3, 20, 28, 62, 64–65; CitiPower, *Regulatory proposal 2016-2020*, April 2015, pp. 197, 199–200, 211–212 (Powercor's regulatory proposal on the return on equity appears to be identical in substance to CitiPower's); Jemena Electricity Networks, *2016-20 electricity distribution price review regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, pp. 2–3, 19, 25, 37, 54, 56–58, 76; Ergon Energy, *Submission to the AER on its Preliminary Determination: Rate of return—Cost of equity*, July 2015, pp. 3–7, 14–16, 25, 28–29; Energex, *2015-20 revised regulatory proposa*l, July 2015, pp. 93–94, 102; SAPN, *Revised regulatory proposal*, July 2015, pp. 329–330, 333–334, 336, 338–341, 347–348, 355; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 8, 31–34; Frontier Economics, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015, pp. 1–6, 28–29; CEG, *Measuring risk free rates and expected inflation*, April 2015, pp. 1–8; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, pp. 22–23; NERA, *The relation between the market risk premium and risk-free rate: Evidence from independent expert reports*, April 2015, pp. iv–v, 10–11; NERA, *Energy regulation insights: European regulators' WACC decisions risk undermining investment decisions*, Issue 41, February 2015; RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015; RBA (Glenn Stevens), *Speech: The world economy and Australia*, 21 April 2015.

854 ActewAGL, *Access arrangement information for the 2016-21 ACT, Queanbeyan and Palerang access arrangement: Appendix 8.02—Return on equity detailed proposal*, June 2015, p.34; AGN, *2016/17 to 2020/21 access arrangement information: Attachment 10.1—Rate of return*, July 2015, pp. 29–30; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 316; United Energy, *2016 to 2020 regulatory proposal: Attachment—Return on equity*, April 2015, pp. 11–19; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 213, section 12.2 (Powercor's regulatory proposal on the return on equity appears to be identical in substance to CitiPower's); Jemena Electricity Networks, *2016-20 electricity distribution price review regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, p. 58, section 2; Ergon Energy, *Submission to the AER on its Preliminary Determination: Rate of return—Cost of equity*, July 2015, pp. 11–14; SAPN, *Revised regulatory proposal*, July 2015, pp. 337, 344–347; Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, pp. 20–26.

adjustments if it is significantly out of line with the other information we consider. Our assessment in step five indicates that our return on equity estimate is commensurate with the efficient financing costs of a benchmark efficient entity and reflective of prevailing market conditions. We consider that this other information also supports the level of our foundation model equity risk premium.

We are also not satisfied there is a clear relationship between the 10 year forward looking risk free rate and MRP, generally or in the current market (see section C.7 of appendix C—MRP).

The service providers have submitted several explanations to support their view that the MRP has increased with the recent decreases in the risk free rate (as proxied by CGS yields). We set these out in Table 3-38, along with a reference to our detailed response.

Table 3-38 Current service providers' main explanations to support current inverse relationship between the risk free rate and MRP

Explanation	Considered in this section
There has been a 'flight to quality' or a portfolio shift towards government bonds and away from risky equity	Section C.7 of appendix C—MRP
Hurdle rates used to evaluate business investment opportunities (and earnings yields) have not decreased with the risk free rate	Section C.7 of appendix C—MRP
DGM estimates show that the MRP has increased as the risk free rate has decreased	Section C.7 of appendix C—MRP
Independent expert reports demonstrate a current inverse relationship between the risk free rate and MRP	Section E.7 of appendix E—other information

Source: AER analysis

Further, we do not consider the risk arising from disruptive technologies can be reasonably classified as systematic (or non-diversifiable) risk. Systematic risk is risk which affects the market as a whole (such as macroeconomic conditions and interest rate risk). We consider developments in disruptive technologies such as distributed generation, smart technology and power storage are unlikely to have significant effects outside the energy sector. Therefore, we do not consider it is reasonable to account for this risk in the equity beta (see section D.1.4 of appendix D—equity beta for a detailed response).

Partington has advised, '[t]he low bond rates tell us that the required return for low risk assets is low'.[855] Partington observed the market rose following the RBA cut to the cash rate on 3 February 2015. While he noted we should be cautious about making

[855] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 72.

inferences based on singular instances, he observed this appeared in line with a fall in required returns. Specifically, he considered:[856]

> Rationally the market went up either because investors expected significant growth in company cash flows, or because their required return went down as a consequence of a lower interest rate. Given that the discussion at the time was about a slowing economy and reduced growth, a fall in required returns seems the more plausible explanation.

More recently, Partington and Satchell considered the submissions put forward by service providers and stated:[857]

> There is a possibility that current low interest rates could result in higher equity risk premiums, but we do not think this is likely and more importantly we have seen no convincing evidence that this is the case.

Consideration of relevant information

We have fully set out how we consider all relevant material throughout our return on equity attachment and appendices (for examples, see appendix C—MRP, D—equity beta and E—other information).[858] Estimating the return on equity is not a precise science and the exercise of judgement is required. We must have regard to the material before us to seek to achieve the allowed rate of return objective. In steps one and two we clearly explain the role we assign to each source of relevant information, which is based on our assessment of its merits.

We do not consider Gray and Hall's approach to weighting relevant information has appropriate regard to the merits of each source of relevant information, relative to our approach. For example, we have clearly and consistently assessed the merits of each source of relevant information against a set of criteria we developed in consultation with stakeholders during the Guideline process. In contrast, Gray and Hall do not appear to have developed a framework to clearly and consistently assess each source of relevant information on its merits.[859] Therefore, while their end result (the quantitative weights) is clear, we consider the evaluation process through which they arrive at this end result is not sufficiently clear, consistent or comprehensive. This is necessary for determining the role of relevant information, such that it contributes to the achievement of the allowed rate of return.

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856 Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 74.

857 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

858 Specifically, section C.8.2 of appendix C—MRP, sections D.3 and D.5.3 of appendix D—equity beta and appendix E—other information.

859 Gray and Hall (as SFG) explain their weighting approach in SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 79–83, 84–85, 88–91.

A.3 Role of equity models

At the time we developed the Guideline, we assessed the merits of the SLCAPM, the Black CAPM, the FFM, and the DGM against the criteria set out in the Guideline. We developed these criteria to help use undertake an assessment that would contribute to the achievement of the allowed rate of return objective. Guided by our criteria, we determined the appropriate role for each model to ensure our estimate of the return on equity achieved the allowed rate of return objective.[860] We did not assess alternative (non-standard) versions of the SLCAPM separately against our criteria.

We developed the foundation model approach, utilising the SLCAPM as the foundation model, taking into account a range of considerations covered in the explanatory statement to the Guideline.[861] Most importantly, at the time we published the Guideline, we expected the application of the foundation model approach (using the SLCAPM as foundation model) to contribute to the achievement of the allowed rate of return objective.

Service providers have submitted further material in support of alternative uses for the models above. Having assessed this material, we have determined to continue using the SLCAPM as the foundation model. We have also determined to use the other models as we indicated in the Guideline.[862] After assessing all of the material before us, we are satisfied that the roles in our Guideline and our reasons for those choices remain valid.

We have assessed the models against our assessment criteria in the explanatory statement to the Guideline.[863] These criteria are relevant to the achievement of the allowed rate of return objective by ascertaining the role that relevant evidence should play on the basis of their strengths and limitations. We have not used these criteria determinatively or invite consideration not relevant to the rate of return objective; contrary to some service providers' views.[864] Rather, our overarching consideration in determining the use for models is what will contribute to the achievement of the allowed rate of return objective. For this decision we have assessed the non-standard (historically based) implementations of the SLCAPM against our criteria. We consider this is appropriate because they have fundamental differences to the standard forward looking specification of the SLCAPM.

[860] AER, *Explanatory statement rate of return guideline*, 17 December 2013, p. 58.

[861] AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 54–56.

[862] AER, *Rate of return guideline*, 17 December 2013, p. 13.

[863] AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 24–30.

[864] For instance, AGN, AusNet Services, CitiPower/Powercor, JGN, SAPN and United Energy raised this issue in, *Submission in relation to the first round of regulatory determination under the new rules* in 13 February 2015; For example, AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 300; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 204; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 212; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, pp. 42–46.

We discussed the key reasons for our use of the different models in section 3.4.1 of this attachment. However, we discuss further considerations relating to each model below.[865]

A.3.1 Sharpe–Lintner CAPM

The SLCAPM is an equilibrium asset pricing model. It is based on the well accepted finance principle that rational investors will seek to minimise risk (as measured by portfolio variance) for a given expected return.[866]

As discussed in section 3.4.1 of this attachment, we consider the SLCAPM will, as the foundation model in our foundation model approach, result in a return on equity that contributes to the achievement of allowed rate of return objective. We consider this is the case for the reasons set out in this final decision and in the Guideline's explanatory statement and its appendices.[867] In coming to this conclusion, we and our consultants have considered the material submitted to us after publishing the Guideline. This has included consideration of the service providers' proposals and submissions on these proposals.[868]

The SLCAPM is the dominant model used to estimate firms' cost of capital by providers of capital to firms (that is, investors).[869] We consider the SLCAPM:

- is reflective of economic and finance principles and market information
- is fit for purpose as it was developed for estimating the cost of capital
- can be implemented in accordance with good practice
- is not unduly sensitive to errors in inputs or arbitrary filtering
- uses input data that is credible and verifiable, comparable and timely and clearly sourced
- is sufficiently flexible to allow for changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.

While a range of challenges to the model have been raised over many years, the model remains the dominant asset pricing model used for capital budgeting.[870] We

865 We repeat some material already set out in the reasons for our decision to provide context for the more detailed material covered in this appendix.

866 Many university texts cover the model. See for example: Peirson, Brown, Easton, Howard and Pinder, *Business Finance*, McGraw-Hill, Ninth edition, 2006, pp. 200–207.

867 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 10–14.

868 We are concurrently assessing regulatory proposals from three different service providers. We are also assessing revised regulatory proposals from eight different service providers. We take these businesses' different adaptations into account.

869 See Brealey, Myers, Partington and Robinson, *Principles of corporate finance*, McGraw Hill Australia, 2007, p. 216.

870 McKenzie and Partington note, 'no framework is perfect, the foundation model has its weaknesses, but these are well-documented and in many cases can either be diagnosed or perhaps compensated for in empirical practice…This model has been around for in excess of half a century and has become the standard workhorse

consider the use of the SLCAPM, with reasonably selected input parameters, should ensure the allowed rate of return is commensurate with the benchmark entity's efficient financing costs. We consider cross checks on the return on equity, using other information as set out in this decision, also provide supporting evidence that the return on equity derived using the SLCAPM-based foundation model approach will contribute to the achievement of the allowed rate of return objective.

A substantial amount of the material commented on our conclusions and choice of SLCAPM as the foundation model. Generally, the service providers considered the SLCAPM was likely to provide downward biased estimates of the return on equity of the benchmark efficient entity.[871] The majority of other stakeholders supported the use of the SLCAPM as the foundation model.[872] However, a number of stakeholders also submitted we should consider lowering our SLCAPM input parameters relative to those published with the Guideline.[873]

We do not agree with the service provider submissions to depart from the foundation model approach for the reasons stated in section 3.4.1 of this attachment. Likewise, we

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model of modern finance both in theory and practice. See *Report to the AER part A: Return on equity*, October 2014 p. 9.

871 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposa*l, August 2015, p. 114–115; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 29; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 280; United Energy, *2016 to 2020 Regulatory Proposal*, April 2015, p. 11–115; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 209; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 217; Energex, *2015-20 revised regulatory proposa*l, July 2015, p. 89–90; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 137; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 338; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 4.

872 For example, Mr Bruce Mountain, *CCP2, Advice on AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015, p.11; Consumer Utilities Advocacy Centre, Re: Victorian electricity distribution pricing review (EDPR), 2016 to 2020, 13 July 2015, p. 2; Victorian Energy Consumer and User Alliance, Submission to the AER, Victorian Distribution Networks' 2016-20 Revenue Proposals, July 2015, p. 3; Business SA, *Submission to AER on their preliminary decision, 3 July 2015*, p.2; Alternative Technology Association, ActewAGL Access Arrangement Proposal, 10 August 2015, p. 10; Energy Retailers Association of Australia, *Preliminary Decisions for Ergon Energy and Energex determinations 2015-16 to 2019-20*, 3 July 2015, p.1; Energy Consumers Coalition of South Australia, *AER SA Electricity Distribution Revenue Reset, The AER preliminary decision - A response*, 3 July 2015, p.38.

873 For example, Alliance of Electricity Consumers, *Submission to the AER's Preliminary Decision Queensland*, 3 July 2015; Alliance of Energy Consumers, *Submission to Energex and Ergon Energy's Revised Regulatory Proposals (Qld)*, 24 July 2015, p.9; QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.20; Total Environment Centre, S*ubmission to the AER on the Preliminary Decisions on the QLD distributors' Regulatory Proposals 2015-20,* 3 July 2015, p.8; Cotton Australia, *AER Determination Ergon Energy*, 3 July 2015, p.2; Energy Users Association of Australia, *Submission to AER draft determination and Energex's revised revenue proposal 2015 to 2020*, 24 July 2015, p.11; Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.11; QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.21; Energy Users Association of Australia, *Submission to AER draft determination and Energex's revised revenue proposal 2015 to 2020*, 24 July 2015, p.11; Canegrowers, *AER Draft Determination: Ergon Energy and Energex - Network Distribution Resets 2015-2020, 3 July 2015*, p.2.

do not agree with submissions to lower the input parameters from those published in the Guideline for the reasons set out in appendix C—MRP and appendix D—Equity beta. Our consultants supported both our use of the foundation model approach in the Guideline and the use of the SLCAPM as the foundation model.[874]

Submissions supporting the SLCAPM as the foundation model

The majority of stakeholders (other than service providers) supported using the SLCAPM as the foundation model.[875] However, a number of them submitted we should consider lowering our SLCAPM input parameters relative to those published with the Guideline.[876] Based on the empirical evidence from Professor Olan Henry's (Henry) 2014 beta report, several stakeholders proposed that the equity beta should be below 0.7.[877] Table 3-39 summarises a number of these submissions.

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[874] Handley, *Advice on return on equity,* 16 October 2014, p. 4; Handley, *Further advice on the return on equity*, 16 April 2015; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 9–14; Partington, *Report to the AER: return on equity (updated)*, April 2015, p. 11; and Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015.

[875] For example, Mr Bruce Mountain, *CCP2, Advice on AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015, p.11; Consumer Utilities Advocacy Centre, Re: Victorian electricity distribution pricing review (EDPR), 2016 to 2020, 13 July 2015, p. 2; Victorian Energy Consumer and User Alliance, Submission to the AER, Victorian Distribution Networks' 2016-20 Revenue Proposals, July 2015, p. 3; Business SA, *Submission to AER on their preliminary decision, 3 July 2015*, p.2; Alternative Technology Association, ActewAGL Access Arrangement Proposal, 10 August 2015, p. 10; Energy Retailers Association of Australia, *Preliminary Decisions for Ergon Energy and Energex determinations 2015-16 to 2019-20*, 3 July 2015, p.1; Energy Consumers Coalition of South Australia, *AER SA Electricity Distribution Revenue Reset, The AER preliminary decision - A response*, 3 July 2015, p.38.

[876] For example, Alliance of Electricity Consumers, *Submission to the AER's Preliminary Decision Queensland*, 3 July 2015; Alliance of Energy Consumers, *Submission to Energex and Ergon Energy's Revised Regulatory Proposals (Qld)*, 24 July 2015, p.9; QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.20; Total Environment Centre, S*ubmission to the AER on the Preliminary Decisions on the QLD distributors' Regulatory Proposals 2015-20,* 3 July 2015, p.8; Cotton Australia, *AER Determination Ergon Energy*, 3 July 2015, p.2; Energy Users Association of Australia, *Submission to AER draft determination and Energex's revised revenue proposal 2015 to 2020*, 24 July 2015, p.11; Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.11; QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.21; Energy Users Association of Australia, *Submission to AER draft determination and Energex's revised revenue proposal 2015 to 2020*, 24 July 2015, p.11; Canegrowers, *AER Draft Determination: Ergon Energy and Energex - Network Distribution Resets 2015-2020, 3 July 2015*, p.2.

[877] For example, Mr Bruce Mountain, *CCP2, Advice on AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015, p.10; Energy Retailers Association of Australia, *Re: Issues paper – Victorian electricity distribution pricing review 2016-2020*, 13 July 2015, p. 2; Origin Energy, *Re: Submission to Victorian Electricity Distributors Regulatory Proposals,* 13 July 2015, p. 9; Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.11; SACES, *(2015) Analysis of AER Preliminary Decision on SA Power Networks 2015-20*, p.4..

Table 3-39 Submissions supporting the SLCAPM

Stakeholder	Submission
AGL	AGL fully supported the AER's use of its Rate of Return Guideline for determining a rate of return which balances the interests of the distributions networks and energy consumers. AGL submits that the equity beta provided by the AER guideline can be considered generous given the regulated framework ensures distribution networks' revenue recovery.[878] AGL submitted that the equity beta provided by the AER guideline can be considered generous given the regulated framework ensures revenue recovery by distribution networks.[879]
Alternative Technologies Association (ATA)	ATA expected the AER's determinations to be consistent with its recent decisions and provide for a lower WACC.[880]
Business South Australia	Business SA supported the AER's decision not to depart from its rate of return guideline.[881]
The Consumer Utilities Advocacy Centre (CUAC)	The Consumer Utilities Advocacy Centre submitted that the WACC proposals from distributors are excessive, and encourages the AER to instead apply the methodology of its Rate of Return Guideline in estimating a fair rate of return.[882]
Consumer Challenge Panel (CCP)	The CCP is unconvinced by arguments from the service providers' various consultants' reports urging the AER to use models other than the SL-CAPM for calculating the RoR. The CCP considered that these alternative models are currently not being utilized by academics nor valuation practitioners.[883]
Energy Consumers Coalition of SA (ECCSA)	The Energy Consumers Coalition of SA (ECCSA) rejected SAPN's assertion that its risk profile has changed and that the AER's approach to return on equity developed during the Better Regulation program does not reflect this change in risk. The ECCSA notes that the Better Regulation program was finalised within the past 2 years and considers it to be contemporary.[884] The ECCSA is concerned with AGN's equity modelling framework, which the

878 AGL, *Submission on Australian Gas Networks (South Australia) Access Arrangement Proposal 2016-21*, 11 August 2015, p.2.

879 AGL, *Re: Australian Gas Networks (South Australia): Access Arrangement Proposal 2016-21*, 10 August 2015, p. 2.

880 Alternative Technology Association, *Submission on Australian Gas Networks (SA) Access Arrangement Proposal*, 10 August 2015, p.10.

881 Business SA, *Submission to AER on their preliminary decision, 3 July 2015*, p.2.

882 Consumer Utilities Advocacy Centre, *RE Victorian electricity distribution pricing review (EDPR), 2016 to 2020*, 13 July 2015, p.2.

883 Mr Bruce Mountain, *CCP2, Advice on AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015, p.11.

884 Energy Consumers Coalition of South Australia, *Submission on SA Power Networks' revised proposal, 24 July 2015*, p.6.

Stakeholder	Submission
	ECCSA consider to be arbitrary and includes weighting for models that have not met the tests of transparency, repeatability and validity in the Australian context. The ECCSA rejected the suggestion that a lower cost of equity (as would be derived under the RoR Guideline) would result in an inability of AGN to invest in the network in the future as it could not recover its costs. If AGN applies prudent capital management principles, there is no reason to believe that it would not recover its costs, although it may not achieve the same above normal profits as it currently enjoys.[885]
The Energy Retailers Association of Australia (ERAA)	ERAA supported the AER's proposed methodology and determination in relation to the WACC. It believed the AER's preliminary decision on the WACC better reflects the financing costs of SA Power Networks with respect to the level and exposure to risk that applies to an Australian regulated energy network service provider and should be preferred over SA Power Networks' estimate.[886]
The Energy Users Association of Australia (EUAA)	The Energy Users Association of Australia (EUAA) considered that the service providers were over compensated by the AER for post GFC financial market conditions that did not eventuate. The EUAA proposed a market risk premium of 5.00 per cent and an equity beta of 0.4, resulting in a vanilla WACC of 5.07 per cent.[887]
Origin Energy	Origin Energy submitted that the AER has no reason to expect that departing from relying principally on the output of the SLCAPM would better contribute to the achievement of the allowed rate of return objective.[888] Origin Energy maintained its view that the AER has adopted a balanced and pragmatic approach that provides certain and predictable outcomes for investors and provides a balance between the views of consumer groups and the network businesses.[889] Origin Energy submitted that the Better Regulation Guideline provides certainty and predictability of outcomes in rate of return issues and a balance between the views of distributors and consumers, and considers that departures from the Guideline should only be approved where there is strong evidence to support the departure.[890]
Queensland	The Queensland Council of Social Service considered the WACC parameters

[885] ECCSA, *Submission on Australian Gas Networks' Access Arrangement Proposal 2016-2021*, 16 August 2015, p.66.

[886] Energy Retailers Association of Australia, *Preliminary Decision SA Power Networks determination 2015-16 to 2019-20*, 3 July 2015.

[887] Energy Users Association of Australia, *Submission to AER draft determination and Energex's revised revenue proposal 2015 to 2020*, 24 July 2015, p.11.

[888] Origin Energy, *Re Submission to Victorian Electricity Distributors Regulatory Proposals*, 13 July 2015, p.10.

[889] Origin Energy, *Submission to AER preliminary decision SA Power Networks*, 3 July 2015.

[890] Origin Energy, *Submission on Australian Gas Networks Distribution 2016-21 Access Arrangement Proposal for ACT*, 10 August 2015, p.5.

Stakeholder	Submission
Council of Social Service (QCOSS)	in the Preliminary Decision are too conservative and are not consistent with both the low prevailing cost of capital and the low risk of distribution activities.[891] The Queensland Council of Social Service submitted that empirical studies, as well as the reports from McKenzie and Partington and Frontier suggest an appropriate equity beta to be around 0.5.[892]
Victorian Energy Consumer and User Alliance (VECUSA)	The Victorian Energy Consumer and User Alliance considered the Victorian service providers' proposed WACC allowances of 7.18-7.38 per cent to be excessive and based on major unjustified departures from the AER's Rate of Return Guideline.[893] The Victorian Energy Consumer and User Alliance considered that the AER's approach to estimating return on equity is more appropriate than the distributors' proposed approaches that adopt weighted averages of different return on equity models. These proposed departures have not been subjected to any rigorous analysis or stakeholder consultation.[894] The Victorian Energy Consumers and Users Alliance noted Professor Henry's report[895] suggests an equity beta at the low end of the AER's Rate of Return Guideline range (i.e. 0.4) more accurately reflects the empirical data available.[896] The Victorian Energy Consumer and User Alliance (VECUA) agreed with other submissions received by the AER over the past year that regard the regulatory framework for Australia's monopoly networks as providing an extremely low business risk environment. The VECUA submits that the market risk premium (MRP) should be set at the bottom of the AER's guideline range (i.e. 5.0%).[897]

Source: AER analysis of submissions.

We consider the submissions in Table 3-39 generally support our use of the SLCAPM as the foundation model in our foundation model approach. However, we do not agree with submissions to lower the input parameters from those published in the Guideline.

891 QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.20.

892 QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.21.

893 Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.3.

894 Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.10.

895 Henry 0.T., *Estimating Beta: An Update*, April 2014.

896 Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.11.

897 Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.11.

Our reasons for this position are set out in appendix C—MRP and appendix D—Equity beta.

Submissions not supporting SLCAPM as the foundation model

A number of service providers submitted that the allowed return on equity for a benchmark efficient entity from the foundation model approach (using the SLCAPM as a base model) is likely to be downward biased. In their initial regulatory proposals, these service providers submitted that we should use different models and additional information to the information in the foundation model approach.[898] Several service providers resubmitted these positions in the revised regulatory proposals and in their submissions on other service providers' regulatory proposals.[899]

These service providers appear to have submitted that the downward bias is due to improper consideration of relevant material in either:

- Using the foundation model approach, with the SLCAPM as a foundation model.[900]
- Forming a view on the appropriate parameter values to use in applying the foundation model approach. That is, values for the risk free rate, MRP and equity beta.[901] For example, Energex, Ergon Energy and SA Power Networks submitted we should consider return on equity estimates from the FFM and Black CAPM when setting the return on equity.[902] They also submitted that DGM estimates of

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898 Energex, *2015–20 regulatory proposal*, October 2014, pp. 156–160; Ergon Energy, *Regulatory proposal appendix C: Rate of return*, October 2014, pp. 125–130; SAPN, *Regulatory proposal 2015–20*, October 2014, pp. 316, 319; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 1; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 137; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 8; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 223; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 231; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 84.

899 AGN, AusNet Services, CitiPower/Powercor, JGN, SAPN and United Energy each put forward a submission titled, *Submission in relation to the first round of regulatory determination under the new rules* in 13 February 2015Ergon Energy, *Submission on the draft decisions: NSW and ACT distribution determinations 2015–16 to 2018–19*, 13 February 2015. Several service providers also submitted NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015. Energex, *2015-20 revised regulatory proposal*, July 2015, p. 102; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 350;
Additionally, CitiPower/Powercor, Jemena Electricity Networks, United Energy, Multinet each put forward a submission titled *Submission in relation to the current regulatory determination processes for SAPN, Energex, Ergon Energy, AGN* in July 2015*.*

900 ActewAGL, Energex, Ergon Energy, Jemena Electricity Networks, SAPN, AusNet Services, CitiPower/Powercor, APTNT, ActewAGL and United Energy.

901 ActewAGL, Energex, Ergon Energy, Jemena Electricity Networks, SAPN, AusNet Services, CitiPower/Powercor, APTNT, ActewAGL and United Energy

902 Energex, *2015-20 revised regulatory proposal*, July 2015, p. 102; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 350;

the required return on equity are likely to improve estimates of the required return on equity.[903]

A number of service providers appear to have submitted, directly or implicitly, that the parameters we select for the SLCAPM under the foundation model approach are insufficient to overcome the downward bias in the SLCAPM. Service providers submitted these positions in their initial proposals.[904] The QLD and SA service providers also resubmitted these positions in their revised proposals.[905] The key information that service providers used to support these propositions included:

- Studies of ex post performance of the SLCAPM.[906]
- Frontier and NERA submitted that empirical tests reject the SLCAPM and it performs poorly relative to the other models.[907]
- Empirical and theoretical information related to the estimation of the SLCAPM input parameters (particularly in relation to equity beta and MRP).[908]
- Other direct estimates of the return on equity from alternative sources to the SLCAPM.[909]

We have considered the key submissions on these points in our final decision for JGN, and this material remains relevant.

We do not consider that they support any further adjustment to our SLCAPM input parameters to contribute to the achievement of the allowed rate of return objective. We are satisfied that our return on equity estimate would fairly compensate a benchmark entity facing a similar degree of risk to SA Power Networks for its efficient equity financing costs.

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903 Energex, *2015-20 revised regulatory proposal*, July 2015, pp. 87–90; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 351;

904 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 311; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 113; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 210; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 218; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 4.

905 Energex, *2015-20 revised regulatory proposal*, July 2015, p. 90; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 360.

906 For instance, several service providers submitted the consultant report, NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015;.

907 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 7–10; NERA, *The Cost of Equity: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015, p. ii.

908 For instance, several service providers submitted the consultant report, SFG, *Beta and the Black CAPM*, February 2015

909 For instance, the majority of service providers submitted that the return on equity estimated using the FFM, Black CAPM and DGM was higher than under the SLCAPM. For recent reports, see Frontier, *An updated estimate of the required return on equity*, June 2015.

To support their position, the current service providers also submitted new reports from Frontier, Malko, NERA and Ronald L. Knecht.[910] The key arguments in these reports are similar to previous submissions:

- it is inappropriate to rely on the SLCAPM as the foundation model,
- the SLCAPM produces biased estimates of the cost of equity
- there has been no change in our approach under the new rules and this results in a return on equity that is not reflective of prevailing market conditions
- we do not give appropriate weight to certain sources of relevant information, either by imposing arbitrary binding constraints or inappropriately widening ranges

We have reviewed the new material before us and continue to disagree with the view that we have placed inappropriate reliance on the SLCAPM. While we recognise all models have strengths and weaknesses, we consider the SLCAPM to be the superior model before us for the purpose of estimating the allowed return on equity for reasons outlined in the Guideline and JGN final decision:

- The SLCAPM is widely used and understood
- It is reflective of economic and finance principles and market information
- It is fit for purpose as it was developed for estimating the cost of capital
- It can be implemented in accordance with good practice

In relation to the SLCAPM, Partington and Satchell noted the following additional observations:[911]

- The SLCAPM is 'ubiquitous in relation to the estimation of the cost of equity' and 'the same cannot be said for the alternative models proposed by the regulated businesses.
- It is 'widely used and understood'.
- The SLCAPM has passed the test of time and 'has had several decades of widespread practical use in estimating the cost of capital'.

We consider our approach to estimating the return on equity best contributes to the achievement of the allowed return of return objective. In this regard, it is irrelevant whether or not, or to what extent, our approach may have changed from that applied under previous versions of the NER. As per the new rules and the Guideline, we have regard to a range of models, evidence and information when estimating the cost of equity. In formulating and applying our six-step foundation approach, we have

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[910] Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 7–10; NERA, *The Cost of Equity: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, pp. 9–11; Ronald L. Knecht, *Witness Statement: Ronald L. Knecht*, June 2015; Frontier Economics, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015, pp. 28–29.

[911] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 17–21.

assessed the strengths and limitations of each piece of information and its relevance with regard to meeting the rate of return objective (see section 3.4.1 for more detail).

Under the NER/NGR, we must have regard to prevailing conditions in the market for equity funds in estimating the return on equity.[912] We are satisfied that we have had significant regard to prevailing market conditions in estimating the return on equity for a benchmark efficient entity. This is evident throughout the implementation of our six step foundation model approach. For example:

- our risk free rate is based on prevailing market rates, and
- we consider conditioning variables and the DGM when determining the MRP and give consideration to range of other information (at step four of our foundation model approach).

Gray and Hall (Frontier) submitted that evidence of investors' required returns is different from our approach which results in more volatile estimates that move in 'lock-step' with movement in the risk free rate.[913] In contrast, we are satisfied that equity prices move with changes in interest rates. Most approaches to estimating the return on equity require a risk free rate component.[914] These treat the expected return on equity as a risk premium over the risk free rate (which compensates investors for the time value of money). [915] We consider 10 year CGS yields are the most suitable proxy for the risk free rate.[916] We also recognise there is broad consensus with this positon during the Guideline process.[917]

Malko and Knecht outlined four US-based regulators (Massachusetts, Nevada, California and Delaware) that have considered the other models (along with the SLCAPM).[918] Some of these regulators also appear to have also derived estimates from these models in considering regulated returns. We have recognised the use of other equity models by regulators in our April and June 2015 decisions which referenced study by Stephan Schaeffler and Christoph Weber that examined the

912 NER clauses 6A.6.2 (g) and 6.5.2(g) and NGR rule 87 (7).

913 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 37–38.

914 The majority of financial models proposed by service providers include a risk free rate component. These include the SLCAPM, the Wright approach, the Black CAPM and the FFM. Further, the way service providers apply the DGM incorporates a risk free rate component.

915 McKenzie, Partington, *Report to the AER: Supplementary report on the equity market risk premium*, 22 February 2012, pp. 11–12.

916 Gregory, *The risk free rate and the present value principle*, November 2012, p.5; Lally, *The present value principle*, March 2013, p. 10-12.

917 Lally, *The present value principle*, March 2013, p. 13; Wright, *Review of risk free rate and Cost of equity estimates: A comparison of UK approaches with the AER*, October 2012, p. 3; RBA, *Letter regarding the CGS market*, July 2012; Treasury and AOFM, *Letter regarding the CGS Market*, July 2012. Stakeholders also widely accepted this proxy during the Guideline development process. See ENA, *Response to the draft guideline*, October 2013, p. 30; APA Group, *Submission on the draft guideline*, October 2013, p. 23-24; NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 18. Spark Infrastructure, *Response to the draft guideline*, October 2013, p. 4.

918 Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, pp. 9–11; Ronald L. Knecht, *Witness Statement: Ronald L. Knecht*, June 2015.

regulatory practices in 21 countries.[919] The same study also concluded that the, 'standard model for determining capital costs' for energy businesses is the SLCAPM.

Bias and the SLCAPM as the foundation model

In their initial regulatory proposals, the majority of current service providers submitted that the SLCAPM is downward biased for stocks with a beta of less than one.[920] To support this position, service providers submitted a range of reports, including those from Frontier, Malko and NERA.[921]

The key arguments in these reports are that the SLCAPM contains biases or limitations that the other models address, the SLCAPM performs poorly compared to the other models (FFM and Black CAPM) and the SLCAPM produce biased estimates. These also show a relationship between beta (market risk) and realised returns that is flatter than the relationship predicted by the SLCAPM (using the long term government bond rate as a proxy for the risk free rate in the model).[922] The QLD and SA service providers resubmitted this position in their revised regulatory proposals.[923]

Further, service providers resubmitted a NERA report on the empirical performance of the SLCAPM and a NERA report on the literature in support of the SLCAPM, Black CAPM and FFM.[924]

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[919] Stephan Schaeffler and Christoph Weber, 'The Cost of Equity of Network Operators – Empirical Evidence and Regulatory Practice', *Competition and Regulation in Network Industries*, 14(4), 2013, p. 386.

[920] ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 120; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 29; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 285; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 113; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 209; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 217; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 4.

[921] ActewAGL, Ergon Energy, JGN, TasNetworks and SAPN submitted SFG Consulting, *The required return on equity for regulated gas and electricity network businesses*, 6 June 2014. Energex submitted SFG, *Estimating the required return on equity*, 28 August 2014; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015; NERA, *The Cost of Equity: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015,; Ronald L. Knecht, *Witness Statement: Ronald L. Knecht*, June 2015; Frontier Economics, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015.

[922] SFG Consulting, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks*, 6 June 2014, pp. 21–24; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, Frontier, Key issues in estimating the return on equity for the benchmark efficient entity, June 2015, pp. 20–25; NERA, The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks, June 2015, pp. 4–7; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, p. 8.

[923] Energex, *2015-20 revised regulatory proposal*, July 2015, p. 90; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 338;

[924] NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015. NERA, *Review of the literature in support of the Sharpe-Lintner CAPM, the Black CAPM, and the Fama-French three factor model*, A

Apart from this, in substance, service providers submitted little new material since the Guideline development process, where we considered submissions around potential bias in the SLCAPM.[925]

At this time, we conclude the evidence is unclear given the empirical limitation of the tests. Notwithstanding potential limitations with the model, we consider that our implementation of the model recognises any potential empirical limitations.

We previously engaged Associate Professor Graham Partington and Professor Michael McKenzie (McKenzie and Partington) to review many of these views as part of the preliminary and April and June 2015 decisions. This analysis still applies to much of the material submitted to us by the current service providers. This is because:

- The service providers submitted a large number of reports that were previously considered in the preliminary and April and June 2015 decisions.[926]
- The key points do not differ substantively from those considered by McKenzie and Partington for the JGN final decision.

In relation to the SLCAPM, McKenzie and Partington found the following:[927]

- As the foundation model it, 'provides a starting point, which is firmly based in a mature and well accepted theoretical and empirical literature'.
- Its efficacy comes from surviving the test of time. They noted the 'model has been around for in excess of half a century and has become the standard workhorse model of modern finance both in theory and practice'.
- Its 'place as the foundation model is justifiable in terms of its simple theoretical underpinnings and relative ease of application'.
- The majority of international regulators primarily base their decision on the SLCAPM framework.
- The fact some work appears to show other models better explain the cross section of realised average returns does not invalidate the use of the model for several reasons. For instance, the cross section of returns is only one dimension of interest.[928]
- The evidence against the SLCAPM may not be as robust as once thought when more appropriate statistical tests are used.
- The empirical evidence against the model does not invalidate its use for estimating the cost of capital for projects when making capital budgeting decisions.

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report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy, March 2015.

925 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 11–13;

926 For example, Jemena Electricity Networks submitted nine consultant reports that were previously considered in the JGN final decision to support its regulatory proposal,.

927 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 9–10.

928 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 9.

McKenzie and Partington also considered that the Black CAPM was not based on more realistic assumptions. Further, they considered that the empirical results for the Black CAPM and SLCAPM were not directly comparable.[929]

Several service providers resubmitted an empirical test of the SLCAPM and the Black CAPM by NERA that was considered in the JGN final decision.[930] We continue to observe that the results in NERA's report appear counterintuitive. For instance, NERA's in-sample tests indicated there was a negative relation between returns and beta—which is not consistent with the theory underpinning the SLCAPM or the Black CAPM.[931] NERA also provided an estimate of the zero-beta premium of 10.75 per cent.[932] It has been acknowledged that it is implausible for the zero beta premium to be equal to or greater than the MRP.[933] Further, having reviewed this report in relation to its results on the Black CAPM, Partington advised:[934]

> the results of NERA's various empirical analyses (most recently NERA, 2015) show that the reference portfolio they use is not on the efficient set ex-post. If it were, then there would be a perfect linear relation between the returns on securities and their betas calculated relative to the reference portfolio. Empirically, however, this is not the case. Therefore, the reference portfolio is not on the efficient set.
>
> The implication of a reference portfolio that is not on the efficient set is that there is an infinite set of zero beta portfolios with differing returns that can be associated with the reference portfolio. In this case, the zero beta return can be more or less arbitrarily chosen. NERA (2015) and SFG (2015) restrict the choice by fitting a regression model to the data in order to obtain a single estimate.

Frontier and NERA submitted further on the low beta bias for the SLCAPM which would result in a lower return on equity for low beta firms.[935] However, Partington previously noted that the foundation model does not provide a downwardly biased estimate in the current context. He also advised:[936]

> The theoretical justification for a downward bias has previously been considered in McKenzie and Partington (2012, p. 19-20) and they do not find in favour of this argument in this context. We also do not view the statistical

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929 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 22–23.

930 NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

931 NERA, *Empirical performance of the Sharpe–Lintner and Black CAPMs*, February 2015, pp. 25, 31.

932 NERA, *Empirical performance of the Sharpe–Lintner and Black CAPMs*, February 2015, p. 29.

933 NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 92; SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, p. 3.

934 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 25.

935 Frontier, Key issues in estimating the return on equity for the benchmark efficient entity, June 2015, pp. 20–25; NERA, The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks, June 2015, pp. 16–17.

936 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 33.

> justification (see SFG (2013a, p. 5), SFG (2014a, p. 10-12) for a discussion of the Vasicek adjustment) as valid in this context.

Further, there are a number of explanations (for example, economic conditions) that do not imply a bias in beta. These explanations were noted by Partington and Satchell as well as Handley.[937] For example, Mujisson, Fishwick and Satchell (2014) found that beta for a given portfolio remains relatively constant despite changes in the interest rate and market movements.

We consider the empirical information submitted in relation to the ex post performance of the different models does not show our application of the SLCAPM will undercompensate the benchmark efficient entity for its efficient cost of equity. The benchmark firm is not average risk and its risk is not expected to change given its regulated monopoly nature. Empirical evidence by Professor Henry supports this and shows no clear evidence of mean reversion of risk towards the average risk of the market (see appendix D—Equity beta). Partington also observed Henry's result in advising that a Vasicek adjustment was not valid. He advised:[938]

> we note the work of Henry (2008), who finds no evidence that would support the use of the Vasicek model for Australian data. The results of the Henry (2008) study:
>
>> "… suggest that there is little convincing evidence of regression to unity in this data. Therefore, it is difficult to justify the application of the Blume or Vasicek adjustments." (p. 12)

Further, Partington and Satchell made the following observations for testing empirical performances of asset pricing models:

- Testing of an asset pricing model involves how well it describes ex-ante expected returns when security prices are in equilibrium. Empirical work attempts to examine how well the asset pricing model explains ex-post realised returns which 'may not be a particularly good test'.[939]
- The results are dependent on the method used to conduct the test (for example the characteristics used in sorting stocks into portfolios when testing model performance).[940]
- Fischer Black has previously suggested that testing of model performance using ex-post realised returns 'might be telling…more about the shocks to the expected returns (volatility) rather than the equilibrium expected returns'.[941]

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937 Partington and Satchell, *Report to the AER: Return of equity and comment on submissions in relation to JGN*, May 2015, p. 16; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 5.

938 Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 33–34.

939 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 20.

940 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, pp. 23–24.

941 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 20.

- We note NERA referred to the work of Kan, Robotti and Shanken (KRS) for the superior performance of the FFM compared to the CAPM. We are not persuaded at this time as there is no conclusive evidence of the superior performance of the FFM–as KRS also found the conditional CAPM and ICAPM to be the best performing models if the portfolios are formed by ranking stocks on size and CAPM beta instead of by book-to-market and size.[942]

Partington and Satchell also commented on the other models in their most recent report:

- They do not recommend using empirical estimates from alternative models to determine the cost of capital in the Australian context due to issues that are intractable.[943]
- It would not be appropriate to adopt the FFM at this time when it is under revision by its creators.[944] The claims of a book-to-market bias in the SLCAPM for large stocks is also an open question due to FFM's value (HML) factor being driven by small stocks.
- Estimates of the zero beta return are problematic and unreliable and there is no unambiguous empirical basis for determining what an upper bound should be.[945]
- The zero beta return is not current and can take many years of data to estimate. while the current government bond rate is readily available.[946]

Further, McKenzie and Partington have expressed that the foundation model approach, using the SLCAPM as the foundation model, would be expected to:[947]

- lead to a reasonable estimate of the return on equity
- lead to a rate of return that meets the allowed rate of return objective
- not lead to a downward biased estimate of the cost of equity for a benchmark efficient entity.

The current service providers and their consultants have submitted for consideration other models (along with the SLCAPM) for estimating the cost of equity. They noted that these models (Black CAPM and FFM) address the limitations of the SLCAPM.[948]

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942 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 24.

943 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 18.

944 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 19.

945 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 18–20.

946 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 20.

947 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 13–14.

948 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 25; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015; NERA, *The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015, pp. 16–17.

In developing the Guideline and making this decision, we have had regard to the strengths and limitations of the relevant models and consider the SLCAPM to be the superior model before us for the purpose of estimating the allowed return on equity.

McKenzie and Partington have noted that estimates from alternative models could be useful in triangulating the return on equity to the extent these are well founded, unbiased and appropriately combined.[949] However, Partington and Satchell continue to note issues with implementation of the Black CAPM and FFM such as 'problems with estimating the zero beta return' (for the Black CAPM) and the FFM being revised by its originators'.[950] Lewellen, Nagel and Shaken (LNS) have also previously noted that 'none of the models provides much improvement over the simple or consumption CAPM when performance is measured by the GLS[951] R2 or q'.[952]

Partington has also emphasised the dangers of simply combining information from different models. He advised, 'it cannot be taken for granted that a number is meaningful without fully understanding the context in which it is estimated'.[953]

Handley indicated that our use of the SLCAPM as foundation model was entirely appropriate and reasonable.[954] He noted: [955]

> '[t]he Sharpe-CAPM is the standard (equilibrium) asset pricing model. It has a long established and well understood theoretical foundation and is a transparent representation of one of the most fundamental paradigms of finance – the risk-return trade off.

Evidence from broker and valuation reports supported the views of Handley and McKenzie and Partington that the SLCAPM is the standard asset pricing model among market practitioners. All but one of the valuation reports we examined used the SLCAPM as the primary model for estimating the return on equity.[956]

NERA submitted that the low beta bias should be taken into account in determining the cost of equity because the NER states the rate of return should be commensurate of the costs of a benchmark efficient entity with a similar degree of risk.[957] We do not agree with this view. In setting a rate of return, the rate of return would compensate

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949 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 14.

950 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 18–20 & 26.

951 Generalised least squares,

952 Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 21.

953 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 14.

954 Handley, *Advice on return on equity,* 16 October 2014, p. 4.

955 Handley, *Advice on return on equity,* 16 October 2014, p. 4.

956 42 independent valuation reports dated between 27 April 2013 and 28 February 2015 contained a discounted cash flow analysis, but only four of these reports used another model (the dividend growth model) to estimate the return on equity. Three of these four reports used the alternate model as a cross-check on an initial SLCAPM-based estimate. The remaining report used the DGM to directly estimate the value of the proposed transaction (a return on equity estimate was an input into the DGM rather than an output).

957 NERA, *The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015, p. 26.

investors only for non–diversifiable risks (systematic risks) and other types of risks are compensated via cash flows and some may not be compensated at all.[958]

We have considered the empirical evidence that the SLCAPM underestimates return on low beta stocks when examined using ex post data. Because we cannot reliably estimate the Black CAPM, and it cannot be proven or quantified on an ex ante basis, we do not make a specific adjustment to beta to correct for potential low beta bias. However, we consider the theoretical principles underpinning the Black CAPM demonstrate that there are market imperfections that could cause the true (unobservable) expected return on equity to vary from the SLCAPM estimate. It is important to note that all models with simplifying assumptions will likely be affected by market imperfections when they are applied in a practical setting.

Bias and our choice of SLCAPM parameters

We consider our SLCAPM parameters result in a return on equity that will contribute to the achievement of the allowed rate of return objective. This is for the following reasons:

- Our risk free rate proxy reflects the current conditions in the market for capital. It is an unbiased estimator of the risk free rate that should be used in the SLCAPM (see section 3.4.1).
- Our MRP of 6.5 per cent is a fair estimate of the MRP having regard to all the information before us (see section 3.4.1 and appendix C–MRP).
- We have chosen an equity beta point estimate of 0.7 from the upper end of our estimated range. This estimate is with reference to a range of material considered on the basis of merit (see section 3.4.1 and appendix D–Equity beta).

We apply an equity beta of 0.7, which is above many of the equity beta estimates in Henry's 2014 report.[959] We recognise that McKenzie and Partington indicated the Black CAPM (of itself) does not justify any uplift to the estimated equity beta to be used in the SLCAPM.[960] Nevertheless, we consider this model theoretically demonstrates that market imperfections could cause the SLCAPM to generate return on equity estimates that are too high or too low. Therefore, we have taken this into account in exercising our regulatory judgment to use an equity beta of 0.7 in the SLCAPM. This is the equity beta set out in the Guideline.

The service providers' proposals currently before us, submissions and our consultants' advice, do not satisfy us that the SLCAPM will systematically underestimate the return on equity for the benchmark efficient entity. We set out our assessment of the SLCAPM and the other models against the assessment criteria in section 3.4.1 of attachment three.

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[958] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, p.33.

[959] Henry, *Estimating β: An update*, April 2014.

[960] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24.

Gray and Hall (Frontier) submitted it is impossible to know whether any adjustments we made to the CAPM parameters, to account for evidence from other financial models, is appropriate if the other models are never estimated.[961]

In developing the Guideline, we assessed and determined the six step foundation model approach for estimating the cost of equity for the benchmark efficient entity based on a range of information, including the role of relevant financial models. We have also had regard to new information submitted by the current service providers in implementing the foundation model approach for estimating the cost of equity (see section 3.4.1 and relevant appendices for more detail). We are satisfied that, to determine a rate of return that meets the rate of return objective, we do not need to estimate the cost of equity using the Black CAPM, DGM or FFM.

Conclusions with respect to the SLCAPM

Having considered the material before us and the advice from our consultants in relation to this material, we consider using the SLCAPM as our foundation model will result in a return on equity estimate that contributes to the achievement of the allowed rate of return objective. We consider the use of the SLCAPM as the foundation model will not result in a downward biased estimate of the return on equity for the reasons set out in this appendix (in particular, sections A.1 and A.3.1).

While we acknowledge that the SLCAPM has weaknesses. We note:

- We remain of the view that the SLCAPM is the superior model to use as the foundation model (at this time). We agree with our consultants that the evidence against the model is far from clear.[962] However, we accept that if the application of alternative models became more robust, consistent, and widely accepted, then it might be appropriate to reconsider their role in the future.
- We have not applied the SLCAPM mechanistically with respect to the MRP or equity beta. Step three of our foundation model approach covers our selection of input values these parameters.
- We have applied the SLCAPM in a measured manner in choosing an equity beta above the best econometric estimate implied from Henry's 2014 report.[963] We note our beta of 0.7 is generally below the equity beta service providers and their consultants have proposed (typically between 0.8 and 0.94).[964] However, it is

961 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 14.

962 Handley*, Advice on the return on equity*, 16 October 2014, pp. 4–5; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 13–14; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 33–34.

963 Henry, *Estimating beta: An update*, April 2014.

964 Equity beta estimates from service providers ranged from 0.8 to 0.94. The former is based on our previous estimate for equity beta prior to the Guideline. The latter is based on SFG's estimate using the risk premium implied from its DGM in SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15

above the equity beta a number of stakeholders considered appropriate, given the risk of the service providers.[965]

We consider the SLCAPM is appropriate as a foundation model to use to estimate the return on equity of the benchmark efficient entity. We consider its use in this context will lead to a predictable estimate of the return on equity, and this will be valuable in ensuring regulated service providers can efficiently raise equity. We are not persuaded to change our approach by the new material submitted by the current network service providers and their consultants.

The key reasons for using the SLCAPM as our foundation model remain unchanged from the reasons in the Guideline and subsequent decisions. These reasons include:[966]

- It is widely used for estimating the expected return on equity for regulated companies. This includes use by academics, market practitioners and other regulators.
- The SLCAPM, estimated as the sum of the risk free rate, and the product of the equity beta and MRP, is relatively simple to implement. We consider these input parameter estimates are based on robust, transparent and replicable analysis supports.
- Other relevant material can be used to inform the SLCAPM parameter estimates. This may mitigate limitations of the model. The approach, therefore, facilitates the inclusion of a broad range of material, but may still provide some certainty to stakeholders as to the final return on equity.
- The SLCAPM can be used to provide a range of estimates and a point estimate from within this range. This functionality provides further predictability to stakeholders regarding the final return on equity value.

A.3.2 Fama French Three Factor Model

The FFM is a three factor model of asset returns.[967] It incorporates the following three risk factors:[968]

May 2015.The majority of current network service providers proposed an equity beta of 0.82 (Energex, Ergon, ActewAGL, AusNet Services, United Energy, CitiPower and Powercor) which is based on SFG's estimation.

965 For some examples, Energy Retailers Association of Australia, *Re: Issues paper – Victorian electricity distribution pricing review 2016-2020*, 13 July 2015, p. 2; Origin Energy, *Re: Submission to Victorian Electricity Distributors Regulatory Proposals*, 13 July 2015, p. 9; Victorian Energy Consumer and User Alliance, *Submission to the AER, Victorian Distribution Networks' 2016-20 Revenue Proposal*s, July 2015, p. 11, citing Henry, O.T., *Estimating Beta: An Update*, April 2014; South Australian Council of Social Service, *Submission to Australian Energy Regulator on SA Power Networks 2015-2020 AER Preliminary Decision*, June 2015, p. 1 and attachment South Australian Centre for Economic Studies, *Independent review of parameters used in the calculation of the proposed weighted average cost of capital*, June 2015, p. 3; Queensland Council of Social Services, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, July 2015, pp. 22-24.

966 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 13–14; AER, *JGN final decision, Attachment 3–Rate of Return*, June 2015, pp. 254–255.

967 Fama, E.F., French, K.R., 'The cross section of expected stock returns', *The Journal of Finance*, 47, 1992, pp. 427–66.

- the return on the market (thus it incorporates the CAPM's systematic risk factor by having the return on the market as a factor)
- firm size (measured by market capitalisation)
- the ratio of book value to market value.

Based on the information before us when we published the Guideline, we determined we would give the FFM no role in estimating the return on equity for the benchmark efficient entity. We maintain our reasons for this position as set out in the Guideline's explanatory statement and its appendices having reviewed service providers' initial and revised proposals, supporting documents and submissions on our draft and preliminary decisions.[969] [970] We do not consider that using the FFM will result in a return on equity estimate that contributes to the achievement of the allowed rate of return objective. McKenzie and Partington have also previously supported our decision to not use the model.[971] We consider Handley's comments on the model also support our decision to not use the FFM.[972]

The key reasons for giving the FFM no role at the time of publishing the Guideline were:[973]

- There is little evidence of companies or regulators using the FFM to estimate the return on equity.
- Empirical implementation of the FFM is relatively complex and opaque. Also, its estimates are sensitive to the chosen estimation period and methodological assumptions. For instance:
    - Estimates of the value and size factors vary considerably. This suggests the model is not robust and is sensitive to different time periods and estimation methodologies.

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968 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 15–16.

969 AER, *Rate of return guideline*, 17 December 2013, p. 13; AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 57–72; AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 18–23.

970 For example, SFG, *The required return on equity for regulated gas and electricity network businesses*, 6 June 2014, pp. 33–37; SFG, *The Fama-French model*, May 2014, pp. 17–32; SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015; NERA, *The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015

971 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 15–19. Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 11; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

972 Handley, *Advice on return on equity,* 16 October 2014, pp. 7–10. We reengaged Handley to consider material submitted with service providers' revised proposals. It does not appear that this material caused Handley to change his earlier positions. See Handley, *Further advice on the return on equity*, March 2015, pp. 3–4; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28.

973 AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 57–72; AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 18–23.

- The FFM is more complex to estimate than the SLCAPM as there are more input parameters to estimate.

- There is a lack of theoretical foundation for the factors and the instability of parameter estimates. The disappearance of the size effect may reflect the lack of theoretical foundations for the factors in the FFM.
- The ex-post (backward looking) observation of apparently priced risk factors does not mean these factors are priced ex-ante (on a forward looking basis).

The Energy Consumers Coalition of South Australia (ECCSA) agreed with the role we assign to the Fama–French model. ECCSA rejected the associated proposal by the networks to use multiple models to assess the outcomes then weighting these models to arrive at a point estimate.[974]

In its submission relating to the SA and QLD distributors, the Consumer Challenge Panel (CCP) was also unconvinced by arguments from the various service providers for the AER to use models other than the SL-CAPM for estimating the cost of equity. The CCP considered that these alternative models are currently not being utilized by academics nor valuation practitioners.[975] Similarly, the Victorian Energy Consumer and User Alliance (VECUA) considered that our approach to estimating return on equity is more appropriate than the distributors' proposed approaches that adopt weighted averages of different return on equity models. These proposed departures have not been subjected to any rigorous analysis or stakeholder consultation.[976]

In their initial proposals, the majority of service providers argued that empirical estimates from the FFM should be used for estimating the return on equity.[977] The QLD and SA service providers resubmitted these positions in their revised proposals.[978] The

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974 ECCSA, *Submission on Australian Gas Networks' Access Arrangement Proposal 2016-2021*, 16 August 2015, p.58.

975 Mr Bruce Mountain, *CCP2, Advice on AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015, p.113

976 Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p.10.

977 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, pp. 125–126; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, pp. 19–20; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 281; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 204–205; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 212–213; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 31. Energex, *2015–20 regulatory proposal*, October 2014, pp. 164–165; Ergon Energy, *Regulatory proposal, appendix C: Rate of return*, October r2014, pp. 128–129 SAPN, *Regulatory proposal 2015–20*, October 2014, pp. 313–319.

978 Energex, *2015-20 revised regulatory proposal*, July 2015, p. 87; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 365–67.

service providers used their empirical estimates of the return on equity from the FFM to do one or more of the following:

- Estimate their proposed return on equity (as part of a multi model approach).[979]
- Provide evidentiary support that their estimate of the return on equity is reasonable and will contribute to the achievement of the allowed rate of return objective.[980]
- Support the view that the foundation model approach as set out in the Guideline will not contribute to the achievement of the allowed rate of return objective.[981]

Service providers responded to our key reasons for giving the FFM no role in their initial and revised proposals.[982] The main responses to our reasoning in the Guideline include:[983]

- Our position that estimates are sensitive to the choice of estimation periods and methodological assumptions is not a valid reason to not use the model.[984] Regarding sensitivity, SFG noted that the beta risk factor in the SLCAPM is also sensitive.[985]
- Our position that the model is relatively complex and opaque is not a valid reason to not use the model.[986] Even so, SFG did not consider the FFM complex to implement.[987]
- We are incorrect in concluding there is little use of the FFM by companies to estimate their cost of capital, or by regulators to set their cost of capital.[988]

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979 ActewAGL, Energex, Ergon Energy, SAPN,, Jemena Electricity Networks, CitiPower, Powercor, APTNT, United Energy, AusNet Services and AGN

980 ActewAGL, Energex, Ergon Energy, SAPN,, Jemena Electricity Networks, CitiPower, Powercor, APTNT, United Energy, AusNet Services and AGN

981 ActewAGL, Energex, Ergon Energy, SAPN,, Jemena Electricity Networks, CitiPower, Powercor, APA, United Energy, AusNet Services and AGN

982 Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 31 & 46; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, pp. 125–126; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, pp. 19–20; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 281; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 204–205; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 212–213; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 87; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 365–67.

983 SFG, *The required return on equity for regulated gas and electricity network businesses*, 6 June 2014, pp. 33–37; SFG, *The Fama-French model*, May 2014, pp. 17–32; SFG, *Estimating the required return on equity*, 28 August 2014, pp. 83–87; SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015;

984 SFG, *The Fama–French model*, May 2014, pp. 23–26.

985 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 11–14l

986 SFG, *The Fama–French model*, May 2014, pp. 23–26.

987 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 17–18;

988 SFG, *The Fama–French model*, May 2014, pp. 20–21; Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 2.

- Our position that the lack of theoretical foundation for the model suggests it may be unstable and may reflect the disappearance of the size effect are not clearly correct and/or valid reasons to reject the use of the model.[989] Further, theoretical justification for the FFM was developed after the model was developed, and this is standard for scientific progression.[990]
- Our position that even where factors are observed in ex-post realised returns, this does not mean the (historically observed) risk factors are priced ex-ante, is not a valid reason (of itself) to reject the use of the model.[991] Rather, SFG considered the FFM and SLCAPM shared the same purpose — to explain the cross-section of stock returns.[992]

Some of the current service providers[993] provided new reports from NERA, Gray and Hall (now Frontier), Malko and Knecht on the FFM with the following key points:

- The FFM performs better than the SLCAPM.[994]
- The FFM should be considered when estimating the cost of equity.[995]
- We have rejected the use of FFM, which addresses the book to market bias of the SLCAPM, based on imprecision and varying estimation techniques that could be adopted.[996]

We are not satisfied with these arguments. We set out our reasons for this position in the following sections.

Sensitivity

We consider the variation in estimates of the FFM indicates that these estimates are highly sensitive to the chosen methodology. As noted in section 3.4.1, a recent study in the UK by Michou, Mouselli and Stark (2014) reinforces this conclusion.[997] This study surveyed the research literature on the FFM and identified a variety of different methodologies used to estimate the FFM in the UK. The study found that different methodologies generated substantially different results. A principal conclusion of

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989 SFG, *The Fama–French model*, May 2014, pp. 27–32.

990 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 15–16;

991 SFG, *The Fama–French model*, May 2014, pp. 26–27.

992 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 14–15.

993 ActewAGL, AGN, AusNet Services, CitiPower, Ergon Energy, Energex, Jemena Electricity Networks, Powercor, SAPN and United Energy.

994 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 18–19; NERA, *The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015, pp. 34 & 37.

995 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 25; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, p. 9; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015.

996 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 21–22.

997 Michou, M., Mouselli, S., Stark, A., 'On the differences in measuring SMB and HML in the UK - Do they matter?', *British Accounting Review*, Volume 30, 2014, pp. 1–14.

Michou, Mouselli and Stark was that the results of the FFM are highly sensitive to the methodology chosen, so that 'factor construction methods can matter in the use of factor models and, as a consequence, factor construction methods need to be considered carefully in empirical settings'.[998] By adopting different methodologies, different experts come to substantially different findings.

We consider a critical limitation of the FFM is its lack of stability to specification and implementation choices. In addition to the work of Michou, Mouselli and Stark, the Australian work of Brailsford, Guant and O'Brien (2012) noted that regarding the FFM's specification choices around break points: 'what appears to be relatively innocuous choices in portfolio construction can lead to substantially different conclusions'.[999] Brailsford, Gaunt and O'Brien (2012) explained why their results were different from other studies which found a positive size premium in Australia. In particular, they drew attention to how their results depended on the specific methodology they used.

In contrast, we have a higher degree of confidence in our SLCAPM input parameters and resulting return on equity estimates from the SLCAPM. We have confidence in our proxy for the risk free rate (see section 3.4.1 of attachment 3), which would be the same if we were to apply the FFM. We are also satisfied with our estimates of the MRP and equity beta, which we provide detailed reasoning for in appendix C—MRP and appendix D—Equity beta. In particular, we consider our empirical analysis of equity beta shows that businesses in our comparator set generate a consistent pattern of empirical estimates that is robust across different sample periods and econometric techniques.[1000] We acknowledge that the reasonable range these empirical estimates generate could be considered wide (0.4 to 0.7). However, we have regard to additional information and adopt an estimate at the top of this range.[1001] Various consumer groups have previously characterised this as a conservative response, to the benefit of service providers.[1002]

Regarding sensitivity, SFG and Gray and Hall (previously SFG, now Frontier) considered all models requiring parameter estimates to be sensitive — including the

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998 Michou, M., Mouselli, S., Stark, A., 'On the differences in measuring SMB and HML in the UK - Do they matter?', *British Accounting Review*, Volume 30, 2014, p. 12.

999 Brailsford, T., Guant, C., and O'Brien, M., 'The investment value of the value premium', *Pacific-Basin Finance Journal*, 20, 2012, p. 417.

1000 AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 49.

1001 In appendix D—Equity beta, we recognised that an empirical equity beta range of 0.4 to 0.7 could be considered reasonable for the benchmark efficient entity. We adopted a point estimate of 0.7.

1002 Bell Bay Aluminium, *Submission on TasNetworks revenue proposal*, 8 Aug 2014, p. 3.; CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, February 2015, p. 7; EUAA, *Submission to TasNetworks revenue proposal*, 8 Aug 2014, p. 8. EUAA also submitted its support for the Guideline in EUAA, S*ubmission to the SAPN revenue proposal (2015 to 2020)*, 30 January 2015, p. 13; MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 53; Norske Skog Paper Mills, *Submission on TransGrid's revenue proposal*, p. 8; TMEC, *Submission to the AER draft determination*, 6 February 2015, p. 1.

SLCAPM.[1003] While we recognise that all models can be sensitive, we are not satisfied that the sensitivity of the FFM is comparable to the SLCAPM. This is for the following reasons:

- SFG appears to suggest that the sensitivity arising from the SLCAPM is due to the market factor. We have no reason to expect that adding arguably more sensitive factors (the size and value factors) would produce a model with a comparable level of sensitivity.
- Gray and Hall (Frontier) suggest that our implementation of the SLCAPM results in excessive volatility in the cost of equity estimates due to movement in the risk free rate. If required equity returns do not move with the risk free rate, this implies investors require a change in the risk premium to offset this effect. We do not consider that such a definitive relationship is supported by evidence.[1004]
- McKenzie and Partington indicated they do not consider we should use the FFM to estimate the return on equity. This is due to uncertainties that surround its use.[1005] They considered the evidence indicated that the FFM was unlikely to produce empirically stable estimates. Further, the FFM does not have the ability to reliably estimate the required return on equity for a benchmark efficient entity.[1006]
- Partington did not agree with SFG's submission that all models are sensitive to different estimation periods and methodologies. He advised:[1007]

> We do not agree with SFG however, that “this applies to all models”. We agree that estimated values may vary over data sets, the question is do they vary moderately or do they vary so much as to be considered unstable and/or unreliable? In this context we note that Henry (2008, 2009, 2014) tests for, and finds no evidence of, structural instability in the estimates of the equity beta in the SL-CAPM.

In the Guideline, we found the FFM was relatively complex and opaque. Also, its estimates were sensitive to the choice of estimation periods and methodological assumptions. In response to this, SFG submitted the variation between FFM estimates

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[1003] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 11–14; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 7

[1004] For example, see Partington, *Report to the AER: Return on equity (updated)*, April 2015, pp. 72–75; AER, *Access arrangement final decision Envestra Ltd 2013-17,Ppart 3,* March 2013, pp. 30–31; Parting and Satchell, Preliminary draft report to the AER: Part A, p. 17; AER, Access arrangement 2015–20 final decision Jemena Gas Networks (NSW), Attachment 3, June 2015, p. 238.

[1005] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 38–39; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

[1006] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 38–39; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 14.

[1007] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 25. Partington reviewed submissions made after this report and concluded that they do not change his conclusions (see: Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6).

arises because the studies that produce them are of different quality. We should only consider estimates from the best studies.[1008] Further, NERA previously submitted:[1009]

> [t]his criticism is puzzling because tests of the null that an unconditional risk premium is constant through time typically lack power. In other words, uncovering evidence of instability in risk premiums is generally difficult. This is because realised risk premiums are noisy.

We do not consider there are clear objective grounds to distinguish the 'best' studies. McKenzie and Partington supported this view.[1010] While SFG argued that one methodology to estimating the FFM is superior to other methodologies, we disagree.[1011] We consider there is no agreed best methodology. McKenzie and Partington supported our position by questioning what the objective criteria to determine the best studies are.[1012] McKenzie and Partington also highlighted a vast array of models add further factors to the FFM. They pointed to one academic article that used over 50 variables to predict stock returns, and another that showed over 330 different predictive return signals.[1013] They identified that Fama and French have proposed a five factor version of the model that they claim provides a better description of returns than their original three factor model.[1014]

We also consider that the key point, as noted by Handley,[1015] is that it is far from clear what the relevant factors are, and whether or not these factors reflect risk that should be compensated for in the allowed rate of return.

Complexity

On our position that the FFM is complex to implement (relative to the SLCAPM), service providers have previously submitted the following consultant views:

- SFG submitted, 'the regulator would need to have regard to a relevant financial model even if it was complex'.[1016]

1008 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2; SFG, *The Fama-French model*, 13 May 2014, p. 24. SFG suggests that the AER should use an approach akin to that in Brailsford, Tim, Clive Gaunt and Michael O'Brien (2012a), 'Size and book-to-market factors in Australia', *Australian Journal of Management*, 37, pp. 261–81.

1009 NERA, *The Fama–French Three–Factor Model A report for the ENA*, October 2013, p. 31.

1010 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 38.

1011 SFG, *The Fama-French model*, 13 May 2014, p. 24.

1012 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 38.

1013 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 16–17; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 36.

1014 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 16; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 36.

1015 Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, May 2015, p. 24.

1016 SFG, *The Fama-French model*, 13 May 2014, p. 23. They also argue that just because the FFM has more variables than the SLCAPM, this does not mean it is less accurate. For example, if aircraft flight times are affected

- NERA submitted that the FFM produces a less precise estimate than the SLCAPM, 'because it requires beta estimates relative to, not one, but three factors'. However, there may be a trade-off between precision (low standard deviation) and bias — the FFM should be considered given its relative lack of bias.[1017]
- SFG did not consider the FFM complex to implement because it simply required estimating three factors instead of the one factor in the SLCAPM.[1018]

In response to these submissions on the relative complexity of the FFM, we have had regard to all financial models, irrespective of their level of complexity. We accept that a more complex model may be preferred over a less complex model where it offers a better estimate. However, we do not consider the FFM provides a better estimate than the SLCAPM given the high degree of uncertainty around its estimates. We also do not consider the FFM will provide an unbiased estimate relative to the foundation model approach using the SLCAPM as the foundation model. This is because we consider there is no compelling evidence that our approach, as applied, will give a downward biased estimate of the return on equity.

We do not agree with SFG's position that FFM is not complex to implement because it simply requires estimating three factors instead of the one factor in the SLCAPM.[1019] Estimating the MRP and equity beta in the SLCAPM has resulted in a large amount of material being submitted by service providers, consultants and consumer groups.[1020] This material adds a large amount of complexity to the task of estimating a return on equity that contributes to the achievement of the allowed rate of return objective. Given this, we have no reason to consider that estimating two additional premiums and correlation coefficients would not add considerable complexity to our task.

Use in practice

SFG responded to our position in the Guideline that there is little evidence of companies and regulators using the FFM to estimate the return on equity. In particular, SFG submitted:[1021]

- The background paper for the Nobel Prize awarded to Eugene Fama for his finance work stated that the FFM factors are now standard.

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by a number of variables, a model is not less accurate if it includes all the variables (pp. 23–24); SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 17–18.

1017 NERA, *The Fama-French Three-Factor Model: A Report for the ENA*, October, 2013, p. 24; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, pp. 99–103.

1018 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 17–18.

1019 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 17–18.

1020 A sample of the most recent material includes: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 1–58; NERA, *Memo: Revised estimates of the MRP*, November 2014, pp. 1–3; SFG, *the required return on equity for the benchmark efficient entity*, February 2015, pp. 17–36; SFG, *Beta and the Black CAPM*, February 2015, pp. 1–45; NERA, *Historical estimates of the MRP*, February 2015, pp. 1–51; SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 25–44.

1021 SFG, *The Fama-French model*, 13 May 2014, pp. 17–32.

- The CFA[1022] certification includes extensive coverage of the FFM.
- Leading journals on financial economics continue to publish articles on the FFM.
- Survey evidence may be misleading.
- There are two examples of the FFM being used in US courts.
- Morningstar provides betas for the FFM.
- The current service providers also submitted reports from Knecht and Malko which noted increasing use of FFM (along with the SLCAPM and other models) by US regulators and expert witnesses.[1023]

In response to these submissions, we note there is a distinction between the econometric application of the FFM by academics and the use of the FFM by practitioners. We accept that academics have applied different specifications of the FFM in an attempt to explain anomalies in realised return data relative to the ex-ante expected return predictions of the SLCAPM. That is, the FFM has been used as a theoretical factor model to econometrically fit realised return data. However, we recognise that this is a different purpose to an asset pricing model that stably predicts future expected returns and is used to systematically and stably price assets. McKenzie and Partington supported our views on the FFM's inability to stably predict returns and considered the parameter instability demonstrated in the literature to be symptomatic of its weakness.[1024]

We maintain the view expressed in the Guideline and the preliminary and April and June 2015 decisions that regulators do not commonly use the FFM to estimate the rate of return. There is evidence that regulators, in particular, tend not to use the FFM. A recent study by Stephan Schaeffler and Christoph Weber examined the regulatory practices in 21 countries. It concluded that the, ‘standard model for determining capital costs’ for energy businesses is the SLCAPM, finding that the FFM is not used in regulatory decisions.[1025] Partington advised, 'regulators have flirted with the use of the Fama and French model, but that has not encouraged its ultimate adoption in regulation'.[1026] He agreed with the view expressed by Green, Lopez and Wang in relation to potentially using multi-factor models to update the US Federal Reserve's method of estimating the cost of equity for US banks. Green, Lopez and Wang found:[1027]

1022 Chartered Financial Analyst

1023 Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015.

1024 McKenzie and Partington o, *Report to the AER part A: Return on equity*, October 2014, p. 18; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 38.

1025 Stephan Schaeffler and Christoph Weber, ‘The Cost of Equity of Network Operators – Empirical Evidence and Regulatory Practice’, *Competition and Regulation in Network Industries*, 14(4), 2013, p. 386.

1026 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 15.

1027 Green, E.J., Lopez, J.A., Wang, Z., 'Formulating the imputed cost of equity capital for priced services at Federal Reserve banks, *Federal Reserve Bank of New York Economic Policy Review*, Vol. 9, No. 3, September 2003, p. 73.

> Multibeta models could be employed to calculate the equity cost of capital used in the PSAF. However, because there is no consensus on the factors, adoption of any particular model would be subject to criticism. Because the academic literature shows that multibeta models do not substantially improve the estimates, the gain in accuracy would likely be too small to justify the burden of defending a deviation from the CAPM. We therefore do not recommend using multibeta models to calculate the cost of equity capital in the PSAF. Nevertheless we present some numerical results based on the Fama and French (1993) model. These results indicate that any additional accuracy provided by multibeta models is clearly outweighed by the difficulties in specifying and estimating them.

We maintain the view in the Guideline that companies do not commonly use the FFM to estimate the rate of return. As part of reviewing the material service providers submitted, we examined 32 valuation (expert) reports completed in 2013 and 2014.[1028] All but one of the broker and valuation reports we examined used the SLCAPM as the primary model. While eight of the 32 reports discussed the FFM, only four of these reports provided some somewhat arbitrary uplifts for the size factor. None of the reports provided any adjustment for the value factor. We consider this demonstrates that the FFM is not currently used widely, or in any determinative way, to value firms in Australia. We also do not consider this level of use justifies its empirical use given the other issues with the model.

We also note the FFM is just one of a family of 'factor models'. Factor models may include one or both of the size and value factors. They may also include a large number of other factors. In their early articles on the FFM, Fama and French argued that a central contribution of their research was that the two additional factors in the FFM captured the range of anomalies relative to the SLCAPM.[1029] Subsequent research into factor modelling, however, has identified a variety of factors in addition to those in the FFM—including 'momentum' and a number of macroeconomic variables.[1030] To the extent that the size and value factors are used, they are often used alongside a range of other factors. There appears to be no consensus, and, indeed, nothing approaching a consensus, on the appropriate factors to use in factor

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[1028] 32 independent valuation reports dated between 27 April 2013 and 31 July 2014 contained a discounted cash flow analysis, but only four of these reports used another model (the dividend growth model) to estimate the return on equity. Three of these four reports used the alternate model as a cross-check on an initial SLCAPM-based estimate. The remaining report used the DGM to directly estimate the value of the proposed transaction (a return on equity estimate was an input into the DGM rather than an output). See:

DMR Corporate, *Re: Independent Expert's Report, Report prepared for ILH Group Ltd*, 23 July 2013.

Grant Samuel & Associates Ltd, *Financial Services Guide and Independent Expert's Report in relation to the proposal by Murray & Roberts Holdings Ltd*, 11 October 2013.

Grant Samuel & Associates Ltd, *Financial Services Guide and Independent Expert's Report in relation to the proposal to internalise management*, 7 February 2014.

Grant Samuel & Associates Ltd, *Financial Services Guide and Independent Expert's Report to the Independent Board Sub-Committee in relation to the proposal by APA Group*, 4 March 2014.

[1029] For example, see: Fama, E. F, and French, K. R., 'Multifactor explanations of asset pricing anomalies', *The Journal of Finance*, Vol. 51, No. 1, March 1996, pp. 55–88.

[1030] Cochrane, 'Presidential address: discount rates', *Journal of Finance*, Vol. 66, No. 4, August 2011, pp. 1047–1108.

modelling. Given the large range of potential factors used in factor modelling, as well as the contested and technical nature of this emerging body of research, we consider (at this time) factor modelling is largely inappropriate for determining the regulatory rate of return. Given the complexities, we do not consider (at this time) factor modelling will produce a suitably reliable estimate of the return on equity for regulatory use.

Morningstar's publication of FFM beta estimates, the CFA's teaching of the FFM, and the contents of the background paper for the Nobel Prize do not change our view on the use of the FFM. Morningstar, as with other data services, publishes a range of information for various reasons. This publication (of itself) does not indicate the information is widely used for pricing assets or is suitable for setting a regulated rate of return. Academic and vocational courses, of which the CFA is just one, teach a range of information for various purposes and reasons. The CFA covering the application of the FFM does not indicate that the model is widely used. Finally, the background paper to the Nobel Prize does not indicate the use of the FFM is 'standard' for pricing individual assets. The paper is clear that the award was for the Nobel Laureates' empirical contribution to the understanding of how asset prices are determined. It was not for developing an asset model that is generally accepted as correct.[1031] The paper stated:[1032]

> [a]lthough we do not yet have completed and generally accepted explanations of how financial markets function, the research of the Laureates has greatly improved our understanding of asset prices and revealed a number of important empirical regularities as well as **plausible** factors behind the regularities [emphasis added].

We recognise that the paper indicated Morningstar publishes Alpha relative to the FFM factors and stated it has become standard to evaluate performance relative to 'size' and 'value' benchmarks. However, using these factors to evaluate investment performance is different to using the FFM to estimate the expected return on equity — which is our regulatory task. For example, Partington referenced Carhart et al. (2014) in advising that investors tend to view investment performance as an issue of portfolio management style, rather than reflecting risk factors.[1033] Given this, the paper provided no compelling evidence that the FFM is widely used to price individual assets, or is suitable for setting regulatory rates of return.[1034]

[1031] Economic Sciences Prize Committee of the Royal Swedish Academy of Sciences, *Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013 Understanding Asset Prices*, 2013, p. 1.

[1032] Economic Sciences Prize Committee of the Royal Swedish Academy of Sciences, *Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013 Understanding Asset Prices*, 2013, p. 1.

[1033] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 15. Reference is made to Carhart, Carhart, M. M., 'On persistence in mutual fund performance', *Journal of Finance*, 1997, 52(1).

[1034] Alpha is the difference between the fair and expected rates of return on a stock. See: Body, Kane and Marcus, *Investments*, fifth edition, McGraw-Hill Irwin, p. 273.

Ex ante returns

McKenzie and Partington consider that the FFM cannot be used for reliably estimating the return on equity at this time due to the uncertainties surrounding it.[1035] However, they noted the FFM might be used (either alone or in combination with other models) to estimate the return on equity if the model was used appropriately and a number of the issues with the model were resolved.[1036] They also made the important point that, 'the FFM is used to estimate the average return in the cross section and the benchmark regulated network service provider is not average given its relatively low economic risk'.[1037]

The FFM estimates average returns in the cross section. We are not satisfied this is helpful for our regulatory task because:

- We consider that whether factors are priced in the cross section is unresolved. SFG referred to a number of possible explanations for why the value factor could be genuinely priced in average returns in the cross section.[1038] However, none of the possible reasons is commonly accepted.[1039]
- Even if we accepted that the factors were priced in the cross section, McKenzie and Partington question the appropriateness of applying average returns in the cross section to the benchmark efficient entity. Even if factors are priced in the cross section, this does not necessarily imply that the benchmark efficient entity requires compensation above the level provided for under the SLCAPM.

In the Guideline, we found it was unclear whether the FFM was estimating ex-ante priced risk factors. SFG responded to this by submitting, ‘it is incumbent upon anyone using this argument to set out what level of empirical evidence would be required for them to consider that a particular factor might be relevant’.[1040] SFG submitted that the AER should reach a conclusion on the most likely explanation of whether or not the

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1035 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 18–19; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 38–39; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

1036 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 19.

1037 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18.

1038 These include the risk of financial distress, exposure to changes in expected economic growth and asymmetric exposure to market conditions. See SFG, *The Fama–French model*, 13 May 2014, pp. 30–32.

1039 SFG observed that these three theories, 'is not an exhaustive list of specific theoretical explanations for the performance of the Fama-French model. It represents three prominent theories that have empirical support. In the two decades since the publication by Fama and French (1993) an exhaustive literature has been devoted to theoretical explanations for the explanatory power of SMB and HML'. See SFG, *The Fama–French model*, 13 May 2014, p. 32. McKenzie and Partington discussed this in *Report to the AER, Part A: Return on equity*, October 2014, pp. 15–19, where they referenced Lewellen, Nagel and Shanken's observation that, 'one gets the uneasy feeling that it seems a bit too easy to explain the size and B/M effects'. See Lewellen, Nagel and Shanken, ‘‘A sceptical appraisal of asset pricing tests’, *Journal of Financial Economics*, 2010, 96, p. 175.

1040 SFG, *The Fama–French model*, 13 May 2014, p. 26.

FFM estimates ex ante priced risk factors.[1041] We stress that our position on the FFM not clearly ex ante pricing risk factors is only one piece of evidence informing our regulatory judgment to not use the model. We have considered this in combination with the instability of the estimates from the model, the lack of clear theoretical foundations for the model, and the other evidence discussed above. We have also taken into account the limited empirical use of the model to price assets.

Theoretical foundation

In the Guideline, we stated the FFM lacked theoretical foundation. In response to this:

- SFG submitted the FFM can be embedded in a theoretical framework—either Merton's intertemporal CAPM or Ross's arbitrage pricing theory model.[1042]
- While SFG conceded that the size factor was not persistent in the data, it emphasised that the value factor was persistent. Moreover, the persistence of the value factor provides a good reason to think the value factor has a theoretical foundation.[1043] On the other hand, NERA maintained that both factors may be persistent, although noting the size premium is not statistically significant.[1044]
- NERA submitted it is legitimate to use a model that robust empirical evidence supports, even when you do not know the theoretical foundation. The FFM should not be impugned on the grounds that the empirical support for the model preceded theoretical developments.[1045] SFG also submitted this position.[1046]

In response to the current service providers' submissions, we do not agree that the Guideline simply dismissed the FFM because the theoretical arguments appeared after the empirical arguments. Rather, our concerns regarding the FFM arose because:[1047]

- The parameters have proven to be somewhat unstable.
- The ex post theoretical explanations of the risk factors remain contested.
- That the FFM might be embedded in a theoretical framework does not change that the model was empirically motivated. Despite NERA's defence of the size effect, it appears to have disappeared in Australia.[1048] SFG conceded this.[1049] Further, this does not appear consistent with other empirical evidence that service providers

1041 SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, Report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks and United Energy, March 2015, p. 14.

1042 SFG, *The Fama–French model*, 13 May 2014, p. 2.

1043 SFG, *The Fama–French model*, 13 May 2014, p. 11–15.

1044 NERA, *The market, size and value premiums: A report for the ENA*, June 2013, p. 91.

1045 SFG, *The Fama–French model*, 13 May 2014, pp. 28–29.

1046 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 15–16.

1047 See, for example, Lakonishok, Josef, Andrei Shleifer and Robert Vishny (1994), 'Contrarian Investment, Extrapolation and Risk', *Journal of Finance*, 49(5), pp. 1541–78. This article was cited in the background paper for Fama's Nobel Prize.

1048 NERA, *The market, size and value premiums A report for the ENA*, June 2013, p. 91.

1049 SFG, *The Fama-French model*, 13 May 2014, p. 15.

have put before us.[1050] Moreover, estimates of the value factor also change in magnitude over time.[1051] In addition, while the FFM could be genuinely pricing risk (in the cross section at least), there is no consensus that it is. Even if it was, there is no consensus on what priced risk the non-market factors are actually capturing.

McKenzie and Partington have pointed to academic literature that supported our view that the theoretical basis of a model is an important consideration in determining the value to attribute to empirically based estimates. This literature indicated that a higher degree of empirical certainty may be warranted where there is less of a theoretical basis for the result.[1052]

Partington and Satchell have noted recent work by Fama and French that 'a substantial part of the HML (value premium) is driven by small stocks with a weaker effect for large stocks'. We therefore agree with Partington and Satchell's conclusion that, as a result, the value premium (or high book to market) bias in CAPM estimates of returns for large stocks is less compelling'.[1053]

We also agree with Partington and Satchell's conclusion that, with the original FFM under revision by its originators, it would not be appropriate to adopt the FFM at this time.[1054]

NERA's report noted the superior performance of the FFM compared to the SLCAPM with reference to the work of KRS and LNS.[1055] Partington and Satchell noted LNS has previously cautioned that 'none of the models provides much improvement over the simple or consumption CAPM when performance is measured by the GLS R2 or q'. Partington and Satchell also cautioned that the result 'depends upon the characteristics used in sorting stocks in portfolios' in empirical tests which was also noted by KRS.

SFG submitted that one can interpret the book-to-market ratio as a proxy for: (i) a financial distress risk factor (ii) a GDP growth risk factor; or (iii) the exposure to market risks.[1056]

However, Partington and Satchell noted KRS's finding that the book to market factor 'makes no incremental contribution' to the explanatory power of the FFM.[1057]

1050 SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 28.

1051 SFG, *The Fama–French model*, 13 May 2014, p. 36.

1052 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 17; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 37.

1053 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 19.

1054 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 18–20.

1055 NERA, *The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015, p. 33 & 37

1056 The intuition for this third proxy is as follows: if a firm has a high book-to-market ratio, it tends to have a higher proportion of tangible assets, and to be more exposed in downturns. SFG, *The Fama–French model*, 13 May 2014, pp. 30–32.

1057 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 24.

Overall conclusions with respect to the FFM

For the reasons discussed above, we do not consider the FFM is currently suitable for our regulatory task including:

- estimating the return on equity on the benchmark efficient entity
- performing a cross check on whether other models (including the SLCAPM) are producing reasonable estimates of the return on equity that will lead to an allowed rate of return that will meet the allowed rate of return objective.

We consider the use of the FFM will not contribute to the achievement of the allowed rate of return objective. We do not consider its use will be in the long term interests of consumers.

In response to service providers' submissions on the FFM, we consider the material before us does not justify the use of the FFM in our regulatory context. As explained above and in the reasons for the final decision section, there are numerous specifications of the FFM that produce different estimates of the return on equity. Further, there is no single correct application. It is unclear that any of the different return on equity estimates from the different model specifications reflect an ex ante required return for risk. It is also unclear if any of the different specifications would be capable of estimating the required return on equity of investors in the benchmark efficient entity even if they were capable of estimating required returns for the average firm.

We do not consider the empirical estimates of the return on equity from the FFM appropriate for setting or assessing regulatory returns on equity capital. This is because of the limitations stated above, in section 3.4.1 and in the explanatory statement to the Guideline.[1058] We also do not consider service providers' return on equity estimates using the FFM provide any compelling evidence that our SLCAPM estimate of the required return on equity is downward biased, or that our return on equity will not contribute to the achievement of the allowed rate of return objective.

We further note consultants' admission that the use of FFM for estimating the cost of equity for utilities is not common and there are apprehensions with regard to the use of the FFM.[1059]

Finally, while we have not used the model for this final decision, we acknowledge that the model might be suitable for regulatory use in the future if the key issues with the model could be overcome. However, we consider this is unlikely in the near term given the discussion above and the issues still facing the model over 20 years since it was developed.

[1058] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 18–23.

[1059] Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, p. 9; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015, p. 3.

A.3.3 The Black CAPM

Fischer Black developed a version of the CAPM with restricted borrowing (the Black CAPM).[1060] Black's model relaxes one of the key assumptions of the SLCAPM — that investors can borrow and lend unlimited amounts at the risk free rate. He developed two versions of the model; one with a total restriction on borrowing and lending and one that only restricts borrowing at the risk free rate. However, while he relaxes the SLCAPM assumption of unlimited borrowing and lending at the risk free rate, in its place he assumes investors can engage in unlimited short selling.[1061] Unlimited short selling does not hold in practice either.[1062]

In the place of the risk free asset in the SLCAPM, Black substitutes the minimum variance zero-beta portfolio. This zero beta portfolio faces no market (systematic) risk and is formed through the utilisation of short selling. Black shows in his model that the return on every asset is a linear function of its equity beta (as in the SLCAPM). Further, in the CAPM (security market line) equation, Black finds the expected return on the zero beta portfolio replaces the risk free asset.[1063] Relative to the SLCAPM that can utilise observable proxies for the risk free rate, the Black CAPM requires estimating an additional parameter — the zero beta expected return.

At the time we published the Guideline, based on the information before us, we determined:

- We would use the theory behind the Black CAPM to inform the equity beta estimate in the SLCAPM.
- We would not use the Black CAPM to empirically estimate the return on equity for the benchmark efficient entity.

In the Guideline, we set out our reasons for limiting the role of the Black CAPM to using the theory behind it to inform our estimate of the equity beta.[1064] We maintain these reasons, having fully reviewed the criticisms in the service providers' initial and revised proposals and submissions.[1065] We have also reviewed the service providers' supporting documents and submissions.[1066]

1060 Black, F., 'Capital market equilibrium with restricted borrowing', *The Journal of Business*, 45(3), 1972, pp. 444–455; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 20.

1061 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 22.

1062 This assumption does not accord with how the stock lending markets work because short sellers are required to post collateral when lending stock in the form of cash and/or equity. See McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 25.

1063 Black, F., 'Capital market equilibrium with restricted borrowing', *The Journal of Business*, 45(3), 1972, pp. 446–450.

1064 AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 16–18, 68–77.

1065 For service providers' proposals on the Black CAPM see. Energex, *2015–20 regulatory proposal*, October 2014, pp. 164–165; Ergon Energy, *Regulatory proposal, appendix C: Rate of return*, October 2014, pp. 122–123, 128–131; SAPN, *Regulatory proposal 2015–20*, October 2014, p. 319; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2, 14, 25–28; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 117–120 & 123–130; AGN, *2016/17 to 2020/21*

Our use of the Black CAPM in our foundation model approach is due to the following:

- The empirical implementation of the Black CAPM is unreliable because:
    - in contrast to the risk-free rate, the return on the zero beta asset is unobservable
    - methods for estimating the zero-beta asset are unreliable.
- We consider NERA's 2012 submission illustrated the unreliability of the Black CAPM. This presented estimates of a Black CAPM that implied a negative MRP.[1067]
- There is little evidence that other regulators, academics or market practitioners use the Black CAPM to estimate the return on equity.[1068] In particular, regulators rarely have recourse to the Black CAPM.[1069]
- Using a conservative estimate of beta in the SLCAPM can accommodate potential issues that arise from not estimating the Black CAPM.[1070]

Access Arrangement Information, Attachment 10.1: Rate of Return, July 2015, p. 17–29; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 281–286, 312–313; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 113–121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 205–212; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 213–220; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 87–90 & 101; Ergon Energy, *Submission to the AER on its Preliminary Determination, Rate of Return-Cost of Equity*, July 2015, p. 29–35; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 360; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 25–28 & 38–42.

1066 For supporting documents, see McKenzie and Partington analysed — SFG, *Cost of equity in the Black capital asset pricing model*, May 2014; SFG, *The required return on equity for regulated gas and electricity network businesses,* May 2014; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014. NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015; SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 11–17; SFG, *Beta and the Black CAPM*, February 2015; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015; NERA, *The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015

1067 NERA, *The Black CAPM: A report for APA Group, Envestra, Multinet and SP AusNet*, March 2012. For a response to this submission, see McKenzie and Partington*, Review of NERA report on the Black CAPM*, 24 August 2012.

1068 See, AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, p. 17; AER, *Final decision: Envestra access arrangement*, June 2011, p. 40; Handley, *Advice on the return on equity*, 16 October 2014, p. 12. As part of reviewing the material service providers submit in support of their claims, we examined 32 valuation (expert) reports completed in 2013 and 2014 — none of which used the Black CAPM. NERA now appears to have accepted that the Black CAPM is not a well-accepted model adopted by market practitioners. See NERA, The Fama-French Three-Factor Model A report for the Energy Networks Association, October 2013, p. 41; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 92.

1069 A recent study examined regulatory practices in 21 countries and did not point to any uses of the Black CAPM. See Schaeffler, S., and Weber, C., 'The cost of equity of network operators - empirical evidence and regulatory practice', *Competition and Regulation in network industries*, Vol. 14(2), 2013, p. 386.

1070 Handley found, 'The AER's choice in using the Black CAPM to inform the beta estimate, using the DGM to inform the MRP estimate and not using the Fama-French model is also appropriate and reasonable' in *Advice on the return on equity*, 16 October 2014, p. 5. McKenzie and Partington advised the theory underpinning the Black CAPM does not necessarily support an uplift to beta. McKenzie and Partington advised, 'the theory of the Black

We discussed many of the issues facing the Black CAPM during the Guideline development process and in the JGN final decision.[1071] In their initial and revised proposals, most service providers submitted that empirical estimates from the Black CAPM should be used for estimating the return on equity.[1072] Service providers[1073] then used their empirical estimates of the return on equity from the Black CAPM to do one or more of the following:

- To estimate their proposed return on equity (as part of a multi model approach).
- To provide evidentiary support that their estimate of the return on equity is reasonable and will contribute to the achievement of the allowed rate of return objective.
- To provide evidence that the foundation model approach as set out in the Guideline will not contribute to the achievement of the allowed rate of return objective.

In support of using empirical return on equity estimates from the Black CAPM, service providers appear to have criticised a number of key reasons in the Guideline for limiting the role of the Black CAPM to informing the equity beta.[1074] These responses include the following:

- While SFG recognised that estimates of the zero beta premium can be imprecise, it considered that this was not (in itself) a good reason to assume there is no zero-beta premium.[1075]
- SFG criticised us for not placing reliance on a 'plausible' estimate of the zero beta premium simply because we considered different approaches produced implausible estimates.[1076]

CAPM may have a role to play in choosing the equity beta, although exactly how is still not clear to us' in *Report to the AER part A: Return on equity*, October 2014, p. 24.

1071 See AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 213, pp. 16–18, 68–77; AER, JGN final decision, Attachment 3-Rate of Return, June 2015, p. 269–278.

1072 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 2, 14, 25–28; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 117–120 & 123–130; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 17–29; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 281–286, 312–313; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, p. 113–121; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 205–212; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 213–220; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 25–28 & 38–42; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 87–90 & 101; Ergon Energy, *Submission to the AER on its Preliminary Determination, Rate of Return-Cost of Equity*, July 2015, p. 29–35; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 360.

1073 ActewAGL, AGN, AusNet Services, CitiPower, Ergon Energy, Energex, Jemena Electricity Networks, Powercor, SAPN, APTNT and United Energy.

1074 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 8, 68–73.

1075 SFG, *Beta and the Black CAPM*, February 2015, pp. 7–8.

1076 SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 12–13; SFG, *Beta and the Black CAPM*, February 2015, pp. 19–20.

- SFG and Malko suggested that regulators and market practitioners used the Black CAPM in substance, but not in name. This is because, in substance, an SLCAPM with an intercept above the contemporaneous risk free rate is consistent with the Black CAPM.[1077]
- SFG submitted we should estimate the Black CAPM to be transparent about how we have regard to it and to be 'true to' the models.[1078] Gray and Hall (previously SFG, now Frontier) made similar submissions in its recent report.[1079]
- NERA indicated that the SLCAPM suffered from low beta bias, but also indicated that neither the Black CAPM nor the SLCAPM performed well empirically.[1080]

Having considered these submissions, we remain satisfied with our position in the Guideline and preliminary and April and June 2015 decisions. We consider the sensitivity of the Black CAPM to implementation choices, combined with its lack of use, largely makes it unsuitable for estimating the return on equity for the benchmark efficient entity at this time. We do not consider estimates under the Black CAPM would result in a return on equity that contributes to the achievement of the allowed rate of return objective. We elaborate on our reasons for this positon in the following sections.

Empirical reliability

The instability of the Black CAPM was previously highlighted in the final decision for JGN via NERA's report for TransGrid's revenue proposal. This report lists the following prior estimates of the zero beta return for the Australian market:[1081]

- CEG (2008) reports zero beta premium estimates between 7.21 and 10.31 per cent per annum.
- NERA (2013) reports zero beta premium estimates between 8.74 and 13.95 per cent per annum.

NERA also acknowledged that:[1082]

> estimates of the zero-beta premium produced by studies that use long time series of Australian data are generally larger than estimates of the MRP that the AER has in the past used.

1077 SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 13–14; SFG, *Beta and the Black CAPM*, February 2015, pp. 20–21; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, p. 8.

1078 SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 14–17; SFG, *Beta and the Black CAPM*, February 2015, pp. 21–24; SFG, *Beta and the Black CAPM*, February 2015, p. 4.

1079 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 7 & 21–25.

1080 NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

1081 NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 91

1082 NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 91.

NERA also acknowledged the implausibility of the zero beta premium being equal to the MRP. However, NERA claimed the result simply reflects that there is no relationship between systematic risk and return.[1083] Handley described this as, 'NERA offers what it believes to be a plausible explanation for an apparently implausible result'.[1084] Similarly, SFG submitted that imprecise estimates of the zero beta premium arose from the imprecision in the relationship between beta and stock returns.[1085]

SFG acknowledged that one might expect the zero beta return to lie below the expected return on the market.[1086] SFG estimated a somewhat more plausible estimate of the zero beta premium of 3.34 per cent per annum.[1087] It then attempted to reconcile its estimate with NERA's and stated:[1088]

> When we formed portfolios to measure the relationship between beta estimates we formed portfolios that had approximately the same industry composition, market capitalisation, and book-to-market ratio. So we isolated the relationship between stock returns and beta estimates that was largely independent of other stock characteristics that are associated stock returns. We repeated our analysis after forming portfolios entirely on the basis of beta estimates and found that the zero beta premium was 9.28%. This estimate of the zero beta premium is almost identical to the portfolio return of 10.03% reported by NERA for the 19-year period from 1994 to 2012.

We consider SFG's latest estimate of the zero beta premium appears more plausible. However, we remain of the view that the large range of zero beta estimates by consultants indicates that the model is unsuitable for estimating the return on equity for the benchmark efficient entity. SFG later characterised this logic as not placing reliance on a 'plausible' estimate simply because different approaches produced implausible estimates.[1089] Having reviewed SFG's report, Partington advised:[1090]

> There are a great number of practical difficulties to be confronted when implementing the Black CAPM such that McKenzie and Partington (2014) do not recommend any weight be given to the estimates provided in the network service providers consultants reports. This is an important point as McKenzie and Partington (2014) do not suggest that the Black model cannot be estimated. Indeed, the consultants reports clearly show that it can be done. What they do say however, is that it is unclear what those estimated represent.

In the Guideline, we found that estimates from the Black CAPM were unreliable because:

[1083] NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 92.

[1084] Handley, *Report prepared for the AER: Further advice on the return on equity*, April 2015, p. 6.

[1085] SFG, *Beta and the Black CAPM*, February 2015, p. 8; SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, March 2015, p. 24.

[1086] SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, p. 3.

[1087] SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, p. 3.

[1088] SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, pp. 3–4.

[1089] SFG, *Beta and the Black CAPM*, February 2015, pp. 19–20.

[1090] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

- In contrast to the risk free rate, zero beta returns are not observable.
- There is no reliable method to obtain an estimate of the zero beta return.

In response, NERA submitted several responses to the sources of unreliability identified in McKenzie and Partington (2012).[1091] We set these responses out in our preliminary and April and June 2015 decisions and considered these did not change our view on the empirical use of the model.[1092] Nothing has overcome the issues with the stability of the model. We also question the validity of applying an asset pricing model that prices assets on the basis of equity beta where one does not consider there is a relationship between equity beta and required return.

McKenzie and Partington also considered NERA's submissions and remained of the view that the model is empirically unstable. They stated:[1093]

> Our point that 'what you get depends very heavily on what you do' is well illustrated by the SFG estimate of the zero beta premium, which is quite different to the NERA estimate

Use in practice

We have found no evidence of Australian market practitioners using the Black CAPM.[1094] A recent study by Stephan Schaeffler and Christoph Weber, which examined regulatory practices in 21 countries, concluded that the 'standard model for determining capital costs' for energy businesses is the SLCAPM.[1095] Moreover, the study did not point to any uses of the Black CAPM. In addition, despite pointing to a report by the Brattle Group indicating two examples of regulators using the Black CAPM, NERA now appears to have accepted that the Black CAPM is not a well-accepted model adopted by market practitioners.[1096]

In contrast, SFG and Malko implied that regulators and market practitioners used the Black CAPM in substance, but not in name. SFG considers, in substance, an SLCAPM with an intercept above the contemporaneous risk free rate is consistent with the Black CAPM.[1097] We could be inclined to accept this position if regulators' and market practitioners' use of uplifts were stated or known to be motivated by Black CAPM

1091 NERA, *Estimates of the Zero-Beta Premium: A report for the ENA*, June 2013.

1092 For example, AER, *Draft decision, ActewAGL distribution determination, Attachment 3*, November 2014, pp. 186–187; AER, *Jemena Gas Networks final decision 2015–20, Attachment 3–Rate of return*, June 2015, pp. 274–275.

1093 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 44.

1094 As part of reviewing the material service providers submit in support of their claims, we examined 32 valuation (expert) reports completed in 2013 and 2014. As discussed above, all but one of the broker and valuation reports we examined used the SLCAPM as the primary model. None of the reports examined used the Black CAPM.

1095 Schaeffler, S., and Weber, C., 'The cost of equity of network operators - empirical evidence and regulatory practice', *Competition and Regulation in network industries*, Vol. 14(2), 2013, p. 386.

1096 NERA, The Fama-French Three-Factor Model A report for the Energy Networks Association, October 2013, p. 41; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 92.

1097 SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 13–14; SFG, *Beta and the Black CAPM*, February 2015, pp. 20–21.

theory. However, we are not aware of any circumstance where this was the motivation.[1098] We also observe this is a curious position given SFG also advocated for estimating the Black CAPM and considered that using the theory underpinning the Black CAPM to inform equity beta estimate was 'not being true to either model'.[1099]

Malko submitted that there is increasing use of the Black CAPM by financial analysts and regulatory decisions over the past 10 years.[1100] However, Malko has also noted that explicit weights have not typically been given to Black CAPM outputs when it (along with other models) was considered by US regulators.[1101] Simply recording or considering estimates from the Black CAPM does not necessarily result in material weight to the estimates nor provide information on how the Black CAPM was used.

Further, we note the current service providers have submitted instances where explicit weight was given to the Black CAPM.[1102] However, the SLCAPM remains the primary model used by regulators.

Use in the foundation model

Our consultant, Partington, reviewed the service providers' initial and revised proposals and supporting documents relating to the Black CAPM.[1103] Partington did not find the material in the revised proposals would convince him to depart from the positions in McKenzie and Partington's 2014 report and Partington and Satchell's 2015 (April and May) reports.[1104] As discussed in the reasons for the final decision section, McKenzie and Partington indicated with respect to the Black CAPM:

- The model is not based on more realistic assumptions than the SLCAPM. The Black CAPM cannot be directly compared to the SLCAPM as they each involve very different investment strategies.[1105] As such, any attempt to compare the Black CAPM and SLCAPM must be done with great care.[1106]

[1098] 42 independent valuation reports dated between 27 April 2013 and 28 February 2015 contained a discounted cash flow analysis. None of these reports estimated the Black CAPM and zero reports referred to low beta bias. Only one non-Grant Samuel report included an uplift due to the risk free rate being low at the time.

[1099] SFG, *Beta and the Black CAPM*, February 2015, p. 23; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 48.

[1100] Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, p. 7.

[1101] Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, p. 8.

[1102] For example, Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 26–27.

[1103] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015; We engaged Partington and Satchell to review a number of new reports provided by service providers, including: Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015; Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015; SAPN, *Witness Statement: Ronald L. Knecht*, June 2015; NERA, *The Cost of Equity: Response to the AER's final decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015

[1104] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 11; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6. McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 20–25..

[1105] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 22–23.

[1106] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 16.

- While the model might be used for estimating the return on equity for the benchmark efficient entity, it can be very sensitive to implementation choices.[1107]
- They would not recommend using the service providers' estimates from the Black CAPM to inform the equity beta given the practical difficulties with implementing the model.[1108]
- The model (of itself) does not justify any uplift to the equity beta.[1109]

Handley also considered the Black CAPM in his reports.[1110] We consider his report also supported our decision to not use empirical estimates from the model. He noted with respect to the model:

- It is not widely used in practice. This is because the estimation of the zero beta rate, which can fall anywhere below the expected return on the market, is a non-trivial task.[1111]
- The Black CAPM and low beta bias are not equivalent concepts. As such, the empirical results of Black Scholes and Jenson (1972) and Fama and French (2004) are not direct tests of the Black CAPM.[1112]
- It is unclear that low beta bias is a priced risk not already captured by the SLCAPM.[1113] Handley later reiterated that our understanding of the low beta bias is still far from clear.[1114]
- NERA's results that the zero beta premium equals the MRP has an unsettling implication that, 'there is a minimum variance portfolio that has no exposure to the risk of the market but is still expected to yield the same return as the market portfolio.'[1115]

We agree with McKenzie and Partington that the Black CAPM (of itself) does not justify an uplift to the equity beta in the SLCAPM.[1116] However, we have had regard to it when exercising our regulatory judgment in selecting the equity beta. We consider the Black CAPM does demonstrate that market imperfections could cause the true

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1107 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 25; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 44–45.

1108 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 44.

1109 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 44.

1110 Handley, *Advice on return on equity,* 16 October 2014, pp. 9–12; Handley*, Report prepared for the AER: Further advice on the return on equity*, April 2015, pp. 5–6.

1111 Handley, *Advice on return on equity,* 16 October 2014, p. 12.

1112 Handley, *Advice on return on equity,* 16 October 2014, p. 10.

1113 Handley, *Advice on return on equity,* 16 October 2014, p. 11.

1114 Handley*, Report prepared for the AER: Further advice on the return on equity*, April 2015, p. 6.

1115 Handley, *Advice on return on equity,* 16 October 2014, p. 12. Handley does indicate the plausibility of this would depend on the variance of this portfolio and notes the minimum variance zero beta portfolio may bear unsystematic risk.

1116 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 44.

(unobservable) required return on equity to vary from the SLCAPM-based estimate. We consider this a relevant consideration in selecting the equity beta.

Our position as outlined above demonstrates why, in contrast to Gray and Hall's (Frontier) proposed approach,[1117] we do not estimate a zero-beta premium when considering the theory underpinning the Black CAPM in selecting equity beta.

Currently, based on all the evidence before us, we do not consider the available zero beta estimates sufficiently reliable:

- Partington and Satchell noted that, irrespective of the name and framework (the Black, Vasicek and Brennan versions of the CAPM), the major issue with zero beta CAPMs is determining the return of the zero beta portfolio.[1118] They noted Beaulieu, Dufour and Khalaf's conclusion that the estimate of the zero beta return is unstable and unreliable over time.[1119]
- Partington and Satchell also noted Shanken has cautioned using the method by Litzenburgern and Ramaswamy and Shanken (used by NERA) to estimate the zero-beta premium because such procedures can lead to unreliable estimates.[1120]

Gray and Hall (Frontier) submitted it is not possible to have proper regard to the Black CAPM without estimating it.[1121] We are satisfied with not using the Black CAPM to estimate the cost of equity at this time. The Black CAPM carries a number of issues which makes it unsuitable for estimating the cost of equity for the benchmark efficient entity.[1122] Further, Partington has recommended not using empirical estimates of the FFM and Black CAPM in the Australian context because many of the issue are 'virtually intractable and estimates, such as those of the zero beta return are so problematic and unreliable as to render them virtually worthless'.[1123]

- Gray and Hall (Frontier) has also characterised the proposed use of Black CAPM as making an explicit, transparent adjustment to the SLCAPM cost of equity, rather than an implicit ambiguous adjustment made by the experts, brokers and the AER.[1124] We do not agree with this view. We account for the Black CAPM because we recognise there is some merit to its theoretical basis. However, we propose to use the Black CAPM informatively given the instability and lack of use of the model, and expert advice indicating that the Black CAPM does not (of itself) justify a

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1117 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 7.

1118 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, pp. 25–26.

1119 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, pp. 19 & 26.

1120 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 26.

1121 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 7.

1122 AER, JGN final decision, Attachment 3–Rate of return, June 2015, pp. 74–78.

1123 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 18.

1124 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 63.

specific uplift.[1125] In particular, the theory of the Black CAPM is necessarily qualitative in nature.

- The current service providers have submitted that we have adjusted the equity beta for the Black CAPM in order to provide a correction for low beta bias. This is incorrect. We do not consider the current network service providers have shown that low beta bias exists on an ex ante basis and that it reflects a priced risk factor that would contribute to the allowed rate of return objective.
- However, we have considered the empirical evidence that the SLCAPM underestimates return on low beta stocks when examined using ex-post data. We consider the theoretical principles underpinning the Black CAPM demonstrate that there are market imperfections that could cause the true (unobservable) expected return on equity to vary from the SLCAPM estimate. It is important to note that all models with simplifying assumptions will likely be affected by market imperfections when they are applied in a practical setting. Because we cannot reliably estimate the Black CAPM, we do not use it to make a specific adjustment to beta.

Overall conclusions with respect to the Black CAPM

For the reasons discussed above, we do not consider empirical estimates from the Black CAPM are currently suitable for our regulatory task. These are unsuitable for:

- estimating the return on equity for the benchmark efficient entity
- performing a cross check on whether other models (including the SLCAPM) are producing reasonable estimates of the return on equity that will contribute to the achievement of the allowed rate of return objective.

We consider the theory behind the Black CAPM demonstrates that an uplift to the raw equity beta estimate may be appropriate due to potential concerns around market imperfections impacting on the SLCAPM. However, consistent with the advice from McKenzie and Partington, we now do not consider it justifies any given uplift (of itself).[1126]

See section 3.4.1 of this attachment for our assessment of the Black CAPM against our assessment criteria.

A.3.4 Dividend Growth Model

DGMs use forecast dividends of businesses to derive the return on equity by making the assumption that the present value of these dividends is equal to the business' market value of equity.

[1125] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 44.

[1126] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 44.

In the Guideline, we determined we would limit the use of DGMs (based on market wide dividend estimates) to informing the MRP in the SLCAPM.[1127] We also indicated we would not use a DGM to estimate the required return on equity on individual network businesses.[1128]

The key reasons in the Guideline for limiting the use of the DGM to estimating the MRP included:

- We considered a sufficiently robust data series existed for estimates of dividend yields for the Australian market. Whereas, we did not consider sufficiently robust data existed to form robust estimates of the required return on equity for Australian energy network service providers.[1129] We noted there were difficulties with constructing credible datasets for implementing industry specific DGMs.[1130] We also noted there were not enough Australian businesses to perform DGMs on individual businesses.[1131]
- We considered there were methods for estimating the growth rate of dividends for the Australian market. Whereas, we considered it was unclear if a sufficiently robust method for estimating the dividend growth rate for Australian energy networks had been developed. We noted this was particularly the case for estimating the long term dividend growth rate.[1132]
- We also considered that the sensitivity of DGMs to input assumptions would limit our ability to use a DGM as the foundation model. For example, estimates of simple DGMs (such as those previously proposed by CEG) have provided implausible estimates of the return on equity for the benchmark efficient entity.[1133] For example, in the Guideline we found that simple DGMs generated average returns on equity for energy infrastructure businesses over an extended period that significantly exceeded the average return on equity for the market. This did not make sense as the systematic risk of network businesses is less than the overall market.[1134]

The current service providers proposed using empirical estimates from the DGM to inform the overall return on equity.[1135] The majority of current service providers also

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1127 AER, *Rate of return guideline*, 17 December 2013, p. 13.

1128 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 14–17.

1129 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 15.

1130 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 77.

1131 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 119.

1132 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 15.

1133 For example, see CEG, *Internal consistency of the risk free rate and MRP in the CAPM*, 30 March 2012, p. 50.

1134 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 120–122.

1135 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 45–50; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 136–138; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 43–44; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331–333; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, pp. 117–120; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 221–224; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 229–232; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 96–97 & 101–103; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of* supported SFG's approach to estimating the return on equity for the benchmark efficient entity using a DGM. [1136]

Service providers then used their empirical estimates of the return on equity to do one or more of the following:[1137]

- To estimate their proposed return on equity as part of a multi model approach, or to inform input parameters into the SLCAPM.[1138]
- To provide evidentiary support that their estimate of the return on equity is reasonable and will contribute to the achievement of the allowed rate of return objective.[1139]
- To provide evidence that the foundation model approach as set out in the Guideline will not contribute to the achievement of the allowed rate of return objective.[1140]

Several of the current service providers criticised our position in the Guideline and our preliminary and April and June 2015 decisions to limit the role of the DGM to informing the MRP. These service providers considered the DGM should inform the overall return on equity and not be limited to informing the MRP.[1141] The majority of service

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Return, July 2015, p. 146–147; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 368; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 81–85.

1136 Service providers submitted several SFG reports on this DGM construction. For the most recent report, see SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, February 2015.

1137 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 45–50; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 136–138; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 43–44; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331–333; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, pp. 117–120; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 221–224; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 229–232; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 96–97 & 101–103; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146–147; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 368; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 81–85.

1138 ActewAGL, Energex, Ergon Energy, SAPN, United Energy, JGN, AusNet Services, AGN, APTNT, CitiPower, Powercor.

1139 ActewAGL, Energex, Ergon Energy, SAPN, United Energy, JGN, AusNet Services, AGN, APTNT, CitiPower, Powercor.

1140 ActewAGL, Energex, Ergon Energy, SAPN, United Energy, JGN, AusNet Services, AGN, APTNT, CitiPower, Powercor.

1141 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.02: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 45–50; APTNT, *Amadeus Gas Pipeline: Access Arrangement Revision Proposal*, August 2015, p. 136–138; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 43–44; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 331–333; United Energy, *2016 to 2020 Regulatory Proposal,* April 2015, pp. 117–120; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 221–224; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 229–232; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 96–97 & 101–103; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 146–147; SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 368; Jemena providers used an estimate by SFG of an industry wide return to estimate the equity beta and MRP for the SLCAPM.[1142]

We note much of the material provided by the current network service providers was considered in the preliminary and April and June 2015 decisions and reviewed by Partington in 2014 and 2015. In summary, Partington maintained the positions in his 2014 report.[1143] Having reviewed all this material, McKenzie and Partington supported our decision to not use the DGM to directly estimate the return on equity on the benchmark efficient entity. They also supported limiting the use of the DGM to informing the estimate of the MRP.[1144] However, they raised concerns around the reliability of DGM estimates.[1145] While we use the DGM to inform the estimate of the MRP, we also take these concerns into account (see appendix B—DGM and appendix C—MRP).

McKenzie and Partington also raised specific concerns about the simultaneous estimation approach applied by SFG for the service providers. They indicated that this application of a DGM could generate virtually any return on equity estimate through model specification choices.[1146]

Having had regard to the material before us, we remain of the view that DGM estimates at the firm level are too unreliable to use to estimate the return on equity. No material submitted since the Guideline has changed our view. We consider our consultants' reports support this view.[1147] In addition to the points above, we also note:

- SFG's approach does not entail directly estimating the return on equity for the benchmark efficient entity using the DGM. Rather, SFG applies its DGM to produce an MRP and a coefficient for energy networks' risk premiums relative to the MRP (an indirect equity beta estimate). We consider that, in doing so, SFG has overstated its DGM's ability to reliably estimate the return on equity for the benchmark efficient entity directly (see appendix B—DGM). After we made this point in our November 2014 draft decisions, SFG responded to this by defending

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Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal,* April 2015, p. 81–85.

1142 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014.

1143 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* October 2015, p. 15.

1144 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 39–40; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 58–59.

1145 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 26–36; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 46–56.

1146 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 34–36; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 53–56.

1147 Handley, *Advice on return on equity,* 16 October 2014, pp. 13–15; Handley, *Further advice on the return on equity*, 16 April 2015; Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 26–41; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 46–56; Partington & Satchell, *Report to the AER: return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

its approach of producing an indirect estimate of beta.[1148] Our point is not a criticism of SFG's indirect equity beta estimate per se — although we do not support it. Rather, our point is that SFG is effectively using its DGM to estimate the MRP to incorporate into a SLCAPM. Meanwhile, SFG criticised our approach of using the DGM to estimate the MRP, rather than to directly estimate the benchmark efficient entity's required return on equity.

- There are less analyst forecast-based estimates of the return on equity for network businesses than for all firms in the market.[1149] Therefore, we expect DGM estimates would be more reliable at the market level than the industry specific level (noting we do not consider them particularly reliable at the market level). After we made this point in our preliminary and April and June 2015 decisions, SFG responded to this with, 'we cannot compare the usefulness of one estimation technique to another just by counting data points'.[1150] We do not find this response satisfying, particularly given SFG has not submitted convincing reasons for its approach to estimating an indirect equity beta.
- The very high return on equity estimates from SFG's DGM model, equating to an equity beta of 0.94 in the SLCAPM, appear inconsistent with the results in Professor Olan Henry's 2014 report.[1151] These also appear inconsistent with the low risk nature of regulated natural monopolies.[1152] After we made this point in our preliminary decisions, SFG appears to have responded by criticising our conceptual analysis and our reliance on OLS to estimate the equity beta.[1153] We remain satisfied with our position in the preliminary and April and June 2015 decisions. The large volume of material we considered in appendix D—equity beta indicates that 0.94 is well above the range of reasonable estimates of the equity beta. SFG appears to criticise us by stating, 'the AER has only ever relied upon one measure of the risk of a benchmark energy network – the slope coefficient from a regression of stock returns on market returns'.[1154] However, under the SLCAPM, the relevant risk of an individual stock is its contribution to the risk of a

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[1148] SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, February 2015, p. 31 (para 173 point a). Also see SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 15–16.

[1149] There are only 99 analyst forecast-based estimates of the return on equity for network business between 1 June 2002 and 20 February 2014, whereas, there are 5,344 analyst forecast-based estimates of the return on equity for all firms in the market. See SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, pp. 49–50.

[1150] SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, February 2015, p. 31 (para 173 point b). Also see SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 15–16.

[1151] Henry found the majority of equity beta estimates for energy network service providers operating in Australia fell between 0.3 and 0.8. See Henry, *Estimating beta: an update*, April 2014, p. 63.

[1152] See Frontier Economics, *Assessing risk for regulated energy networks*, July 2013; McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

[1153] SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, February 2015, p. 32; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 15–16.

[1154] SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, February 2015, p. 32.

well-diversified portfolio — that is, market risk. This relevant risk is captured by the equity beta, which is the correlation between the stocks return with the return on the market.[1155]

In a short note for several service providers, Grant Samuel considered we did not give balanced regard to these two sources of information.[1156] We consider this final decision has appropriate regard to the relative strengths and limitations of the SLCAPM and the DGM. Given this, we highlight the following:

- This section of appendix A focuses on why we do not use DGMs to directly estimate the return on equity for the benchmark efficient entity. Therefore, it is more geared towards the limitations of DGMs. To understand how we use DGMs, this appendix should be read in conjunction with appendix B—DGM and our material on the MRP.
- While we acknowledge DGMs' limitations, we also acknowledge their strengths. For example, see section 3.4.1 of attachment three, appendix B—DGM and appendix C—MRP. Appendix B focuses on explaining how and why we construct and apply the DGM to inform our decision. In this appendix, we ask the question, 'given we are applying a DGM, how can we apply it well and what do we need to be careful of?' We also discuss limitations regarding the DGM's sensitivities in appendix B. However, we consider it helpful to have regard to these limitations in forming our decision. Similarly, Grant Samuel also acknowledged that DGMs have limitations in stating:[1157]

  > We accept the question of the long term dividend growth rate becomes the central issue and is subject to a much higher level of uncertainty (including potential bias from sources such as analysts) and we do not dispute the comments by Handley on page 3-61

- We are satisfied with our decision to use the DGM to inform our MRP estimate rather than the overall return on equity estimate. We consider this is based on sound reasoning, as set out in section B.5 of appendix B—DGM. Further, we consider it is evident that using the DGM at the MRP level had a real impact on our estimated return on equity, through influencing our decision to select a higher estimate of the MRP.
- Malko submitted that the wide acceptance of DGM or DCF in the US demonstrates that this model is sufficiently robust to be useful in economic regulatory decision making.[1158] However, we note Malko's admission that current corporate and academic practices are less supportive of the use of DGM method alone in estimate a rate of return and consider that other information should also inform the

[1155] Brigham, Daves, 'Intermediate financial management', 2010, Ed. 10, South-Western Cengage Learning, pp. 48–49.

[1156] Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 2.

[1157] Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 3.

[1158] Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, pp. 4–5.

decision'.[1159] We have considered the DGM in detail and its relevance for estimating the cost of equity as part of the Guideline process and in subsequent decisions.

Gray and Hall (Frontier) submitted that the DGM could have had stabilising effect on the allowed ROE via the MRP moving in the opposite direction as the government bond yield and that the AER's own DGM shows a strong offsetting relationship between the risk-free rate and the MRP. [1160] We do not agree with this view as it assumes a clear relationship between the 10 year forward looking risk free rate and the MRP (see section C.7 of appendix C—MRP).

Further, Gray and Hall's statements are effectively based on using the DGM to estimate the cost of equity and then making observations on movement in the risk free rate and MRP. For reasons outlined in section 3.4.1 and appendix B—DGM, we use our construction of the DGM (based on market wide dividend estimates) to informing the MRP in the SLCAPM.[1161] We do not use a DGM to estimate the required return on equity on individual network businesses.[1162]

McKenzie and Partington have supported our decision to not use the DGM to directly estimate the return on equity on the benchmark efficient entity. They also supported limiting the use of the DGM to informing the estimate of the MRP.[1163] However, they raised concerns around the reliability of DGM estimates.[1164]

Overall conclusions with respect to the DGM

For the reasons discussed above, we do not consider estimates of the benchmark efficient entity's return on equity from DGMs suitable for our regulatory task. This includes:

- Estimating the return on equity for the benchmark efficient entity, or
- Estimating a return on equity to assess the reasonableness of other return on equity estimates (including the return on equity estimate from our implementation of the SLCAPM).

We remain of the view that it is appropriate to use our construction of the DGM to inform the MRP. This is for the reasons discussed in section 3.4.1 of attachment three and appendix B—DGM. However, we note McKenzie and Partington's concerns

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1159 Malko Energy Consulting, *Statement of Dr J. Robert Malko*, June 2015, pp. 4–5.

1160 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 31–33.

1161 AER, *Rate of return guideline*, 17 December 2013, p. 13.

1162 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 14–17.

1163 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 39–40; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 58–59.

1164 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 26–36; Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 46–56.

around our DGM's outputs and have taken these concerns into account when using MRP estimates based on DGMs.

See appendix B—DGM and appendix C—MRP for further discussion on the use of the DGM for estimating the return on equity and around the application of the DGM to estimate the MRP. We provide an assessment of DGMs against our assessment criteria in the reasons for the final decision section. We also assess SFG's and our DGM against our assessment criteria in appendix B—DGM.

A.3.5 Wright specification of the SLCAPM

In its access arrangement proposal, APTNT estimated a 'Wright' specification of the SLCAPM (Wright CAPM) that resulted in an estimated return on equity of 8.47 per cent.[1165] APTNT used the prevailing risk free rate (4.14 per cent) and an equity beta of 0.58. However, the Wright CAPM assumes the return on the market is relatively constant through time. It therefore assumes a clear inverse relationship between movements in the risk free rate and MRP.

We do not agree with the form of the Wright CAPM, or the underlying premise of the model that there is a clear inverse relationship between movements in the risk free rate and MRP. We note the model is not widely accepted or used in practice.[1166] We consider capital (equity and debt) commands a risk premium over a base (risk free) rate and it is unclear why this risk premium would increase or decrease to entirely offset changes in the base risk free rate. While required returns on equity are not directly observable, we have not been provided with compelling evidence for a clear inverse relationship between the long term forward looking risk free rate and the long term forward looking MRP.[1167] Further, we do not consider the model adequately takes into account the prevailing conditions in the market for equity funds to the extent that movements in the MRP do not perfectly offset movements in the risk free rate.[1168]

In general, we are not satisfied that relying greatly on estimates under the Wright approach would contribute to the achievement of the allowed rate of return objective.

We do not consider empirical estimates from 'long term' or Wright specifications of the SLCAPM (that is, historically based versions of the SLCAPM) are currently suitable for our regulatory task. This includes:

- estimating the return on equity for the benchmark efficient entity

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[1165] APTNT, *Amadeus Gas Pipeline Access Arrangement Information Effective 1 July 2016 - 30 June 2021*, August 2015, p. 21.

[1166] The model's main use appears to be for regulatory purposes in the UK. See Wright, *Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER*, October 2012.

[1167] For a discussion, see AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 25–26. Also see CEPA, *AER: Victorian gas networks market evidence paper*, February 2013; McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and MRP*, February 2013; Lally, *Review of the AER's methodology*, March 2013.

[1168] The rules require that in estimating the return on equity, regard must be had to the prevailing conditions in the market for equity funds. See NER 6.5.2(g); 6A.6.2(g); NGR 87(7).

- estimating a return on equity for the purpose of assessing the reasonableness of other return on equity estimates (including the return on equity estimate from our implementation of the SLCAPM).

We have had regard to empirical estimates of the return on equity from Wright specifications of the SLCAPM put forward by the service providers and their consultants. However, we do not use empirical estimates of the return on equity from the 'long term' (historically based) specification of the SLCAPM. We do not consider these estimates will result in an estimate of the return on equity that will contribute to meeting the allowed rate of return objective. The Wright approach does not have a large role in informing the allowed return on equity.[1169] We do not consider that giving this information a large role would contribute to the achievement of the allowed rate of return objective. For our use of the Wright approach, see step four of our foundation model approach under section 3.4.1.

[1169] The Wright specification assumes the real expected return on the market is constant. We use the Wright approach to estimate a range (at a point in time). See AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 26–28.

B Dividend growth model

Dividend growth models (DGMs) use forecast dividends of businesses to derive the return on equity by making the assumption that the present value of these dividends is equal to the business' market value of equity.[1170] Consistent with the rate of return guideline (Guideline), we use DGMs to inform our estimate of the market risk premium (MRP).[1171]

There are many ways to construct a DGM. We consider our construction of the DGM has some value in informing the MRP. However, the practical implementation of DGMs has significant limitations which we consider limits their usefulness. We use our preferred construction of the DGM, which we consider balances simplicity and transparency with the ability to generate results that are estimated consistently over time,[1172] given the limitations of implementing the model. Moreover, we consider DGMs as a class are likely to overstate the return on equity and/or the MRP in the current market. This is because:

- analyst forecasts are well understood to be upward biased[1173]
- DGMs use dividends as a proxy for free cash flow to equity (see section B.5.1).

In this appendix we set out our preferred construction of the DGM and assess the more complex DGM SFG Consulting (SFG) proposed in various reports for several service providers.[1174] At the present time, SFG's DGM and our preferred construction of the

1170 For clarity, we use the term 'return on equity' in regards to market value. This is consistent with the rest of our decision, and the use of terminology in the rules. In its report on the DGM, SFG uses 'return on equity' in regards to book value and uses the term, 'cost of equity' with regards to market value.

1171 AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 84.

1172 In the Guideline we stated that ' For DGMs to be given greater consideration in the regulatory process, we consider that it is necessary to settle on a variant that can be consistently applied through time. A consistent approach through time will moderate some of the causes of variation.'. See: AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 85.

1173 McKenzie and Partington, *The DGM*, December 2013, pp. 8–9; McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 26, 31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46, 51; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6. Partington and Satchell's 2015 report is an update to McKenzie and Partington (2014) and Partington (2015), which considers submissions to JGN's access arrangement review. They noted there is nothing in those submissions that would lead them to depart from the findings in McKenzie and Partington (2014) and Partington (2015). Therefore, references to McKenzie and Partington (2014) or Partington (2015) also apply to Partington and Satchell (2015).

1174 SFG, *Alternative versions of the dividend discount model and the implied cost of equity: Report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, TasNetworks and TransGrid*, 15 May 2014 (SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014); SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, AusNet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015 (SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015).

DGM produce similar estimates of the MRP. This appears to be a coincidence, rather than a commonality in approach and/or agreement in DGM construction. DGMs are highly sensitive to the data, model specification, computations and assumptions employed. This appendix explains our concerns with the limitations of DGMs in general, and SFG's DGM in particular.

In this appendix we set out:

- Our preferred construction of the DGM.
- The reasons for our preferred construction of the DGM. This includes our reasons for not adopting the DGM SFG proposed in its reports for several service providers. This also includes an assessment of SFG's and our DGMs against the criteria set out in the Guideline.
- Our reasons for using DGMs to inform the MRP. We also provide reasons for not using DGMs to inform the overall return on equity for a benchmark efficient entity.
- Prevailing estimates of the MRP using our preferred construction of the DGM.
- Discussion of the limitations in our, and other, DGM estimates and some sensitivity analysis surrounding our prevailing estimates.

In our April/June 2015 final and preliminary decisions, we discussed our and SFG's DGM constructions, and responded to the service providers' views in detail.[1175] We do not consider the service providers have submitted new material to support their views in this area. Therefore, we maintain our views and reasoning from our April/June 2015 decisions. This reasoning is reproduced in the sections below.

Moreover, SFG has not updated its DGM since its February 2015 report, which uses data up to December 2014.[1176] In contrast, our updated DGM estimates for this decision use data over the two months ending August 2015.

B.1 Preferred construction of the dividend growth model

Our preferred construction of the DGM is consistent with that set out in the Guideline.[1177] The following equation depicts this DGM, which we apply to estimate *k*, the expected return on equity for the market portfolio:

1175 See, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, appendix B.

1176 See, for example, Frontier, *An updated estimate of the required return on equity: Report prepared for Ergon Energy*, July 2015, p. 5; Frontier, *An updated estimate of the required return on equity: Report prepared for Energex*, June 2015, p. 5; Frontier, *An updated estimate of the required return on equity: Report prepared for Australian Gas Networks*, June 2015, p. 5; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, May 2015, p. 3; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 38–41. However, Gray and Hall's (as SFG and/or Frontier) DGM estimate of the MRP has increased since February 2015. This is because they subtract an updated risk free rate from the unchanged DGM estimate of the market return.

$$P_c = \frac{m \times E(D_c)}{(1+k)^{m/2}} + \sum_{t=1}^{N} \frac{E(D_t)}{(1+k)^{m+t-0.5}} + \frac{\frac{E(D_N)(1+g)}{k-g}}{(1+k)^{m+N-0.5}}$$

Where: Pc is the current price of equity, for which we use the S&P/ASX 200 index as the proxy

E(Dc) is expected dividends per share for the current financial year[1178]

E(Dt) is expected dividends per share for the financial year t years after the current financial year

m is the fraction of the current financial year remaining, expressed as a decimal point

N is the time period after which dividend growth reverts to its long-term rate (for the two stage model, N = 2, for the three stage model N = 9)

g is the expected long term growth rate in nominal dividends per share. For this parameter, we use a range of 4.0 to 5.1 per cent, with a point estimate of 4.6 per cent.

We adopt two versions of a simple standard DGM:

- A two stage DGM, which assumes that dividends grow at the long term growth rate following the dividend forecast period.
- A three stage DGM, which assumes that dividend growth transitions linearly over eight years from the short term growth rate implied in the dividend forecast period to the long term growth rate.

Our DGMs also display the following characteristics:

- They use analysts' consensus forecasts for the overall market from the Bloomberg Professional Services (Bloomberg).
- They estimate the market return on equity monthly based on consensus dividend forecasts for the current and following two financial years.
- They estimate a long term growth rate in dividends per share (DPS). We determine this by adjusting the long term growth rate in gross domestic product (GDP) for the net creation of shares.

B.2 Reasons for the preferred construction

There are various high level reasons why we consider our preferred construction of the DGM is reasonable. For instance, we developed our preferred construction of the DGM in close consultation with stakeholders when developing the Guideline.[1179] We have

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1177 See: AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 114–125 for more information on our preferred DGM construction. Note that since publishing our Guideline we have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

1178 We sourced dividend forecasts from Bloomberg. We have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

1179 For example, see AER, *Explanatory statement to the draft rate of return guideline*, August 2013, pp. 219–225; AER, *Consultation paper: Rate of return guidelines*, May 2013, pp. 101–102.

considered a variety of submissions on our construction of the DGM,[1180] which have not persuaded us to depart.[1181] Further, experts have critically reviewed our construction of the DGM.[1182] We consider this advice suggests that, overall, our construction of the DGM is reasonable.[1183] We also have sound reasons for adopting the technical specifications of our preferred construction of the DGM. We discuss these reasons in the following paragraphs.

B.2.1 The long term dividend growth rate

We consider our estimated long term growth rate of nominal DPS[1184] of 4.6 per cent to be reasonable, if not 'somewhat on the generous side'.[1185] We derive this by:

- Starting with Dr Martin Lally's (Lally's) estimated long term expected growth rate in real GDP of 3.0 per cent. This recognises that it is implausible for dividends to grow faster than the economy in the long term (that is, in perpetuity). Otherwise, the stock market would outgrow the overall economy, which does not make sense.[1186] When producing this estimate, Lally had regard to the following:[1187]

  > In respect of the long-run expected GDP growth rate, the historical average over the period 1900-2000 is 3.3% (Bernstein and Arnott, 2003, Table 1), and the average over the 11 years since 2000 is 3.1% (The Treasury, 2012, Chart 2.2), yielding an average over the period 1900-2011 of 3.3%. Furthermore, Bernstein and Arnott provide average real GDP growth rates over 16 developed countries, and the average over this set of 16 countries is 2.8%, suggesting that even the figure of 3.3% is too high. Furthermore, the Australian Federal Treasury (The Treasury, 2012, Chart 2.2) has forecasted the Australian real GDP growth rate at 3% over the next four years. Taking account of all of this, an estimate for long-run expected real GDP for Australia should be about 3%.

- Applying deductions of 0.5, 1.0 and 1.5 per cent to the long term expected growth rate of real GDP to obtain the expected long term growth in real DPS. We apply

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[1180] Specifically, see SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013; SFG, *Reconciliation of dividend discount model estimate with those compiled by the AER*, 10 October 2013; SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015.

[1181] Note that since publishing our Guideline we have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

[1182] McKenzie and Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December 2013; Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013.

[1183] For example, McKenzie and Partington found our 'implementation of a two stage model is a reasonable, transparent and easily reproducible' and recommended consider a transition to long term growth (which we subsequently adopted). See McKenzie and Partington, *The DGM*, December 2013, p. 24.

[1184] Hereafter, we use long term dividend growth rate and long term growth rate of nominal dividends per share interchangeably.

[1185] McKenzie and Partington, *The DGM*, December 2013, p. 15. McKenzie and Partington find the average of the long term dividend growth rate estimates they consider is 3.73% (3.78% excluding the most extreme values).

[1186] Lally, *The dividend growth model*, 4 March 2013, p. 13.

[1187] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, p. 14.

these deductions because the expected long term growth in real GDP is higher than the expected long term growth in real DPS. This is because of the net creation of shares through new share issuance (net of buybacks) and the emergence of new companies.[1188] In determining what deductions to apply, Lally considered the following:[1189]

  - Bernstein and Arnott argued for subtracting 2.0 per cent. This is partly because real GDP growth over the last century grew about 2.0 per cent faster than real growth in DPS with per annum.[1190] However, Lally considered this comparison would exaggerate the relevant adjustment in the presence of a declining dividend payout rate.[1191]
  - Bernstein and Arnott argued to subtract 2.0 per cent. This is partly because market capitalisation grew about 2.0 per cent per annum faster than a capitalisation-weighted price index, using US data since 1925. However, Lally considered this comparison would exaggerate the relevant adjustment when market capitalisation grows simply due to listings from foreign firms and from previously unlisted US firms.
  - Given the points above, Lally considered the correct adjustment is less than 2.0 per cent.

- Nominalising growth, by assuming expected inflation is 2.5 per cent, given by the midpoint of the Reserve Bank of Australia's (RBA's) target range of 2.0 to 3.0 per cent.

Professor Michael McKenzie and Associate Professor Graham Partington (McKenzie and Partington) advised that if anything, the long term dividend growth rate we apply is somewhat on the generous side.[1192] They considered the average of long term dividend growth rate estimates should be 3.73 per cent—or 3.78 per cent, excluding the most extreme values.[1193] In contrast, we apply an estimate of 4.6 per cent.

In its 2014 and 2015 reports for several service providers, SFG disagreed with McKenzie and Partington's view that our long term dividend growth rate may be

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1188 Bernstein, Arnott, 'Earnings Growth: The Two Percent Dilution', *Financial Analysts Journal*, September/October 2003.

1189 Lally, *The dividend growth model*, 4 March 2013, p. 14.

1190 Bernstein, Arnott, 'Earnings Growth: The Two Percent Dilution', *Financial Analysts Journal*, September/October 2003, table 1.

1191 A declining dividend payout rate has been characterised in at least the US market. See Grinold, Kroner and Siegel, ‘A Supply Model of the Equity Premium’, *The Research Foundation of CFA Institute*, 2011, No. 4, Figure 1.

1192 Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 53; McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 34; McKenzie and Partington, *The DGM*, December 2013, p. 24.

1193 The extreme values include the Lally/Barra growth estimate of 0.31% and the CEG estimate of 6.5%. See McKenzie and Partington, *The DGM*, December 2013, p. 15.

generous.[1194] It considered there was a transposition error in the table of nominal long term dividend growth rate estimates McKenzie and Partington used to generate their recommended growth rate (that is, it considered they are actually meant to be real growth rates). SFG formed this view on the basis that it was unlikely to be the case that some of the nominal growth rate estimates would be as low as 0.13 to 1.54 per cent. McKenzie and Partington responded to this in their 2014 report, stating that the growth rates they use are nominal and should not be adjusted for inflation.[1195] Partington reiterated this view in his 2015 report.[1196]

In its 2014 report for several service providers, SFG questioned our view that the long term dividend growth rate could not exceed long term growth in GDP.[1197] We consider our view is reasonable for the following reasons:

- In the long term, aggregate dividends cannot grow at a rate greater than growth in the overall economy. Such an outcome would result in the stock market being larger than the overall economy in the long term. Such an outcome is not plausible as the stock market is a component of the overall economy. McKenzie and Partington supported this.[1198]
- We accept that the above point is a long term argument.[1199] However, in SFG's and our DGMs, the long term dividend growth rate applies to the longest period available, which extends to infinity. If we were to accept SFG’s proposition that the market will not revert to the long term growth rate for an extended period of time, we should account for this by modifying the length of the transition period rather than the long term growth rate.
- SFG noted our estimate of the market value return on equity is higher under our three stage DGM than under our two stage DGM.[1200] SFG submitted this is because listed firms empirically exhibit dividends and earnings growth above our long term growth estimate.[1201] We do not agree that this difference necessarily reflects that our long term dividend growth rate is too low. For instance, this difference could arise because analysts' forecasts are upwardly biased. This

[1194] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, pp. 42–43; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 13.

[1195] McKenzie and Partington, *Report to the AER: Part A, return on equity*, October 2014, pp. 33–34

[1196] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 53.

[1197] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 3.

[1198] McKenzie, Partington, *Report to the AER: The Dividend Growth Model (DGM)*, 14 December 2013, p. 13.

[1199] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 33.

[1200] SFG calls the market value return on equity, the 'cost of equity'. This is the concept we refer to throughout this decision as the 'return on equity'. However, SFG calls the book value return on equity, the 'return on equity'.

[1201] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 6.

upwards bias is widely accepted among researchers.[1202] McKenzie and Partington also noted this difference:[1203]

> also accords with the tendency we noted in McKenzie and Partington (2013b*), for the almost invariably optimistic assumption that whatever the current period happens to be, it is a period of dividend growth rates above the long run rate. While this is feasible for some periods, it is not possible for all periods.

In its 2015 report, SFG disagreed with our view that the long term dividend growth rate could not exceed long term growth in GDP once more.[1204] We do not agree with SFG. We consider it is reasonable to adopt a long term dividend growth rate that is lower than the expected long term growth in GDP for the reasons outlined above. Further:

- McKenzie and Partington noted that there are various assumptions one can make to derive an estimate of the long term dividend growth rate.[1205] For example, at times, the long term dividend growth rate has been set to the inflation rate, the interest rate, the GDP growth rate and the growth in GDP less a reduction to allow for future capital raisings. We consider our approach to estimating the long term dividend growth rate (detailed above) is reasonable. We do not base our estimate of the long term dividend growth rate on historical market returns.[1206]
- The long term dividend growth rate is a very long term concept. For example, both our three stage DGM and SFG's DGM assume that DPS grow at the long term growth rate from year 10 to infinity. In this framework, we consider it is implausible for the long term dividend growth rate to be higher than the expected long term GDP growth rate. However, SFG submitted that:
    - In Australia, earnings per share (EPS) grew faster than GDP in the recent period from 1990 to 2013, where there has been low inflation and high price–earnings ratios (P/E). It submitted that this is the relevant period for estimating the long term dividend growth rate.[1207]
    - If earnings grow at a higher rate than GDP, then mathematically, earnings would eventually exceed GDP. However, the most important period is the next 100 years or less. SFG submitted that the EPS of a large listed company could keep pace with GDP growth for 100 years because it is

1202 See: Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 46; McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 26; McKenzie and Partington, *The DGM*, December 2013, pp. 8–9.

1203 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 33; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 52.

1204 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 9–16.

1205 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 48; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 47.

1206 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 9–11.

1207 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 6, 12–13.

possible to observe listed companies exhibiting such EPS growth for decades. It also submitted that this is consistent with the recent decades of low inflation high P/E.[1208]

- We are not satisfied that observations of listed company earnings over a few recent decades implies that DPS (or EPS) across the market will keep pace with GDP growth in the long term (which extends to infinity in the DGM), or even 100 years, as SFG has suggested. In any given period, dividends can grow at rate higher or lower than the GDP growth rate. Negative growth is also possible.[1209] However, in the long term (that is, in steady state equilibrium), we do not consider such growth is sustainable. We consider Lally has regard to the long term nature of the dividend growth rate by estimating the long term expected real GDP growth rate with reference to the historical average from 1900 to 2011, as well as short term forecasts.[1210] In contrast, SFG based its views on GDP and earnings growth on relatively short time periods (for example, 1990 to 2013). If we were to use current information to estimate the long term dividend growth rate, we would note that GDP (in Australia) has remained below average over the past year,[1211] and the RBA, in its 4 August 2015 Monetary Policy decision, stated:[1212]

  > In Australia, the available information suggests that the economy has continued to grow. While the rate of growth has been somewhat below longer-term averages, it has been associated with somewhat stronger growth of employment and a steady rate of unemployment over the past year. Overall, the economy is likely to be operating with a degree of spare capacity for some time yet.

  In a speech given on 26 August 2015, Glenn Stevens (Governor of the RBA) also stated:[1213]

  > Growth is important. And for a while now, there has not been quite enough growth. There has been growth, and more than in many countries. But, recent labour market outcomes notwithstanding, not as much as we ought to be capable of. Growth rates have mostly started with a ‘2’ for a while now – despite the lowest interest rates in our lifetimes, banks able and willing to lend and measures of consumer and business confidence generally about average

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1208 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 6–7, 15–16.

1209 For example, McKenzie and Partington stated that 'Negative growth rates are more than a remote theoretical possibility. In a study of UK water utilities, Armitage (2012) finds that the utilities have been financing dividends and incurring debt, with the consequence that dividend cuts will be inevitable.'. See: McKenzie and Partington, pp. 28–29; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 48.

1210 Lally then applied deductions to this estimate to account for the net creation of shares and the emergence of new companies, which implies expected long term DPS growth is less than expected long term GDP growth. See: Bernstein, Arnott, 'Earnings Growth: The Two Percent Dilution', *Financial Analysts Journal*, September/October 2003.

1211 RBA, *Statement on Monetary Policy*, August 2015, p. 31.

1212 RBA, *Statement by Glenn Stevens, Governor: Monetary Policy Decision*, 4 August 2015.

1213 Glenn Stevens (RBA), *'Reform' and economic growth*, Speech, 26 August 2015.

(notwithstanding what we keep reading in the media). This may be simply a feature of the post-financial crisis world – the need for balance sheet repair. It may be about changing demographics. It may be that potential growth is a bit lower than we used to think – though I don't think we can know whether that is so at present.

- If SFG considers earnings can grow at a rate higher than GDP for an extended period of time, but will eventually revert to the long term GDP growth rate, then it should adjust the length of its transition period rather than the long term growth rate.
- In its 2015 report, SFG again submitted our estimate of the market value return on equity is higher under our three stage DGM than under our two stage DGM because dividend growth over the first two forecast years is above our long term growth estimate. We maintain our view that this difference does not necessarily reflect that our long term dividend growth rate is too low (see above for our reasoning).
- SFG also submitted that the expected long term GDP growth rate and dividend growth rate are estimates, not facts.[1214] We agree, but consider these growth rates must be estimated because they are not observable. We consider Lally has derived a reasonable estimate of the expected long term GDP growth rate. He used this to transparently derive a reasonable estimate of the long term dividend growth rate, based on the view that expected long term growth in real GDP is higher than the expected long term growth in real DPS.[1215] We note that SFG has not provided an alternative expected long term GDP growth rate estimate.

B.2.2 Standard dividend growth models versus endogenous growth models

It is common practice to estimate the long term dividend growth rate for the market outside of the DGM (standard DGMs).[1216] SFG submitted an alternative approach, which entails estimating the long term dividend growth rate within the DGM itself. We recognise there is no consensus on what is the most appropriate form of DGM.[1217]

[1214] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 6.

[1215] This is because of the net creation of shares through new share issuance (net of buybacks) and the emergence of new companies. See: Bernstein, Arnott, 'Earnings Growth: The Two Percent Dilution', *Financial Analysts Journal*, September/October 2003.

[1216] For example, Gordon and Gordon (1997); Claus and Thomas (2001); Gebhardt et al. (2001); Gode and Mohanram (2003); Fama and French (2002); Chen et al. (2004) and; Botosan and Plumlee (2005).

[1217] This is discussed in Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., pp. 560–639. This shows there are papers which support the standard version of the DGM: Gordon and Gordon (1997); Claus and Thomas (2001); Gebhardt et al. (2001); Gode and Mohanram (2003); Fama and French (2002); Chen et al. (2004) and; Botosan and Plumlee (2005). There are also papers that support jointly estimating the cost of equity and long terms growth rate endogenously: Easton (2004); Easton et al. (2002) and; Nekrasov and Ogneva (2011).

However, we consider our two stage and three stage DGMs, which are standard DGMs, are preferable to SFG's proposed DGM (which is a form of endogenous growth model) for the following reasons:

- Standard DGMs are more widely used in practice to determine the return on equity. For instance, in the United States, rate case regulators have used the standard DGM when estimating the return on equity.[1218] Further, many previous consultant reports from service providers have submitted that we should use a standard DGM.[1219] Since standard DGMs are more widely used, there is a better understanding of their limitations. Associate Professor John Handley (Handley) considered SFG's DGM and advised that it is a new model whose widespread use and acceptance has not been established.[1220]
- Standard DGMs are significantly less complicated than endogenous growth models. We consider there are significant costs associated with complexity. For instance:
    - More complex models are harder to replicate. As a result, these models are relatively opaque to stakeholders. McKenzie and Partington considered that due to the complexity of SFG's DGM, they doubted they could replicate SFG's results given the same dataset.[1221]
    - Complex models are more difficult to administer. For instance, our DGM is relatively mechanical to implement. We download the data from Bloomberg and apply it to a formula. On the other hand, SFG's DGM is considerably more complex to implement and requires substantially more computations to calculate the market value return on equity.[1222] For instance, estimating the MRP over 10.5 years using SFG's model (as at its 2014 report) appears to require more than 128 million individual computations.[1223]

[1218] Since the 1980s, the US Federal Energy Regulatory Commission (FERC) has used DGMs to estimate the return on equity. See FERC, *Policy statement: Composition of proxy groups for determining gas and oil pipeline return on equity*, 17 April 2008, pp. 2–3.

[1219] CEG, *Internal consistency of the risk free rate and MRP in the CAPM*, 30 March 2012, p. 50; NERA, P*revailing conditions and the market risk premium: A report for APA Group, Envestra, & AusNet*, March 2012, pp. 32, 38; Lally, *The dividend growth model, Victoria University of Wellington*, 4 March 2013, pp. 13–15; Lally, *The cost of capital under imputation, prepared for th*e ACCC, 2002, pp. 29–34.

[1220] Handley, *Advice on the return on equity*, 16 October 2014, p. 15. In his May 2015 report, Handley considered submissions to JGN's access arrangement review, and concluded that he does not consider it necessary to change any of the findings in his earlier report (Handley (2014)). See: Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28. Therefore, references to Handley (2014) (or Handley (April 2015)) also apply to Handley (May 2015).

[1221] McKenzie and Partington, *Report to the AER: The DGM*, 14 December 2013, p. 21.

[1222] SFG calls the market value return on equity, the 'cost of equity'. This is the concept we refer to throughout this decision as the 'return on equity'.

[1223] SFG's DGM, as at its 2014 report, considers 47,908 forecasts and 2,672 combinations. Multiplied this is 128,010,176. Under this approach, one would also average over 6 months per firm and average across the firms to get return on market. This approach also requires additional calculations to compute the most 'optimal' combination of factors.

- More complex models may make it harder for stakeholders to participate in the regulatory process. For instance, if we use a particularly complex DGM, stakeholders may not know the inner workings of the model. What drives the results could also become less clear to stakeholders. This may result in stakeholders being less able to contribute in the consultation process. We note the NER places an emphasis on service providers engaging with their customers.[1224]
- In the Guideline, we noted that less complex approaches can be preferred as stakeholders are more likely to understand them. Also, they are less prone to data mining and inappropriate correlation within the model.[1225]

We recognise more complicated models may sometimes be preferable. For example, this could occur if the increased complexity produced a more accurate estimate of the return on equity. However, we do not consider the increased complexity of SFG's DGM has been justified.[1226] This is consistent with our consultants' views. McKenzie and Partington advised that while SFG's DGM is interesting, it is unclear that it achieves any real improvement in the accuracy of the return on equity estimate.[1227] Specifically, McKenzie and Partington were unconvinced about the merits of SFG's DGM, and described it as 'an additional choice among many'. They considered that a reasonable requirement, before adopting SFG's DGM over well-established models, would be agreement on its credibility in the research literature and/or widespread use in practice.[1228] SFG's DGM does not satisfy either of these requirements.

In its 2015 report, SFG questioned our view that its endogenous DGM construction is more complex than standard DGMs, and that the increased complexity has not been justified.[1229] SFG submitted that performing many computations is not the same as performing complex computations. It also submitted that its analysis of more detailed information leads to more reliable DGM estimates. We disagree. We maintain our consideration that SFG's DGM (an endogenous growth model) is significantly more complicated than our (standard) DGMs, and that this increased complexity has not been justified. We detail our reasoning above.

Further, we consider some consultants have overstated the merits of endogenous growth models, by presenting them to be more scientific and less assumption-based

[1224] NER, cl. 6.8.2(c1)(2), 6A.10.1(g)(2). Similarly, 16(1)(b) of the NEL and 28(1)(b) of the NGL requires we inform stakeholders of material issues under consideration and give them a reasonable opportunity to make submissions.

[1225] AER, *Explanatory Statement Rate of Return Guideline*, December 2013, p. 28.

[1226] We note that SFG itself does not claim the return on equity estimates from its DGM construction are more accurate, it only claims they are more stable and reliable (see: SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 2, 48; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 7). We do not consider estimates that are more stable over time are necessarily more accurate.

[1227] McKenzie and Partington, *Report to the AER: The DGM*, December, 2013, p. 5.

[1228] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 27; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 47.

[1229] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 7, 24.

than they are in practice.[1230] McKenzie and Partington showed that under the endogenous growth model, for a given price/earnings ratio, one can obtain any return on equity estimate by judiciously choosing the reinvestment rate and return on equity. For example, one could obtain a 20 per cent market value return on equity by setting the book value return on equity to 30 per cent and the reinvestment rate to 56.7 per cent.[1231] We recognise this is an extreme example. SFG has attempted to filter out 'unrealistic' results by constraining the available choices and requiring its estimates to meet certain criteria. However, this approach is still subject to the following limitations:

- Despite the existence of filtering criteria, SFG's DGM has still produced unrealistic results. In particular, SFG's DGM produces a long term dividend growth rate that is greater than long term growth in GDP. This does not make sense. In the long term, if aggregate dividends outgrew the overall economy, the stock market would grow larger than the overall economy. McKenzie and Partington supported this view.[1232]
- SFG's approach alters the assumptions that are employed, it does not eliminate them. As McKenzie and Partington described:[1233]

> the result is that assumptions about the long term growth rate are replaced by assumptions about how the massive set of available choices should be filtered. Since the available set of choices is limitless, the exact result we get will also be determined by how coarse a grid we apply in initial selection of the choices that we allow to enter the filtering process.

- McKenzie and Partington showed we could apply reasonable alternative filtering criteria that could considerably change the results of SFG's DGM. For example, it is plausible to assume, at some future date, the market value return on equity will equal the book value return on equity.[1234] This is equivalent to assuming investments have a zero net present value. They described this as, 'an attractive assumption because it describes the natural outcome of competition'.[1235] McKenzie and Partington imposed this constraint on SFG’s estimates and price/earnings

[1230] For example, see SFG, The *required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon and Transend*, 27 May 2014, pp. 62–63 (SFG, The *required return on equity for regulated gas and electricity network businesses*, 27 May 2014); SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 63; NERA, *Return on capital of a regulated electricity network: Report for Ashurst*, May 2014, p. 105. Also see: SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015.

[1231] Note that in SFG's reports, it refers to the market value return on equity as the 'cost of equity' and the book value return on equity as the 'return on equity'. We use the market value return on equity to derive our implied MRP estimate.

[1232] McKenzie and Partington, *Report to the AER: The DGM*, 14 December 2013, p. 13

[1233] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 35; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 54.

[1234] McKenzie and Partington adopt SFG's terminology by calling the market value return on equity, the 'cost of equity' and the book value return on equity the 'return on equity'. We refer to the 'return on equity' as the market value.

[1235] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 26; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 46.

model and estimated a market value return on equity of 6.9 per cent.[1236] McKenzie and Partington found:[1237]

> This result gives a considerably lower cost of equity than SFG's estimate, but gives exactly the same PE ratio. The point is that with simultaneous estimation, what you get will depend on the assumptions that underlie your filters. We would argue that the assumption underlying our filter is at least as plausible as SFG's and provides a result that explains the PE ratio just as well.

We consider the above reasoning suggests that endogenous growth models such as SFG's DGM do not necessarily produce more accurate or reliable estimates than standard DGMs. We consider SFG's DGM alters where one has to make assumptions, it does not eliminate them. SFG has not responded to these views in its 2015 report.

In addition to not being satisfied with endogenous growth models in general, we are not satisfied with the particular DGM SFG has put before us. This is for the following reasons:

- The endogenous growth rate SFG uses gives an implausibly high long term dividend growth rate which is greater than the long term GDP growth rate, averaging at about 5.8 per cent.[1238] We consider the expected long term GDP growth should be an upper bound for the long term growth in aggregate dividends. Further, the upper bound for the growth in DPS should be even less. Lally has advised that this reflects the impact of new share issues (net of buybacks) and the formation of new companies.[1239]
- While SFG's DGM methodology has been published in a respected journal (Fitzgerald et al.), there are unexplained differences between Fitzgerald et al.'s and SFG's DGMs.[1240] We consider these differences contribute to the opaqueness of the SFG's DGM and should be explained. In our November 2014 draft decisions and April/June 2015 final and preliminary decisions for several service providers we set out these differences, which include:
    - Unlike Fitzgerald et al., SFG does not calibrate its market value return on equity estimates with reference to firm-specific variables likely to capture risk. We note Fitzgerald et al.'s justification for calibration is that some market value return on equity estimates can contain substantial estimation

1236 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 35; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 54–55.

1237 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 35; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 55.

1238 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 51. In the long term, aggregate dividends cannot grow at a rate greater than growth in the overall economy. Such an outcome would result in the stock market being bigger than the overall economy in the long term. Such an outcome is not plausible as the stock market is a component of the overall economy (see: McKenzie and Partington, *Report to the AER: The DGM*, 14 December 2013, p. 13).

1239 Lally, *Review of the AER's proposed Dividend Growth Model*, 16 December 2013.

1240 Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., pp. 560–639.

errors. This can arise from noise in the data or from the modelling framework not holding for that stock.[1241]

  - Fitzgerald et al. uses 3,012 combinations of market value return on equity, long term ROE and long term growth, while SFG uses 2,762 combinations. This is because the long term growth takes on a range of zero to 10 per cent in Fitzgerald et al., but only 1.0 to 10 per cent in SFG's paper.[1242]
  - Fitzgerald et al. uses a residual income model, while the SFG model is not.[1243]
  - Fitzgerald et al. holds the dividend payout ratio constant over year one to nine, while in the SFG's paper the payout changes over time.[1244]

- In its DGM, SFG imposed unexplained restrictions on the data. For instance, SFG assumed that growth in shares cannot be negative.[1245] This assumption seems unrealistic given share buybacks are widely used.

SFG has not explained the above differences between Fitzgerald et al.'s and SFG's DGM. It has also not explained its assumption that growth in shares cannot be negative.

B.2.3 Term structure of interest rates

Our preferred construction of the DGM assumes that the discount rate does not have a term structure. However, we recognise that a term structure is likely to exist, and this has the potential to materially change our return on equity estimates under the DGM. Specifically, since the risk free rate is relatively low in the current market, our construction of the DGM will likely produce upwardly biased estimates of the MRP.[1246]

Assuming no term structure means there is a single discount rate rather than a different discount rate for each future period. This means at any given point in time, the return on equity for the market is constant for all future periods in the DGM.[1247] While

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1241 Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., pp. 562, 578.

1242 SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013, p. 13; Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 572.

1243 Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 573.

1244 Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 575.

1245 SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013, p. 11.

1246 Lally, *The DGM*, 4 March 2013.

1247 This means, at a given point in time, there is a uniform expectation of the return on equity across all periods in the DGM. However, this uniform expectation can change as one moves through time, because factors such as dividend forecasts, share prices or the expected growth rate in GDP can change over time. Therefore, when estimating the return on equity for the market at any given point in time, our DGM assumes that this estimate applies to all future periods. However, this does not mean our DGM always produces the same return on equity estimates for the market.

this is a strong assumption, analysts commonly apply it to DGMs.[1248] We do not apply a term structure for the following reasons:

- It is not standard practice to apply a term structure to DGMs.[1249]
- Applying a term structure to a DGM will materially increase its complexity. For instance, we would need to undertake more analysis to determine how the return on equity changes over time. Further, we would also need to determine an additional parameter to implement the DGM. This is supported by McKenzie and Partington, who advised:[1250]

  > even if we knew that there was a term structure, we would have the problem of estimating the cost of equity that was to apply to the more distant cash flows. It is a difficult enough problem estimating one cost of equity, without complicating that problem by requiring estimation of another cost of equity to apply at the end of the growth transition period.

- McKenzie and Partington observed, 'the existence of an equity term structure remains an open question in the research literature'.[1251] SFG agreed with this view in its 2015 report.[1252]
- We consider it is unclear whether the return on equity in a DGM with a term structure will be any more accurate than a DGM with a flat term structure. For instance, even if we were certain of a term structure, estimating the return on equity for more distant cash flows would be very difficult. This leads McKenzie and Partington to agree with SFG in observing:[1253]

  > There is the risk that the regulated rate of return varies by substantial amounts over time because of estimation error, associated with whether a term structure exists and the assumption about the long term cost of equity.

[1248] Lally and CEG both agree analysts generally adopt a flat term structure for the market value return on equity. CEG, *Response to AER Vic Gas Draft Decision: Internal Consistency of MRP and Risk Free Rate*, 2012, pp. 37–41; Lally, *Review of the AER's proposed DGM*, 16 December 2013, p. 12.

[1249] See NERA, *Prevailing Conditions and the Market Risk Premium: Report for APA Group, Envestra, Multinet and SP AusNet*, March, 2012, p. 34; NERA, *The Market, Size and Value Premiums: A Report for the Energy Networks Association*, June 2013, p. 50. Further CEG notes that a flat term structure is generally adopted by analysts, and Lally concurs with this statement. See Lally, ***Review of the AER's proposed dividend growth model***, 16 December 2013, p. 12.

[1250] McKenzie and Partington call the market value return on equity, the 'cost of equity'. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 36; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 56.

[1251] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 36; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 56.

[1252] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 5–6.

[1253] McKenzie and Partington and SFG call the market value return on equity, the 'cost of equity'. SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 20; McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 37; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 56.

While we do not include a term structure in our DGMs, we have regard to the fact that a term structure is likely to exist. We recognise, due to its likely existence, our DGMs are likely to overestimate the MRP in relatively low interest rate environments (such as the current environment). Similarly, our DGMs are likely to underestimate the MRP in relatively high interest rate environments. We base this on the following factors:

- Lally advised we adopt a term structure within our DGM. He noted that a DGM with a constant term structure implies the 'forward' rates of the cost of equity for the market are all the same.[1254] This implies the sum of the current 10 year risk free rate and MRP equals the sum of the current expectations of their values in 10 years' time. Therefore: [1255]

  > if the current ten year risk free rate were unusually low relative to its long-term average, and therefore could be expected to be higher in ten years' time, then the current ten-year MRP would have to be unusually high relative to its long-term average by an exactly offsetting amount. This 'perfect-offset' hypothesis is implausible.

- Lally then used an example to illustrate the potential consequences of not including a term structure in a DGM. He concluded that:[1256]

  > This example demonstrates that, when the MRP and the risk free rate are negatively correlated but the changes are less than perfectly offsetting, the DGM with an assumed constant market cost of equity will overestimate the MRP when the risk free rate is unusually low (as is presently the case) and the overestimation may be very significant.

- McKenzie and Partington, 'recommend that it be borne in mind that the existence of a term structure could materially change cost of equity estimates from the DGM'.[1257]

B.2.4 Two and three stage models

We use two and three stage DGMs to inform our estimate of the MRP.

We use a three stage model because we consider the three stage model more plausible. This is because we expect it to take some time for the short term growth in dividends to transition to the long term growth.

In addition to the three stage model, we also consider a two stage model for the following reasons:

[1254] Lally calls the market value return on equity, the 'cost of equity'. Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, p. 11.

[1255] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

[1256] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

[1257] McKenzie and Partington call the market value return on equity, the 'cost of equity'. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 37; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 56.

- We retain the two stage model as a check on the three stage model given the limitation of how we calculate short term growth in the three stage model. Under the three stage model, we calculate shorter term growth as the geometric average growth of dividends between the financial year currently and two years in the future. If the growth in dividends in the two years is abnormally high (low), either due to low (high) dividends in year zero or high (low) dividends in year two, this will cause the initial short term growth in the two stage model to be abnormally high (low). This in turn causes the growth in all years of transition to be abnormally high (low). As a result, given the way the short term growth rate is calculated, the two stage model should be used as a cross check. Alternatively, if we were to only use a three stage model, we would also develop different methods for calculating the short term growth for dividends.
- A three stage model may be conceptually better than a two stage model. However, its relative accuracy depends on how closely the model's pattern of transition reflects reality. While our model uses a linear transition, this may not necessarily reflect reality. For instance, McKenzie and Partington advised:[1258]

> Clearly, if growth rates are expected to be negative during the transition phase, then assuming that they are positive and steadily declining to the long term rate is likely to give a worse result than the two stage model. The point is that the expected transition might not be a steady linear adjustment, but could for example, be U shaped or inverted U shaped, V shaped, or might involve exponential decay.

- The relative accuracy of a three stage model also depends on how closely our estimated length of transition reflects reality. We estimate an eight year transition period. However, there is no consensus among experts on this. For instance, SFG adopted an eight year transition.[1259] However, McKenzie and Partington recommended a transition of three to five years based on the length of business cycles.[1260] SFG submitted that business cycle data does not indicate how long it would take for a high growth firm to revert to a normal growth firm. McKenzie and Partington accepted this submission, but noted that the objective, 'is not to estimate the growth rate for a specific high growth firm, but rather to estimate the market growth rate in order to get the market cost of equity'.[1261]

[1258] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 52.

[1259] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 6; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 5.

[1260] Evidence from Pagan (1998) provides an average expansionary phase of approximately three years for the Australian stock market. See McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 52. Also see Pagan, A.R. 1998, 'Bulls and bears: a tale of two states', Walras-Bowley Lecture, Montreal.

[1261] McKenzie and Partington call the market value return on equity, the 'cost of equity'. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 33; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 52.

- We recognise the possibility that the transition is less than our estimated eight years. Therefore, having regard to a two stage model (with no transition) allows us to consider our model's sensitivity to this.

In its 2015 report, SFG submitted that we should not consider estimates from our two stage model. It considered using our two stage model as a 'cross check' has no basis. That was because, according to SFG, market value return on equity estimates from the two stage model are always lower than those from the three stage model.[1262] SFG also considered that we provide no indication of what this cross check means.[1263] We disagree. We consider it is useful to consider estimates from the two stage model as well as the three stage model, for the reasons described above. We also provide our reasoning above for why and how we use the two stage model as a check on the three stage model.

B.2.5 Consensus dividend forecasts

We use overall market consensus dividend forecasts in our preferred construction of the DGM. This entails obtaining the daily consensus dividend forecasts for the ASX 200 index. We average these forecasts on a monthly basis and apply them directly to the DGM to determine the MRP.

On the other hand, in its 2014 report, SFG proposed an approach that entails initially estimating the market value return on equity using individual analyst forecasts.[1264] Using individual analyst forecasts (of dividends) allows them to be matched with the price observed close to the same date. However, it significantly increases the complexity of SFG's DGM construction. We do not accept SFG's approach. In short, we consider the potential benefits from this approach are very limited, given its increased complexity (see section B.2.2 for a discussion on the costs of complexity).

We consider SFG's approach adds a significant amount of complexity to the DGM because it entails going through the following steps:

a. Apply the DGM to determine the implied market value return on equity for a given analyst report on a given business at a given point in time. Repeat this for each analyst forecast.

b. Aggregate all the analysts’ market value return on equity estimates over a six month interval on a given business to determine the market value return on

[1262] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 16. SFG calls the market value return on equity, the 'cost of equity'. This is the concept we refer to throughout this decision as the 'return on equity'.

[1263] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 5.

[1264] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 8. SFG calls the market value return on equity, the 'cost of equity'. This is the concept we refer to throughout this decision as the 'return on equity'.

equity for that business over a six month interval. Repeat this for each business.

c. Estimate a half yearly market value return on equity for the market portfolio by taking the weighted average of the individual businesses market value return on equity over a six month interval.

d. Determine a MRP for a six month interval by subtracting the prevailing risk free rate.

We do not consider this high level of complexity is justified. In particular:

- Benefits from time matching individual analyst forecasts (of dividends) to price data are questionable. This is because SFG averages over the individual analysts' (and individual businesses') market value return on equity estimates to determine a half yearly market value return on equity estimate. This averaging process may eliminate much of the benefit from matching individual analyst forecasts with price data.
- Both approaches appear to produce similar estimates of the market value return on equity, on average.[1265] SFG has also observed this.[1266] We question the benefit of estimating the return on equity over 128 million times when we can obtain, on average, a similar result by estimating the return on equity once monthly using consensus forecasts.[1267]
- While SFG has found its approach decreases dispersion in market value return on equity estimates:[1268]
    - Dispersion is not necessarily problematic—particularly to the extent that the actual return on equity may be volatile.
    - SFG's estimates will be less volatile than our monthly estimates because SFG averages its individual market value return on equity estimates to determine semi-annual estimates (we use two-monthly estimates).[1269]
    - McKenzie and Partington have observed that, expressed as a percentage of the mean return on equity, the reduction in volatility under SFG's approach is about a quarter of one per cent (0.26 per cent). In their view, treating this difference as material would be attaching more precision to DGM estimates than warranted.[1270]
- McKenzie and Partington have observed that analysts make sluggish adjustments to the information in prices. For this reason, matching the dates of analysts'

[1265] By 'both approaches' we mean SFG's model with consensus forecast and SFG's model with individual analyst forecasts.

[1266] SFG, *Dividend discount model estimate of the cost of equity*, 19 June 2013, p. 10.

[1267] We use daily data, which we average across the month before applying it to our DGM.

[1268] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 8.

[1269] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 50.

[1270] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51.

forecasts and prices will not necessarily match the information in the analysts' forecast and prices. Matching information sets would require using lagged prices. However, the appropriate lag is unknown. Even if we knew the appropriate lag, it could vary across analysts and time.[1271]

- Further, we consider that SFG's approach is more likely to contain out-dated forecasts than our approach. Under consensus forecasts, dividends for a given firm are the simple average of each analyst's latest forecast. Consequently, as an analyst updates their forecast, their old forecast drops out of the consensus. While an analyst may have produced its latest forecast many months earlier, this does not mean it is necessarily out-dated. That is, just because share prices change on a continuous basis does not mean analyst dividends forecasts change—share prices could change for a range of reasons. However, under SFG's approach, it averages all forecasts over six months. This includes out-dated forecasts and gives greater weight to analysts that revise their forecasts more frequently.[1272] SFG has not provided reasons for doing this. Further, this approach is not consistent with Fitzgerald et al., which states, 'in the event that the analyst has issued multiple earnings and target prices within a half-year, we use the analyst's most recent set of forecasts'.[1273]

In its 2015 report, SFG changed its approach to average all forecasts over two months instead of six.[1274] SFG submitted that this change was in response to our view that SFG's six month averaging process is likely to include outdated analyst forecasts. We consider SFG's new approach may mitigate the problem of outdated analyst forecasts in its market value return on equity estimates to some extent. However, this does not rule out the possibility that one analyst may make more than one forecast in a given two month averaging period. In this case, SFG's approach will still give greater weight to analysts that revise their forecasts more frequently. SFG has not explained why this is preferable to giving analysts equal weight. We also maintain most of our other views set out above, and maintain our consideration that the high level of computational intensity from using individual analyst forecasts is not justified. For example, we consider:

- The benefit of using individual analyst forecasts is still questionable because SFG averages over its individual market value return on equity estimates to determine a two-monthly market value return on equity estimate.

1271 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51.

1272 If an analyst covering a firm revises its forecast over the six month period, SFG's estimate would incorporate both the old and revised forecast. See SFG, *Dividend discount model estimate of the cost of equity*, 19 June 2013, p. 10.

1273 Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 581.

1274 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 22.

- Both approaches appear to produce similar estimates of the market value return on equity, on average.[1275] Even at this time, the latest estimate of the MRP from SFG's DGM is 8.0 per cent (for the two months to end–December 2014) when using our preferred imputation adjustment.[1276] This is similar to our three stage DGM estimate of the MRP of 8.2 per cent for the two months to end–August 2015.
- Dispersion is not necessarily problematic—particularly to the extent that the actual return on equity is volatile. SFG submitted that this view is inconsistent with regulatory precedent, because we have always estimated the MRP at 6.0 or 6.5 per cent.[1277] However, we do not use our DGM to estimate the MRP in isolation. We consider a range of information sources, placing most reliance on historical excess returns. We recognise that the return on equity for the market (and the MRP) can change over time. We consider our DGM estimates can more readily reflect changes in market conditions (and the MRP) than historical excess returns estimates, but may not track these changes accurately (see step two of section 3.4.1). While SFG's DGM estimates may exhibit less dispersion, we are not satisfied that this implies they track changes in market conditions (and the MRP) more accurately.
- McKenzie and Partington have observed that analysts make sluggish adjustments to the information in prices. For this reason, matching the dates of individual analysts' forecasts and prices will not necessarily match the information in the individual analysts' forecast and prices.[1278] SFG submitted that an observation only enters its dataset if the price target is released within a 28 day window of the analyst earnings forecast.[1279] SFG considered that this allows it to estimate the market value return on equity that is inferred from an analyst's forecast of earnings made with the same information as the analyst's estimate of a fair share price. However, we consider market prices should be used in DGMs, not analyst's target prices (see section B.2.6). Therefore, we continue to consider that matching individual analyst forecasts to prices would require using lagged prices. However, the appropriate lag is unknown, and even if we knew the appropriate lag, it could

[1275] By 'both approaches' we mean SFG's model with consensus forecast and SFG's model with individual analyst forecasts.

[1276] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 39. We consider this to be the latest MRP estimate from SFG's DGM because SFG has not updated its DGM since December 2014. Therefore, we took the return on the market estimate for the two months end–December 2014 (10.96 per cent, the most recent estimate from SFG's February 2015 report, p. 39), and subtracted the risk free rate estimate over the same time period (2.98 per cent). SFG, in its recent reports, presents different MRP estimates from its DGM because it subtracts more recent risk free rate estimates from its December 2014 DGM estimate of the market return.

[1277] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 27.

[1278] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51.

[1279] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 23–24.

vary across analysts and time.[1280] Additionally, SFG noted that, on average, market value return on equity estimates based upon time matched analyst forecasts and prices are about the same as market value return on equity estimates based upon consensus forecasts.[1281] However, it also submitted that these estimates are not the same throughout the entire time period as using consensus forecasts (and not time matching dividends and prices) increases the dispersion of estimates. As explained above, we consider dispersion is not necessarily problematic, and are not satisfied that matching the dates of analysts' forecasts and market prices will result in more accurate return on equity estimates.

B.2.6 Market prices

We consider market prices should be used in DGMs. DGMs are discounted cash flow models based on the assumption that the current price of a share is equal to the discounted value of all expected future dividends. According to DGMs, an investor should be indifferent between receiving the market price of the share today and receiving the expected dividend of the share over the life of the asset. Both SFG's and our DGMs are instances of the following equation:

$$P_0 = \frac{E(D_1)}{(1+k)^1} + \frac{E(D_2)}{(1+k)^2} + \frac{E(D_3)}{(1+k)^3} + \frac{E(D_4)}{(1+k)^4} + \cdots$$

In its 2014 and 2015 reports, SFG submitted that we should use target prices in this equation.[1282] These are the stock prices that an analyst expects to arise over the next 12 months. However, we consider that market prices should be used instead. This is for the following reasons:

- It is standard practice to use market prices in DGMs.[1283]
- If we use target prices in our DGM, the return on equity estimate will reflect analysts' views rather than the market's view on the return on equity.[1284] McKenzie and Partington found this would be appropriate if the objective was to discover analysts' implicit discount rates. They noted this would be, 'rather like an implied

1280 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51.

1281 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 27.

1282 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, pp. 7–12; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 22–23.

1283 Although SFG proposes using target prices, it recognises it is more common to use market prices, particularly when consensus dividend forecasts are used (which is what we use in our preferred DGM construction). See SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 8.

1284 SFG disagreed with this view in its 2014 report. It submitted that regardless of whether we use the market price or the target price, we are still making an estimate of the market-implied cost of equity (SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 9).

opinion survey of analysts'.[1285] However, McKenzie and Partington observed the objective is to obtain the market's implied return on equity.[1286]

- McKenzie and Partington advised that using target prices to infer analysts' discount rates could be problematic. This is because some analysts do not use DGMs to form their target prices. For instance, some would use price earnings multiples applied to forecast earnings, and some would use other methods.[1287]
- Under a DGM, an investor should be indifferent between receiving the market price of the share today and receiving the expected dividends of a share over the life of the asset. However, the target price of a share is not a current share price forecast. Instead the target price reflects an analyst's view of what the share price might be over the next 12 months. That is, the target price represents the analysts' expectation of the share price.[1288] Regardless of SFG's assumptions, investors do not have a choice of receiving the target price today or receiving the stream of dividends over the life of the asset. As a result, the indifference equality relationship in the general DGM equation does not hold if target prices are used.

In its 2014 and 2015 reports, SFG submitted there is value in using target prices rather than market prices.[1289] It noted that analysts' earnings and dividend forecasts could reflect a degree of optimism or pessimism. The analyst's price target also, presumably, reflected this sentiment. SFG has also noted there are studies which report that analyst earnings expectations are optimistic.[1290] SFG considered that by using target prices, this could offset bias in analyst dividend forecasts.[1291] We do not agree with this view for the following reasons:

- If analysts' dividend and price forecasts are biased, it is also plausible that the analysts' implied return on equity is biased. In turn, this raises concerns about SFG's methodology of reverse engineering analysts' estimates of the market value return on equity.[1292] The return equity estimate may have a bias similar to the dividend and price forecasts.
- If there is a bias in analyst forecasts, one possible approach would be to adjust for the bias in the analyst dividend forecasts. Under such an approach, the return on

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1285 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 50.

1286 McKenzie and Partington, *Report to the AER: The DGM*, December 2013.

1287 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 50.

1288 Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 570.

1289 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, pp. 11–12; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 22–23.

1290 SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013, p. 10.

1291 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 22–23.

1292 SFG calls the market value return on equity, the 'cost of equity'. This is the concept we refer to throughout this decision as the 'return on equity'.

equity estimate from the DGM would be unbiased and would accurately reflect the market's views of the return on equity. However, we consider such an adjustment is likely to be complex and there is no accepted method to do so. For this reason, we do not apply an adjustment. However, to the extent there is an upwards bias in the dividend forecasts, this could bias the return on equity estimate from our DGM upwards. McKenzie and Partington considered analysts' forecasts are upward biased.[1293] Therefore, we consider stakeholders should view our DGM estimate of the MRP as an upper bound.

SFG did not respond to the above views in its 2015 report. Instead it stated that:[1294]

> the AER has never performed a computation using analyst forecasts, price targets, or share prices, to illustrate the potential bias, or made any other attempt to estimate the cost of capital in a manner that accounts for potential bias.

We explain why we do not adjust for the bias in analyst dividend forecasts above. Also, McKenzie and Partington have written that 'a well-established literature finds clear evidence that analysts' forecasts are overly optimistic with respect to target prices, earnings and dividends'.[1295]

B.2.7 Assessment of dividend growth models against our criteria

In the Guideline, we set out the criteria for assessing the merits of the various sources of information in setting the allowed rate of return. We noted decisions are more likely to meet the allowed rate of return objective if they use estimation methods, financial models, market data and other evidence that meet these criteria.[1296]

Several service providers proposed SFG's construction of the DGM. We have assessed SFG's and our construction of the DGM against the criteria set out in the Guideline.[1297] Table 3-40 shows our construction of the DGM has less limitations than SFG's construction.

1293 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26, 30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 46; McKenzie and Partington, *Report to the AER: The DGM*, December 2013, pp. 8–9.

1294 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 23.

1295 McKenzie and Partington, *Report to the AER: The DGM*, December 2013, p. 4.

1296 AER, *Rate of return guideline*, 17 December 2013, p. 6.

1297 SA Power Networks, Ergon Energy, Energex, United Energy, AusNet Services, Jemena Electricity Networks, CitiPower, Powercor, AGN, ActewAGL and APTNT (Amadeus gas pipeline) submitted we consider SFG's DGM set out in: SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014; SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013; and/or SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, section 5.

Table 3-40 Assessing dividend growth models against criteria

Criteria	DGMs in general	AER's construction	SFG's construction
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data	DGMs are based on the finance principle that markets are efficient and the present value of a share reflects the discounted value of its expected future dividends.	Exogenously estimates long term growth in DPS, which is common practice when applying DGMs. We estimate this input on expected long term growth in real GDP, adjusted for new share issuance (net of buybacks) and the emergence of new companies. This recognises it is implausible for dividends to grow larger than the economy in perpetuity.[1298]	Endogenously estimates the dividend growth rate, which has some academic support but is not common practice. While a well-respected journal has published a similar approach to SFG, there are unexplained differences in SFG's DGM.[1299] Its results do not make sense as they suggest dividends outgrow the economy in perpetuity.
Fit for purpose. That is, use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that	While DGMs are used to price shares, they can also estimate the return on equity. While DGMs are used in the Australian context, their use appears limited compared to the SLCAPM.[1300]	Fit for purpose. The AER constructed this DGM for the purpose of informing regulatory decisions. It is also simple to implement.	Fit for purpose if it uses market prices instead of target prices. Otherwise, estimates will reflect analysts' views rather than the market's view on the return on equity. SFG's DGM is unusually complex—its approach to

1298 Lally, *The dividend growth model*, 4 March 2013, p. 13.

1299 Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., pp. 560–639.

1300 DGMs do not appear widely used in the regulatory context. We note that while IPART uses DGMs to inform its estimate of the MRP, it considers this along with additional information like historical excess returns. See IPART, *Review of WACC methodology: Research final report*, 9 December 2013, p. 2. Regarding market practitioners, we considered 32 independent valuation reports dated between 27 April 2013 and 31 July 2014 that contained a discounted cash flow analysis. All but four of these reports used a model other than the SLCAPM (the DGM) to estimate the return on equity. Three of these four reports only used the DGM as a cross-check on an initial SLCAPM estimate. The remaining report used the DGM to directly estimate the value of the proposed transaction). See: DMR Corporate, *Re: Independent Expert's Report*, Report prepared for ILH Group Ltd, 23 July 2013, Grant Samuel & Associates Ltd:, *Financial Services Guide and Independent Expert's Report in relation to the proposal by Murray & Roberts Holdings Ltd*, 11 October 2013; *Financial Services Guide and Independent Expert's Report in*

Criteria	DGMs in general	AER's construction	SFG's construction
purpose. Also, promote simple over complex approaches where appropriate	DGMs can be simple or complex, depending on how they are constructed.		estimating the MRP over 10.5 years requires over 128 million computations.
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets	DGMs rely on market data. Therefore, if the methodology is transparent, it is possible to replicate results.	We are transparent about our DGM. Its simplicity enables stakeholders to apply it in a replicable manner.	While SFG is transparent about its DGM, it is so complex that we consider most stakeholders would have significant difficulties in replicating the results.[1301]
Where models of the return on equity and debt are used these are based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation. These are also based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.	DGMs are highly sensitive to assumptions.[1302] This includes assumptions about the long term dividend growth rate and the length of transition to long term growth. Results are also sensitive to errors in analyst forecasts. McKenzie and Partington consider DGMs can produce upward biased estimates.[1303]	Highly sensitive to our assumption on the long term DPS growth rate. However, we are transparent about how we derive this assumption. Our results are also sensitive to errors in analyst forecasts. McKenzie and Partington consider our DGM is likely to produce upward biased estimates.[1304]	Estimates long term DPS growth endogenously using market data. However, for a given price/earnings ratio, this can produce any estimate based on assumptions on the reinvestment rate and return on equity. While this model filters nonsensical results by requiring estimates to meet certain criteria, these criteria are quite broad.[1305] For instance, it allows

relation to the proposal to internalise management, 7 February 2014; *Financial Services Guide and Independent Expert's Report to the Independent Board Sub-Committee in relation to the proposal by APA Group*, 4 March 2014.

1301 Professor Michael McKenzie and Associate Professor Graham Partington have advised that due to its complexity, they are doubtful that they could exactly reproduce SFG's results given the same data set. See: McKenzie and Partington, *Report to the AER: The DGM*, 14 December 2013, p. 21.

1302 McKenzie and Partington, *Equity market risk premium*, December 2011, p. 25; AER, Final decision: APA GasNet, March 2013, p. 101.

1303 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26, 28–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50.

1304 They consider this is due to factors such as optimistic analyst dividend forecasts, stickiness with dividends and the practice of financing dividends. They also consider our estimate of the long term dividend growth rate is 'on the

Criteria	DGMs in general	AER's construction	SFG's construction
			10% long term DPS growth, although this is implausible. SFG filters data by assuming growth in shares cannot be negative.[1306] It also assumes price/earnings ratios cannot be negative.[1307] SFG's results are also sensitive to errors in analyst forecasts.
Where market data and other information is used, this information is credible and verifiable, comparable and timely and clearly sourced	Uses market data that are timely, well sourced and verifiable. However, evidence suggests analyst forecasts are sluggish and overly optimistic.[1308]	Market data are well sourced and verifiable. Consensus forecasts may contain analyst forecasts produced months earlier, but these may not be out-dated.	Market data are well sourced and verifiable. In 2014, SFG used analyst forecasts over 6 months. In 2015, SFG used analyst forecasts over 2 months. When analysts revise their forecasts, it includes the out-dated forecasts as well.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as	Theoretically, readily reflects changes in the market data as it reflects changes in dividend forecasts	Averages estimates over 2 months. If the DGM produces accurate estimates, these will reflect changing market	In 2014, SFG averaged estimates over 6 months. All else equal, averages estimates over 2 months. All else

high side'. See: McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26, 28–30, 34; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50, 54, 59.

1305 Criteria include: Long term DPS growth between 1–10%, market value return on equity between 4–20%, long term book value return on equity 3–30%. Combinations of parameters must lead to an intrinsic price within 1% of the analyst target price. Picks the combination where year 10 DPS growth best matches long term DPS growth.

1306 This causes SFG to remove 20% of its data. We consider this unrealistic because share buybacks are widely used.

1307 We consider this unrealistic because firms may have negative earnings at any given point in time. Also, Fitzgerald et al. does not make this assumption.

1308 McKenzie and Partington, *The DGM*, December 2013, pp. 8–9; McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26, 31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46, 51.

Criteria	DGMs in general	AER's construction	SFG's construction
appropriate.	and share prices. However, in practice, may not track these changes accurately.[1309] DGMs can generate volatile and conflicting results.[1310]	conditions.	equal, this will capture changing market conditions less than the AER's DGM. However, averaging over 6 months could improve estimates by reducing noise. In 2015, SFG averaged estimates over 2 months, similar to the AER's DGM. However, averaging over 2 months increases noise and may introduce error because there will be less analyst forecasts to average over in a given 2 month period.

Source: AER analysis.

B.3 Reasons for estimating the market risk premium

We employ our construction of the DGM to inform our estimate of the MRP.[1311] This is consistent with the Guideline, where we considered DGM estimates of the MRP as a useful source of evidence.[1312] In the Guideline, we expressed we would employ the DGM to inform the MRP because we considered data from DGMs were sufficiently robust for this purpose. However, while DGMs are theoretically sound, there are many limitations associated with their practical implementation. In the Guideline (and our April/June 2015 final and preliminary decisions), we gave the following key reasons for limiting the use of the DGM to estimating the MRP:

- A sufficiently robust data series exists for dividend yields in the Australian market. Whereas, there are insufficient data to form robust estimates of the required return

[1309] This is due to factors such as sluggish (and optimistic) analyst dividend forecasts, stickiness with dividends and the practice of financing dividends. See: McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26–31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–51.

[1310] Different consultants have produced widely different DGM estimates over short periods. From March 2012–2013, we received DGM estimates of the MRP ranging from 5.90–9.56 per cent. See: AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 101–103, Part 3, 50–56.

[1311] The DGM produces an estimate of the return on equity for the market. The MRP estimate is calculated by subtracting the prevailing risk free rate from the DGM estimate of the return on equity for the market.

[1312] AER, *Rate of return guideline*, December 2013, pp. 13, 16.

on equity for Australian energy network service providers.[1313] There are difficulties with constructing credible datasets for implementing industry specific DGMs.[1314] Also, there are too few Australian businesses to perform DGMs on an individual business level.[1315]

- There are developed methods for estimating the growth rate of dividends in the Australian market.[1316] Whereas, it is unclear if there is a sufficiently robust method for estimating the long term dividend growth rate for Australian energy network service providers.[1317]
- There are important limitations of DGMs that limit our ability to use them as a foundation model. For instance, DGMs can have limited robustness given they are highly sensitive to input assumptions regarding short and long term dividend growth rates. This makes DGMs highly sensitive to potential errors in inputs. Further, DGM estimates of the MRP may generate volatile and conflicting results. For example, we have observed that, over extended periods of time, DGMs generated significantly higher average returns on equity for network businesses than for the Australian market. We consider this fails a sanity test as the systematic risk of network businesses is likely less than the overall market.[1318]

In contrast, some service providers submitted we should use empirical estimates from the DGM in estimating the allowed return on equity for a benchmark efficient entity.[1319] We have reviewed the material submitted since the Guideline. However, we maintain the view that DGM estimates of the return on equity for a benchmark efficient entity are currently unsuitable for our regulatory task (see appendix A–equity models). We engaged McKenzie and Partington to provide advice on the DGM in light of service providers' recent proposals and revised proposals. In their 2014 and 2015 reports, McKenzie and Partington supported our decision not to use DGMs to directly estimate the return on equity.[1320] They did support using our construction of the DGM to inform the MRP estimate. However, they raised concerns around the reliability of DGMs and gave a number of reasons why DGMs are likely to overestimate the return on equity and MRP at the current time.[1321]

[1313] AER, *Explanatory Statement to the rate of return guideline (appendices)*, December 2013, p. 15.

[1314] AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 77.

[1315] AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 119.

[1316] For example, see: M. Lally, *The dividend growth model*, 4 March 2013; CEG, *Response to AER Vic gas draft decisions internal consistency of MRP and risk free rate*, November 2012; and CEG, *Update to March 2012 report: On consistency of the risk free rate and MRP in the CAPM*, November 2012.

[1317] AER *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 15.

[1318] AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 120-122.

[1319] These service providers submitted using the DGM set out in SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014 and SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015.

[1320] McKenzie and Partington, *Report to the AER Part A: Return on Equity*, October 2014, pp. 39–40; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 58–60.

[1321] McKenzie and Partington, *Report to the AER Part A: Return on Equity*, October 2014, pp. 26–41; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–60. In October 2015, Partington and Satchell provided another updated report which considered new material submitted by service providers since our final

In its 2014 and 2015 reports, SFG submitted its construction of the DGM could produce estimates that we could use for the Australian market as a whole, and at the industry level.[1322] However, we consider SFG has overstated the ability of its DGM to provide robust return on equity estimates at the industry level. We set out our reasons for forming this position in the following paragraphs.

In SFG's 2014 analysis, there are 99 return on equity estimates using analyst forecasts for the network businesses over the period 2002 to 2014, based on a six month averaging period.[1323] This is a small sample size, relative to the sample size for estimating the return on equity for the market as a whole. There are few analyst data because there are few network businesses listed on the Australian stock exchange. There is also limited analyst coverage of Australian network businesses. Given the relatively small sample of analyst forecasts available on Australian network businesses, we consider it is difficult to derive a sound return on equity estimate for these businesses using DGMs.

However, there is a large dataset of analyst forecasts available for the Australian market as a whole. While the DGM might overestimate the return on equity for some firms on the market, it might underestimate the return on equity for other firms. Given a large sample size, on aggregate, estimation errors on the return on equity for individual businesses may cancel out. If so, this should produce an unbiased return on equity estimate for the entire market. McKenzie and Partington concurred with this. However, they also considered there was a significant risk that the DGM would overestimate the MRP. Specifically, they advised:[1324]

> It is appropriate to restrict the use of DGM to informing the estimate of the market risk premium. While the DGM is probably the second most popular method of estimating the cost of equity, there is a risk of substantial error in the estimates of the cost of equity for individual firms. Averaging over many firms across the market helps reduce the impact of the error. There is, however, a significant risk that the DGM will overestimate the cost of equity and hence also overestimate the market risk premium.

We consider a small sample size is problematic for any construction of the DGM. SFG, on the other hand, submitted its DGM is capable of producing reliable estimates of the return on equity for a benchmark efficient entity. We disagree.

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decision for JGN. They concluded that there is no compelling reason to change any of the findings in their previous reports (see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015).

1322 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 2; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 30–33.

1323 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 58.

1324 McKenzie and Partington call the market value return on equity, the 'cost of equity'. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 39; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 58–59.

While SFG submitted it used its DGM to directly estimate the return on equity for a benchmark efficient entity, it only used its DGM to indirectly estimate this.[1325] Specifically, SFG applied the following steps to estimate the return on equity for a benchmark efficient entity:[1326]

1. Estimate the market value return on equity for network businesses using its DGM for each of the analysts which provides 99 return on equity estimates.[1327] Then, subtract the risk free rate to obtain the equity risk premium (ERP) for each return on equity estimate.
2. Determine the risk premium ratios by dividing each of the 99 ERPs from step one by the relevant MRP from its DGM.[1328]
3. Take a simple average of the 99 risk premium ratios (determined in step two) to derive an average risk premium of 0.94.[1329]
4. Multiply the average risk premium by the prevailing MRP and add a prevailing risk free rate.

This is similar to using the average risk premium ratio as a substitute for the equity beta in the Sharpe–Lintner capital asset pricing model (SLCAPM). SFG has used its DGM to estimate an average risk premium ratio (using direct DGM estimates of the market return and return on equity for network businesses) and has effectively inserted this into a version of the CAPM to estimate the return on equity for a network business. This is not too dissimilar to our approach. However, unlike our approach, we consider there are several technical issues with SFG's approach. These include:

- The method used to estimate the average risk premium ratio (or effective equity beta for the SLCAPM) is not aligned with the definition of equity beta. The equity beta is the covariance between the return on the market and the return on a business divided by the variance of the market. However, SFG determined its effective equity beta as the ERP of a business divided by the MRP.
- SFG estimated the effective equity beta on a relatively small dataset (99 six-monthly data points). Conversely, when we estimate equity beta over 12 years, there should be about 625 weekly data points.

[1325] SFG used its DGM to directly estimate the return on the market as a whole. We also use the DGM to estimate the return on the market, and therefore, the MRP.

[1326] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, pp. 56–57, 59.

[1327] SFG calls the market value return on equity, the 'cost of equity'. This is the concept we refer to throughout this decision as the 'return on equity'.

[1328] For instance, if there was an analyst forecast for APA on the 1st of April 2013 the DGM would determine the market value return on equity for that analyst forecast. SFG would subtract the risk free rate from the market value return on equity to determine the ERP for APA for the 1st April 2013. SFG would divide the ERP by the DGM's MRP estimate for the period 1 January 2013 to 30 June 2013 to determine the risk premium ratio. SFG would repeat this for all analyst forecasts for network businesses (99 instances in SFG's dataset).

[1329] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 20, p. 48.

- SFG used inappropriate weightings in the estimation process because its DGM gave businesses with more analyst coverage greater weight.

Further, the high estimates from SFG's DGM, equating to an effective equity beta of 0.94 in the SLCAPM, appear inconsistent with the low risk nature of regulated natural monopoly businesses with low elasticity of demand for their services (see section D.1 of appendix D–equity beta). This is also inconsistent with Australian empirical estimates of equity beta, as reported in section D.2 of appendix D–equity beta.

In SFG's 2015 report, it changed its approach to use a two month averaging period. In SFG's 2015 analysis, there are 235 return on equity estimates using analyst forecasts for the network businesses over the period 2002 to 2014.[1330] This is a larger sample size than that used in its 2014 analysis. However, we consider it is still a small sample size relative to the sample size for estimating the return on equity for the market as a whole. We also maintain our above considerations on SFG's average risk premium ratio (or effective equity beta). Moreover, we consider SFG's new approach of using a two month averaging period may introduce errors because of a lack of data. For example, in SFG's sample, there are six two month periods where there were no analyst forecasts for energy network businesses.[1331]

In its 2015 report, SFG submitted that it did not give businesses with more analyst coverage more weight in its DGM analysis.[1332] However, SFG estimates the return on equity for an energy network firm in a given two month period by averaging over all the return on equity estimates implied by all analyst forecasts for that firm over the two month period. If a particular analyst made more than one forecast for that firm in the two month period, then the use of a simple average means that analyst will be given more weight in the return on equity estimate compared to an analyst that makes only one forecast on that stock in a two month period. Further, firms that have more analyst coverage will have more two–monthly return on equity estimates and hence will receive more weight than firms that have less analyst coverage. Therefore, we consider that SFG's DGM gives energy network firms with more analyst coverage greater weight.

SFG disagreed with our views on its DGM based estimate of the average risk premium ratio (or effective equity beta). SFG submitted that it is inappropriate to compare its DGM approach to estimating equity beta with our approach to estimating equity beta (regression analysis of historical stock returns).[1333] However, it also submitted that it is appropriate to compare equity beta estimates resulting from the two approaches, as its

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[1330] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 30–31.

[1331] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 40–41.

[1332] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 31.

[1333] SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 31, paras. 171, 172, 173(b).

DGM based estimate of the average risk premium ratio has the 'same quantitative effect as a beta estimate'.[1334] We consider there are inconsistencies in SFG's reasoning.

There may be more than one way to estimate equity beta. However, using regression analysis to estimate equity beta is widely used and recognised.[1335] Therefore, we can have greater confidence that our approach has been 'tried and tested'. Conversely, we have no evidence before us that SFG's DGM based approach to estimating an effective equity beta for the SLCAPM has been used by market practitioners or regulators to date.

SFG also disagreed with our view that its effective equity beta estimate appears inconsistent with the low risk nature of regulated natural monopoly businesses with low elasticity of demand for their services.[1336] SFG submitted that it is not possible to conclude the benchmark efficient entity has an equity beta below 1.0 based on conceptual analysis. It also submitted that our reasoning implies we consider the equity beta must be less than 0.94. This is a mischaracterisation. We observe that an equity beta of 0.94 appears inconsistent with the low risk nature of regulated natural monopoly businesses with low elasticity of demand for their services. We do not use our equity beta conceptual analysis to determine an upper bound of 0.94 for the equity beta. We discuss our conceptual analysis of equity beta in appendix D–equity beta.

In a subsequent March 2015 report for several service providers, SFG again disagreed with our views on its DGM based estimates of the return on equity for a benchmark efficient entity.[1337] SFG's submission appears to centre on its view that we should rely on more than one 'risk metric' in estimating the return on equity, particularly one that is not based on historical regression data (such as its DGM-based average risk premium ratio). It considered estimates of equity beta based on Australian empirical analysis are

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1334 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 31, paras. 173(a).

1335 For example, Bloomberg, the Australian Graduate School of Management (AGSM), Morningstar and ValueLine estimate equity beta using regression analysis of stock and market index returns. Also, Grant Samuel and Associates (Grant Samuel) relied on equity beta estimates from Bloomberg and AGSM in its 2014 independent valuation report for Envestra. The Economic Regulation Authority (ERA) also estimates the equity beta using regression analysis of stock and market index returns. See: Grant Samuel and Associates, Envestra financial services guide and independent expert's report (appendix 3), March 2014, p. 6 (this shows Bloomberg and AGSM estimates); ValueLine, *Using Beta*, 2 October 2012, viewed on 16 April 2015, link: http://www.valueline.com/Tools/Educational_Articles/Stocks/Using_Beta.aspx#.VS96wNR--Uk; Morningstar, *Investing glossary: Beta*, viewed on 16 April 2015, link: http://www.morningstar.com/InvGlossary/beta.aspx; ERA, *Rate of return guideline explanatory statement*, December 2013, p. 165.

1336 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 32.

1337 SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity: Report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy*, 27 March 2015, pp. 11–12, 26 (SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, 27 March 2015).

unreliable and more widely dispersed than SFG's DGM estimates of the return on equity.[1338]

Much of SFG's March 2015 submission on DGM based estimates of the return on equity has already been addressed in this section. However, we have reviewed this submission and maintain our view that DGM estimates of the return on equity for a benchmark efficient entity are currently unsuitable for our regulatory task. We also maintain our view that there are several technical issues with SFG's indirect DGM estimates of the return on equity for network businesses (which are based on an average risk premium ratio, or effective equity beta, estimate). Our reasoning is set out above, and we add the following considerations:

- We use the SLCAPM as our foundation model. Under the SLCAPM, the equity beta is the measure of a business's systematic risk, relative to the market as a whole.
- Empirical (or regression) analysis is a well-recognised and widely used method to estimate the equity beta (see above).
- We do not rely solely on Australian empirical analysis to estimate the equity beta. We also consider the theory of the Black CAPM and international empirical estimates. Therefore, our 'risk metric' takes more than one source of information into account. Moreover, we consider our equity beta estimate is reliable (see appendix D–equity beta), and we note that our Australian empirical estimates are based on nine comparator firms and estimation periods that can have up to 826 weekly data points.
- We have several reasons for not using our or SFG's DGM to estimate the return on equity for a benchmark efficient entity (see above and appendix A–equity models). The technical issues we identify on SFG's average risk premium ratio estimate are only one part of this set of reasons.
- Dispersion is not, in and of itself, a reason to prefer one estimation technique to another. There are many other factors to consider. We have explained in detail our reasons for using our DGM construction (and not SFG's) to inform our estimate of the MRP and not using DGMs (ours or SFG's) to inform our estimate of the return on equity for a benchmark efficient entity. We are not concerned, as SFG has suggested, that SFG's effective equity beta estimate varies over short time

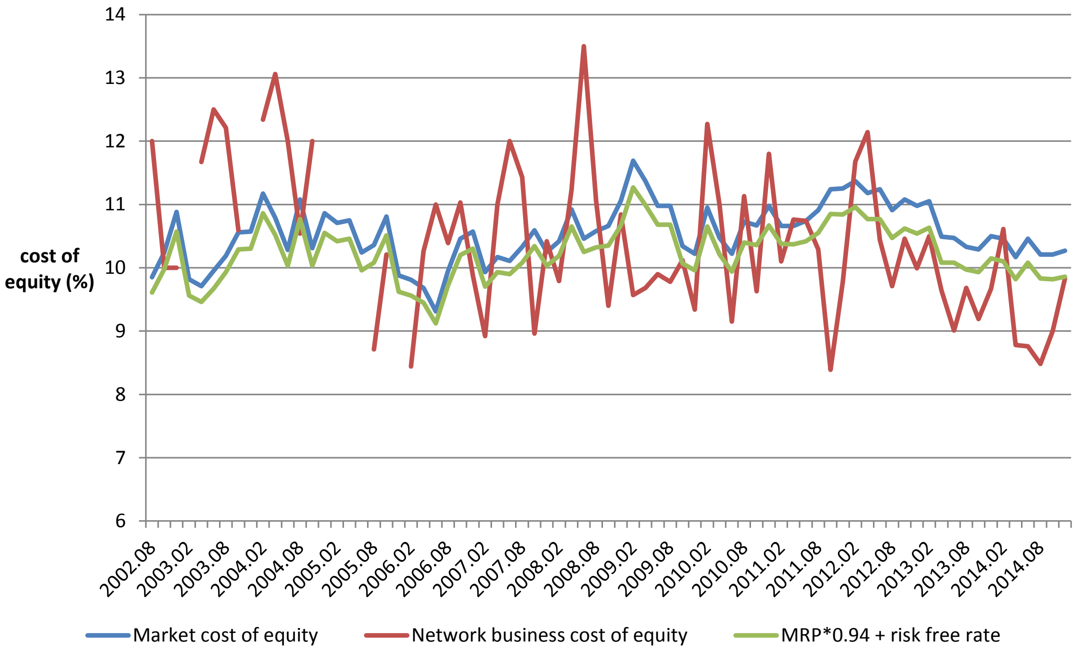
[1338] SFG submitted that our Australian empirical estimates of equity beta are more widely dispersed than SFG's DGM estimates of the return on equity, which means our foundation model return on equity estimates will also be more widely dispersed than SFG's DGM based estimates of the return on equity for a benchmark efficient entity. This assertion is based upon a graph generated for SFG's June 2013 report on the DGM (see: SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013, pp. 18–19 (and figure 1)). Therefore, this graph doesn't compare the most recently available estimates. Also, this graph compares two distributions. One is based on the standard deviation of return on equity estimates from SFG's DGM across 561 firms. The other is based on the dispersion of the SLCAPM return on equity estimates that would occur if equity beta estimates were normally distributed with a mean of 1.0 and standard deviation of 0.6. We are not convinced that this is a like for like comparison.

periods.[1339] We are concerned about the subjectivity of SFG's assertion that its DGM produces more stable return on equity estimates for a benchmark efficient entity. This is discussed in more detail below.

In its 2014 and 2015 reports, SFG submitted its DGM is more reliable and less volatile than our DGM.[1340] However, this perception of stability is subjective and we do not agree with it. Figure 3-20 illustrates this point by showing three time series:[1341]

- the return on equity for the market determined by SFG's DGM (blue line)
- the return on equity for network businesses determined by multiplying the MRP from SFG's DGM by 0.94 then adding the prevailing risk free rate (green line)
- the return on equity for network businesses determined by directly applying SFG's DGM (red line).

Figure 3-20 Movements in SFG's dividend growth model



Source: SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 40–41; AER analysis.[1342]

[1339] SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, 27 March 2015, pp. 11–12.

[1340] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, pp. 48, 57, 65; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 24, 27, 31.

[1341] This is based on SFG's 2015 analysis, which uses a two month averaging period. A similar chart based on SFG's 2014 analysis can be found in our November draft decisions. For example, see: AER, *Draft decision: ActewAGL distribution determination 2015–16 to 2018–19—Attachment 3: Rate of return*, November 2014, p. 231.

[1342] We were unable were unable to replicate SFG's market risk premium, network risk premium and risk premium ratio series in Table 3 of its report because there appears to be an error in the risk free rate series presented by SFG. In

Note: SFG calls the market value return on equity, the 'cost of equity'. This is the concept we refer to throughout this decision as the 'return on equity'.

The gaps in the red line are the result of periods where there were no analyst forecasts for energy network businesses. Therefore, the return on equity for network businesses could not be estimated for these periods.

Figure 3-20 illustrates that direct estimates of the return on equity for network businesses using SFG's DGM (red line) are volatile. Whereas, by construction, SFG's indirect estimates of the return on equity for network businesses using a hybrid CAPM/DGM are more stable (green line). SFG and service providers only proposed indirect estimates. SFG's indirect approach results in a return for the industry that precisely mirrors movements in the market. SFG's indirect approach is predisposed to this outcome because of its construction. It is not clear to us that this outcome is a reasonable reflection of expected returns for the industry.

We consider more confidence in the DGM must be developed before it can be directly applied to network businesses at a given point in time.

B.4 Prevailing estimates

In this section we set out estimates of the MRP using our preferred construction of the DGM. For the two months up to end–August 2015, DGMs produce an estimate of the MRP within the range of 7.5 to 8.6 per cent. We construct this range from DGM estimates under different assumptions. Table 3-41 shows the results.

Table 3-41 MRP estimates under dividend growth models, 0.6 theta (per cent)

Growth rate [a]	Two stage model	Three stage model
4.0	7.5	7.7
4.6	8.1	8.2
5.1	8.5	8.6

Source: Bloomberg, AER analysis.

a) See section B.2.1 for discussion on these long term dividend growth rate estimates. These estimates are based on Lally's analysis, which applies deductions of 0.5, 1.0 and 1.5 per cent to the long term expected growth rate of real GDP of 3 per cent.

Table 3 of SFG's report, the risk free rate series is identical to the market risk premium series. See: SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 40–41 (table 3).

B.5 Sensitivities to prevailing estimates

Evidence before us indicates the MRP implied from DGMs is very sensitive to input assumptions and likely to show an upward bias in current market conditions.[1343] While we still propose to use our construction of the DGM to inform our MRP estimate, we consider it important to have regard to the existence of this potential bias. In this section, we discuss factors we have considered. We also conduct some sensitivity analysis on our DGMs.

B.5.1 Sources of potential upwards bias in the current market

We consider our, and other, DGMs are likely to produce upward biased estimates of the MRP in the current market for the following reasons:

- DGMs use dividends as a proxy for free cash flow to equity, which is the share of the operating cash flow available for owners.[1344] There are a number of problems with this approach:
    - Differences between the free cash flow to equity and the dividend in a particular period may arise as a consequence of financing transactions (that is, borrowing or issuing new shares). Where there is significant financing of dividends and/or where substantial investment demand for funds is anticipated, there is a risk that dividend growth will slow or even turn negative for a period. This is likely to result in upward biased DGM estimates of the return of equity.[1345]
    - Dividends are a smoothed version of both free cash flow to equity and profits. This is because dividends follow slowly with changes in profits. Therefore, dividends are considered to be 'sticky' and are particularly sticky downwards because companies are more averse to cutting dividends. Thus, if profits and free cash flow to equity drop, and investors revise their growth expectations downwards, the share price may drop significantly without the dividend changing. Together, this will cause a higher dividend yield, giving an upwardly biased estimate of the return on equity. The reverse occurs if profits and free cash flow to equity rise. McKenzie and Partington consider there is likely to be an asymmetry in the effects because of the greater reluctance to cut dividends than increase dividends.[1346]

[1343] Lally, *The DGM*, 4 March 2013; McKenzie and Partington, *The DGM*, December 2013, pp. 4–5; McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 26–30; Partington, Report to the AER: Return on equity (Updated), April 2015, pp. 46–50.

[1344] McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, p. 27; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 47. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

[1345] McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 27–29; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 47–49.

[1346] McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 29–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 49–50.

> Many DGMs do not account for the effects of sticky dividends. For example, if prices are decreasing because the earnings prospects of firms are decreasing, these DGMs do not adjust short or medium term growth of dividends down. Instead they rely on dividend forecasts that (over the next two years) reflect expectations of sticky dividends while still using historically based dividend growth rates which do not reflect the fact that earnings prospects of firms have decreased.

- Analyst forecasts are well understood to be upward biased.[1347] McKenzie and Partington considered analysts' forecasts are also slow to adjust to the information in prices. This, in conjunction with the other limitations set out in this section, means that DGMs may not accurately track changes in the return on equity.
- The risk free rate is currently relatively low. Lally observed that if DGMs do not incorporate a term structure, these will produce upwardly biased estimates when the risk free rate is low relative to its long term average, and expected to increase in a future period.[1348] This is discussed further in section B.2.3. We consider it useful to be aware of this potential bias. This is consistent with McKenzie and Partington's advice:[1349]

  > we do recommend that it be borne in mind that the existence of a term structure could materially change cost of equity estimates from the DGM.

B.5.2 Sensitivity analysis

We consider the MRP implied from DGMs is very sensitive to input assumptions such as:

- the long term dividend growth rate
- the period estimates are averaged over
- the use of analyst forecasts, which are likely to be biased (see above).

We show the sensitivity of our DGM to these factors below. DGMs are also sensitive to assumptions regarding short term dividend growth rates, and the length and pattern of any transition to long term dividend growth (see section B.2.4).

Long term dividend growth rate

[1347] McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 26, 31; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46, 51; McKenzie and Partington, *The DGM*, December 2013, pp. 8–9. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

[1348] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

[1349] McKenzie and Partington call the market value return on equity, the 'cost of equity'. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 37; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 56.

We have used our point estimate growth rate (4.6 per cent) as a baseline. We base this on the mid-point of Lally's estimates. We have also considered the top of Lally's range (5.1 per cent). However, McKenzie and Partington advised that if anything, a long term dividend growth rate of 4.6 per cent is on the high side.[1350] McKenzie and Partington considered the long term dividend growth rate should be 3.73 per cent—or 3.78 per cent, excluding the most extreme values.[1351] We have not changed our approach set out in the Guideline. We do not adopt a lower long term dividend growth rate. However, we consider it useful to have regard to our DGM's sensitivity to different assumptions in estimating the long term growth rate. Table 3-42 sets out how these assumptions affect our estimates.

Table 3-42 Growth rate sensitivities in the MRP, 0.6 theta (per cent)

Sensitivity	Two stage model	Three stage model
5.1% growth (top of AER's and Lally's range)	8.53	8.56
4.6% growth (AER point estimate, Lally's estimate)	8.06	8.17
3.78% growth (McKenzie and Partington's estimate)	7.29	7.54

Source: Bloomberg, AER analysis.

Averaging period

We have based our DGM estimate on data over July and August 2015. However, McKenzie and Partington advised that analysts' adjustment to the information in prices is sluggish.[1352] This creates problems with time matching analyst dividend forecasts with prices. It also implies that DGMs may not track changes in the return on equity accurately. McKenzie and Partington stated:[1353]

> Indeed, we would caution against relying on month by month, or even year by year, estimates from the DGM. Averaging measurement error over several periods is likely to reduce the error and therefore, we would recommend taking

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1350 McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, p. 34; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 53; McKenzie and Partington, *The DGM*, December 2013, p. 24.

1351 The extreme values include the Lally/Barra growth estimate of 0.31% and the CEG estimate of 6.5%. See: McKenzie and Partington, *The DGM*, December 2013, p. 15. Note McKenzie and Partington call the market value return on equity, the 'cost of equity'.

1352 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 31–32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51.

1353 McKenzie and Partington call the market value return on equity, the 'cost of equity'. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 43–44.

the mean over several years. In this way the DGM could be used to get a ball park - although likely upward biased figure - for the cost of equity.

We have not changed our approach set out in the Guideline. We do not average over several years because this would reduce the tracking ability of our DGM. However, we consider it useful to have regard to our DGM's sensitivity to the averaging period. Table 3-43 shows these sensitivities. In this table, we use a two month averaging period as a baseline. We also consider a six month averaging period, which is consistent with SFG's DGM (as applied in its 2014 report). Having regard to McKenzie and Partington's advice, we also consider a 12 month averaging period.

Table 3-43 Averaging period sensitivities in the MRP, 0.6 theta (per cent)[1354]

Sensitivity	Two stage model	Three stage model
2 months to end February 2015	8.06	8.17
6 months to end February 2015	7.81	7.95
12 months to end February 2015	7.78	7.97

Source: Bloomberg, AER analysis.

Biases in analyst forecasts

McKenzie and Partington advised us that DGMs are often biased upwards because analysts tend to overestimate dividends in their forecasts.[1355] We consider it useful to have regard to our DGM's sensitivity to potential biases in analyst forecasts. In Table 3-44 we have adjusted forecast dividends per share 10 per cent downwards/upwards.

Table 3-44 DPS forecast sensitivities in the MRP, 0.6 theta (per cent) [1356]

Sensitivity	Two stage model	Three stage model
Forecast	8.06	8.17
Forecast + 10%	8.71	8.83
Forecast - 10%	7.42	7.52

Source: Bloomberg, AER analysis.

1354 Assuming we adopt our point estimate of the long term dividend growth (4.6 per cent).

1355 McKenzie and Partington, *Report to the AER: The DGM*, 14 December 2013, pp. 8–9; McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 26, Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 46.

1356 Assuming we adopt our point estimate of the long term dividend growth (4.6 per cent).

Combined sensitivities

Table 3-45 highlights the potential impact of errors in estimates and assumptions, by bringing these sensitivities together. The DGM estimates of the MRP from this sensitivity analysis range from 6.38 per cent to 9.21 per cent. Taken together, this highlights that DGMs can be very sensitive to assumptions and estimation errors.

Table 3-45 Combined sensitivities in the MRP, 0.6 theta (per cent)

Sensitivity	Two stage model	Three stage model
Baseline [a]	8.06	8.17
Low [b]	6.38	6.68
High [c]	9.18	9.21

Source: Bloomberg, AER analysis.

Notes: a) 4.6% growth, 2 month averaging, DPS forecasts.

b) 3.78% growth, 12 month averaging, DPS forecasts - 10%.

c) 5.1% growth, 2 month averaging, DPS forecasts + 10%.

C Market risk premium

Under the Sharpe–Lintner capital asset pricing model (SLCAPM), the market risk premium (MRP) is the premium above the risk free rate an investor would need, in expectation, to invest in the market portfolio. The MRP compensates an investor for the systematic risk of investing in the market portfolio. Systematic risk is that which affects the market as a whole (such as macroeconomic conditions and interest rate risk) and investors cannot diversify it away through investing in a wide pool of firms.

This appendix sets out why we consider our approach for estimating the 10 year forward looking MRP contributes to the achievement of the allowed rate of return objective.[1357] This appendix also shows why our approach produces an estimate of 6.5 per cent in current market conditions.

We have regard to prevailing conditions in the market for equity funds when estimating a range and point estimate for the MRP.[1358] Recognising nobody can directly observe the MRP, we have regard to these prevailing conditions by considering a range of theoretical and empirical evidence. This evidence comes from historical excess returns, dividend growth model (DGM) estimates, survey evidence and conditioning variables. We also have regard to recent decisions by Australian regulators.[1359]

C.1 Historical excess returns

Historical excess returns are the realised returns stocks have earned in excess of the 10 year government bond rate. We have assessed historical excess returns against our criteria and find this estimation method has significant value.[1360] We are satisfied this is the most robust source of evidence for estimating a 10 year forward looking MRP.[1361] This view is consistent with the Rate of Return guideline (Guideline).[1362] We place most reliance on this source of information in estimating the MRP.

Under current market conditions, we consider historical excess returns produce an MRP estimate of 6.0 per cent from within a range of 5.0 to 6.5 per cent.[1363]

1357 NER, cl 6.5.2(f); NER, cl. 6A.6.2(f); NGR, r. 87(6).

1358 NER, cl 6.5.2(g); NER, cl. 6A.6.2(g); NGR, r. 87(7).

1359 AER, *Rate of return guideline*, 17 December 2013, p. 16.

1360 See steps one and two in section 3.4.1 for our assessment of this information against our criteria.

1361 See steps one and two in section 3.4.1.

1362 AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 78.

1363 In December 2013, we noted that 'while a point estimate of 6.0 per cent is common, the choice of the averaging period and judgements in the compilation of the data result in a range for plausible estimates of the MRP of about 5.0–6.5 per cent'. See AER, *Explanatory statement rate of return guideline,* 17 December 2013, p. 95. For this decision we have updated these estimates to the 2014 calendar year end. In our final and preliminary decisions published in April/June 2015, we stated that, 'Consistent with the worked example in the Guideline, we set the bottom of the range as 20 basis points above the highest estimate from the range of geometric averages'. In the Guideline, we chose 5.0 as the bottom of the historical excess returns range instead of 4.8 because we recognised that estimating the rate of return for a service provider is not a precise science. We considered there is a limit to the specificity for which estimates of the return on equity can be determined (see AER, *Explanatory statement rate*

In the following sections we:

- update the estimates to add data up to the 2014 calendar year end
- consider what sampling period to apply
- consider our use of arithmetic and geometric averages
- consider submissions about the underlying dataset for the period 1883 to 1958.

C.1.1 Updated estimates

Table 3-46 sets out arithmetic and geometric average historical excess returns estimated over different sample periods up until the 2014 calendar year end.[1364] Arithmetic averages range between 5.8 and 6.4 per cent and geometric averages range between 3.9 and 4.9 per cent.

Table 3-46 Historical excess returns based on a theta of 0.6 (per cent)

Sampling period	Arithmetic average	Geometric average
1883–2014	6.2	4.9
1937–2014	5.9	4.0
1958–2014	6.4	4.0
1980–2014	6.3	3.9
1988–2014	5.8	4.1

Source: AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 82; AER updates.

The estimates in Table 3-46 are based on an imputation credit utilisation rate (theta) of 0.6. This is consistent with other parts of this decision (see attachment 4—value of imputation credits).

In an April 2015 report, the Competition Economists Group (CEG), amongst other suggestions, stated that historical excess return estimates of the MRP should be adjusted upwards.[1365] United Energy, Ergon Energy and SA Power Networks submitted this report to us, and AGN made reference to it. We acknowledge this

of return guideline, 17 December 2013, pp. 64–65). Consistent with this reasoning, we do not set the bottom of the range as 20 basis points above the highest estimate from the range of geometric averages. Instead, we have regard to the geometric and arithmetic average estimates in determining a reasonable range.

1364 We have traditionally taken historical excess returns as a calendar year-end estimate. For consistency, and given these change slowly throughout time, we maintain this convention.

1365 CEG, *Measuring risk free rates and expected inflation*, April 2015, p. 24.

submission but note none of these service providers appear to have applied CEG's adjustment to their historical excess returns estimates of the MRP.[1366]

CEG considered Commonwealth Government Securities (CGS) have historically displayed positive (non-zero) betas, which results in historical excess returns estimates being understated.[1367] Our substantive response to CEG's report is set out in section C.7.

We note that our historical excess returns estimates are based on long sampling periods, the longest of which is from 1883 to 2014. However, CEG estimates rolling five year betas for 10 year CGS using data from 1992 to approximately 2014. We do not consider this is a reasonable representation of the historical period. CEG recognises this, stating:[1368]

> Daily CGS yields are not available prior to 1992, however, as shown in Figure 1, the oldest beta estimate is around -0.25. A much longer time series is available from the US, and Campbell et al. provide evidence that suggests an average value in excess of 0.1 for 10 year nominal US Treasury bonds.

Therefore, CEG bases its adjustment on the average beta of 10 year US Treasury bonds over approximately 1960 to 2010, taken from Campbell et al.'s study.[1369] It does not provide any analysis to demonstrate the reasonableness of using US data to make an adjustment to Australian historical excess returns estimates. Nor does it provide any analysis or explanation to demonstrate whether the 1960 to 2010 is representative of the historical period we consider (1883 to 2014). As such, we do not consider CEG's adjustment to historical estimates of the MRP is warranted.

C.1.2 Sampling period

We consider five sampling periods: 1883–2014, 1937–2014, 1958–2014, 1980–2014 and 1988–2014. Brailsford et al. use these estimation periods, stressing that clearly identifiable and material changes in the underlying data determine these periods. These include:[1370]

1366 See Frontier, *An updated estimate of the required return on equity: Report prepared for Ergon Energy*, July 2015, p. 4; Frontier, *An updated estimate of the required return on equity: Report prepared for Energex*, June 2015, p. 4; Frontier, *An updated estimate of the required return on equity: Report prepared for Australian Gas Networks*, June 2015, p. 4; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, May 2015, p. 2. Only SA Power Networks and AGN refer to CEG's findings in their proposals, and appear to use it to support their proposed multi-model approach to estimating the return on equity. See SAPN, *Revised regulatory proposal*, July 2015, pp. 350, 355, 358–359, 368; AGN, *Access arrangement proposal: Attachment 10.1—Rate of return*, June 2015, p. 36.

1367 CEG, *Measuring risk free rates and expected inflation*, April 2015, p. 4.

1368 CEG, *Measuring risk free rates and expected inflation*, April 2015, p. 25

1369 Campbell, Sunderam, and Viceira, *'Inflation Bets or Deflation Hedges? The Changing Risks of Nominal Bonds'*, Harvard Business School Working Paper, January 2013, figure 1.

1370 Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 76–77, 85–86.

- 1883 is the first (calendar) year for which data are available under the Commercial and Industrial price index. However, this did not include a financial sector and suffered from narrow coverage.[1371]
- 1937 is the first year for which data are available on both a broad stock index (the Sydney All Ordinary Shares price index) and on marketable short term government securities. However, Australian government stock price controls were in operation from November 1941 to February 1947. Therefore, some of these observations are not market determined.
- 1958 is the first year for which daily calculations of the Sydney All Ordinary Shares price index were available.
- 1980 is the first year for which daily calculations of the Australian Stock Exchange (ASX) All Ordinaries accumulation index were available.
- 1988 is the first full year of operation of the dividend imputation tax system in Australia.

We have regard to each of these sampling periods because we recognise each of these periods has different strengths and weaknesses. Specifically:[1372]

- Longer time series contain a greater number of observations, so generally produce a more statistically precise estimate (if the time series is stationary).
- Significant increases in the quality of the data become available in 1937, 1958 and 1980.
- More recent sampling periods more closely accord with the current financial environment, particularly since financial deregulation (1980) and the introduction of the imputation credit taxation system (1988).
- Shorter time series are more vulnerable to influence by the current stage of the business cycle and one-off events.[1373]

In its February and June 2015 reports for several service providers, NERA Economic Consulting (NERA) submitted that the use of multiple overlapping sampling periods places more weight on more recent data. It submitted that this reduces the statistical precision of the MRP estimates, and recommended using the longest available sampling period.[1374][1375] We considered NERA's February 2015 report in our April/June

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[1371] The Commercial and Industrial price index only included 5 stocks in 1875, 12 in 1905 and 47 in 1945.

[1372] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 82.

[1373] AER, *Final decision—WACC review*, May 2009, pp. 200, 204; Brailsford, Handley and Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, 2008, vol. 48, pp. 78–82.

[1374] NERA, *Historical estimates of the market risk premium: A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, February 2015, p. 42. (NERA, *Historical estimates of the market risk premium*, February 2015); NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors: A report for ActewAGL Distribution, AGN, APA, AusNet Services, CitiPower, Energex, Ergon Energy, Jemena Electricity* final and preliminary decisions.[1376] We do not consider NERA has provided new reasoning in its June 2015 report to support its position. Therefore, we maintain our view that statistical precision is not the only factor we consider in choosing which sampling periods to use. As outlined above, we have regard to all five sampling periods because each has different strengths and weaknesses. Brailsford et al. stated:[1377]

> If the equity risk premium is stationary over time, then a naïve statistical approach would suggest the longer the estimation period the better. However, we conclude that residual concerns about data quality become increasingly important the further back into the past one looks. Accordingly, the present paper presents a new set of estimates of the historical equity risk premium in Australia, which correspond to various periods of increasing data quality but of decreasing sample size.

Partington and Satchell also considered that, although it reduces the precision of the estimates, there are reasons for using multiple sampling periods, such as possible structural breaks in the data and issues regarding data quality.[1378]

C.1.3 Arithmetic and geometric averages

Historical excess market returns are sensitive to the method of averaging returns over multiple periods. The arithmetic average return is the simple average annual return.

Networks, Powercor, SA Power Networks and United Energy, June 2015, p. 28 (NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015). SFG and CEG used the historical excess returns MRP estimates derived by NERA (over the longest period available) in their 2014 and 2015 reports. See, for example: SFG, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon and Transend*, 27 May 2014, p. 54. (SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014); SFG, *The required return on equity for the benchmark efficient entity: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015, p. 23 (SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015); SFG, *The required return on equity for the benchmark efficient entity: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 25 February 2015, p. 23 (this report is very similar to SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, therefore, any references to the 13 February 2015 report in this appendix also apply to the 25 February 2015 report); CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, p. 27; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 5. We also received a submission from United Energy, which supported NERA's view (see: United Energy, *Submission on the historical market risk premium (MRP) in response to the revised regulatory proposal for Jemena Gas Networks (JGN)*, 26 March 2015, p. 4).

1375 We also note that NERA has previously (in a 2011 report) recommended using only post-1958 data to estimate the MRP using historical excess returns (see NERA, *Market risk premium*, April 2011, pp. 3–8).

1376 AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, pp. 331–333.

1377 Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 75.

1378 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 45–46.

The geometric average return is the average compounded annual return.[1379] In estimating the MRP, we have regard to both arithmetic and geometric average historical excess returns. We set out our reasoning in our final decision for Jemena Gas Networks (JGN), and this material remains relevant.[1380] We also note that Associate Professor Graham Partington and Professor Stephen Satchell (Partington and Satchell) supported our position to have regard to both types of average historical excess returns in their 2015 reports.[1381] Our decision is informed by the following considerations:

- We consider the arithmetic average of 10 year historical excess returns could be an unbiased estimator of a forward looking 10 year return. However, historical excess returns are estimated as the arithmetic or geometric average of one year returns. Since one year historical excess returns are variable, their arithmetic average will overstate the arithmetic average of 10 year historical excess returns. Similarly, the geometric average of one year historical excess returns will understate the arithmetic average of 10 year historical excess returns.[1382]
- We have previously considered arithmetic and geometric averages relevant when estimating a 10 year forward looking MRP using historical annual excess returns.[1383] The Australian Competition Tribunal (Tribunal) found no error with this approach.[1384]
- In their recent review for the Office of Gas and Electricity Markets (Ofgem), Wright and Smithers advocated using geometric average returns, adjusted for return volatility on the arithmetic average. Wright and Smithers based their reasoning on the distortions introduced by direct arithmetic averaging.[1385] While we do not adopt this approach, this indicates that experts and other regulators consider geometric averages valuable.
- Professor Michael McKenzie, Partington and Satchell (McKenzie and Partington, Partington and Satchell) recommended the consideration of both arithmetic and geometric averages, tempered by an understanding of their inherent biases.[1386]

[1379] The arithmetic average is measured as the sum of N numbers divided by N. The geometric average is measured as the Nth root of the product of N numbers.

[1380] AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, pp.333–338.

[1381] Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 17; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 44–45.

[1382] For an additional example, see AER, *Draft decision: SPI Networks access arrangement*, September 2012, Appendix B.2.1.

[1383] For example, see AER, *Final decision: SPI Networks (Gas) access arrangemen*t, March 2013, Part 3, B.5.1.

[1384] Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT4*, 11 January 2012, paragraph 157.

[1385] Wright and Smithers, *The cost of equity capital for regulated companies: A review of Ofgem*, 2014, p. 9.

[1386] McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 5; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, pp. 16–17; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 44–45.

- While we acknowledge geometric averages may exhibit downwards bias, we also note that arithmetic averages may exhibit upwards bias. This is because:[1387]

> As Blume (1974) shows, when compounding the arithmetic average over time, it is the sampling error in the measurement of the arithmetic average return that causes the upward bias in the expected return. If we assume, as in the teaching note for the Harvard case study, that there is no sampling error in the measurement of arithmetic returns then there is no bias. There would also be no bias if the sample of returns was of infinite size. The reality is that we have a finite sample of returns and we do have sampling error. The consequence, as Blume clearly shows, is upward bias when the arithmetic average is compounded over more than one period. It is also well understood that the geometric average normally gives a downward biased measurement of expected returns.

In a series of reports, NERA recommended we give no weight to geometric average historical excess returns.[1388] In June 2015, NERA submitted a further report on this issue.[1389] NERA submitted that arithmetic average of one year historical excess returns is only upward biased if the return is compounded over more than one year. However, it submitted that the AER, aside from some minor adjustments to the RAB and to the evolution of prices over the regulatory period, does not compound the WACC over more than one year.[1390]

We maintain that it is reasonable to have regard to both arithmetic and geometric average historical excess returns in estimating the 10 year forward looking MRP. We set out our reasoning below.

First, we consider NERA's submission takes a narrow view of the issue. As Partington and Satchell stated in their October 2015 report:[1391]

> NERA (2015, History) makes a repeated case that if we are estimating the mean for one period using data over a number of past periods (denoted by T) then they are unaware of any work that suggests the superiority of geometric returns or combinations of geometric or arithmetic returns in situations when the data are iid or correlated. We see no compelling reason why the situation described above is the only one that the AER should consider.

1387 McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 6.

1388 See, for example: NERA, *Prevailing conditions and the market risk premium: A report for APA Group, Envestra, MultiNet and SP AusNet*, March 2012, pp. 3–16; NERA, *The market, size and value premiums: A report for the Energy Networks Association*, June 2013, pp. 25–30 (NERA, *The market, size and value premiums*, June 2013); NERA, *Historical estimates of the market risk premium*, February 2015, pp. 12–24.

1389 NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, pp. 14–28.

1390 NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, p. 14.

1391 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 44.

Second, we consider the building block model is a tool to achieve an outcome whereby the present value of expected revenue equals the present value of expected expenditure over the life of the regulated assets. From this perspective, we consider an appropriate discount rate requires the evaluation of an expected multi-period return on equity.[1392] Partington and Satchell also stated:[1393]

> NERA (2015, History) makes the point that the AER does not compound its estimate of the rate of return and thus should only consider a single period return. However, the point of setting the regulatory return is to select a rate at which new investment is a zero NPV activity. Underlying the rate setting, therefore, is the concept that the return is compounded.

Third, if we were estimating a one year MRP, there remains uncertainty over whether an arithmetic or geometric average (or some combination of the two) of historical excess returns provides a better estimate of expected excess returns. The answer to NERA's concern whether geometric or arithmetic averages are better is unclear and not settled amongst academics. Both methods have limitations. This is well summarised by Partington and Satchell:[1394]

> So which of these estimates is a better measure of expected returns? Jacquier, Kane and Marcus (2003) claim that academics tend to use the arithmetic return and that practitioners tend to use the geometric return. A more rigorous answer is that the choice depends upon what is assumed to be the distribution of returns through time. Assuming returns over time follow independent identical distributions with a finite variance, then it is widely accepted that the arithmetic average is the appropriate estimator of expected returns. Otherwise, the geometric average has a role to play. It has long been well understood that returns do not conform to the assumption of independent identical distributions, see for example Akgiray (1989). The literature has therefore suggested a weighted sum of the arithmetic and geometric averages be used in estimating the expected return. Unfortunately, there is no generally accepted optimal weighting scheme. In our opinion the use of arithmetic averages alone is likely to result in an upward biased estimate of expected returns and the use of geometric averages alone is likely to result in a downward biased estimate.

In their 2012 report, McKenzie and Partington provided numerous references to academic studies that support this view.[1395] They also considered that unbiasedness is only one desirable property of an estimator. Another consideration is efficiency, and

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[1392] Our consideration was discussed in detail in AER, A*ccess arrangement draft decision: Roma to Brisbane Pipeline 2012–13 to 2016–17*, April 2012, pp. 295–296.

[1393] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 44.

[1394] Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 17.

[1395] See McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, pp. 5–9.

'the question then becomes one of trading off bias and efficiency'.[1396] We agree with this view.

Moreover, in their October 2015 report, Partington and Satchell demonstrate that, even in the restricted case that NERA presents, the geometric average can be a superior estimator.[1397]

NERA has questioned the relevance of the Akgiray (1989) and the Jacquier, Kane and Marcus (2003) articles referenced by Partington and Satchell.[1398] It considered these articles do not match how we use historical excess returns data. We consider it is the key messages of the articles that are relevant to our analysis and these are more broadly applicable than NERA suggests. If the key messages of an academic article were only relevant to those undertaking precisely the same task, their usefulness would be exceedingly limited. For example, Akgiray's use of daily stock returns does not necessarily limit the relevance of his key message about the temporal behaviour of stock returns.

Gray and Hall (previously SFG, now Frontier Economics [Frontier]) has also recommended we give no weight to geometric average historical excess returns.[1399] This is a reiteration of its views from previous reports, and is based primarily on SFG's submission that arithmetic averages are more representative of future expectations.[1400] We have responded to SFG's views in our April/June 2015 final and preliminary decisions, 2012 decision for the Roma to Brisbane pipeline and 2013 decisions for the Victorian gas network businesses, and this material remains relevant.[1401]

From the discussion above, it is clear that the decision on whether to use an arithmetic or geometric average of historical excess returns to estimate the MRP is a complex one. We also consider that the difference between our approach and NERA/SFG's recommended approach is unlikely to be material. This is because:

1396 See McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 8.

1397 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 44–45.

1398 NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, pp. 19–20.

1399 See SFG, *The required return on equity for the benchmark efficient entity*, February 2015, p. 23; Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity: Report prepared for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon, Energex, Jemena Electricity Networks, Powercor, SA Power Networks, and United Energy*, June 2015, p. 62 (Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015).

1400 SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 44–49.

1401 See, for example: AER, *Access arrangement draft decision: Multinet Gas (DB No. 1) Pty Ltd Multinet Gas (DB No. 2) Pty Ltd 2013–17—Part 3 appendices*, September 2012, appendix B section B.2.1; AER, *Access arrangement final decision: Multinet Gas (DB No. 1) Pty Ltd Multinet Gas (DB No. 2) Pty Ltd 2013–17—Part 3 appendices*, September 2012, appendix B section B.5.1; AER, A*ccess arrangement draft decision: Roma to Brisbane Pipeline 2012–13 to 2016–17*, April 2012, appendix C section C.1.1; AER, *Access arrangement final decision: Roma to Brisbane Pipeline 2012–13 to 2016–17*, August 2012, appendix B section B.2.1; AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, pp.333–338.

- The lower bound of our range for historical excess returns estimates is above the range of geometric averages and the upper bound is at the top of the range of arithmetic averages. Our MRP point estimate from this source of information is also well above the geometric average estimates, at 6.0 per cent. This means that we place more reliance on arithmetic averages than geometric averages.[1402]
- As shown in Table 3-46, the arithmetic averages of historical excess returns range from 5.8 to 6.4 per cent, and the most recent estimate is 5.8 per cent. Accordingly, even if we were to rely only on the arithmetic averages, they do not support NERA's proposed MRP estimate of 6.55 per cent.[1403]
- Historical excess returns are only one source of information we use to estimate the MRP. We also use DGM estimates, survey evidence, conditioning variables and have regard to other Australian regulators' estimates.

We also note that there is evidence to suggest that historical excess returns data may produce upward biased estimates of the MRP, irrespective of the averaging method chosen.[1404] For example, estimates of the MRP are likely to be subject to survivorship bias. This is when MRP estimates based on historical data are overstated relative to true expectations because historical returns are only estimated on stocks that have survived.[1405] This upward bias is important because various Australian stock indexes exclude failed stocks.[1406]

Ultimately, we consider there are strengths and weaknesses associated with using arithmetic or geometric averages of historical excess returns to estimate the 10 year forward looking (or expected) MRP. We are not satisfied that NERA has provided sufficient evidence to support its conclusion that using arithmetic averages of historical excess returns provides a 'materially better estimate' of the MRP than an estimate based (solely or in part) on geometric averages.[1407] We agree with Partington and

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1402 NERA submitted that the Wright and Smithers review for the Office of Gas and Electricity Markets (Ofgem) we referred to in our April/June 2015 final decisions only use the geometric average of historical excess returns as an input and not as a final estimate (see NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, pp. 21–22). We consider our approach is not dissimilar to this.

1403 NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, p. 4.

1404 AER, *Explanatory statement: rate of return guideline (appendices)*, December 2013, pp. 79–80.

1405 Damodaran, A., *Equity risk premiums: determinants, estimation and implications—the 2012 edition*, Mach 2012, p. 24; McKenzie and Partington, *Equity market risk premium*, December 2011, pp. 6–8. McKenzie and Partington, *MRP: regime switching framework and survey evidence*, August 2012, p. 19; Joye, C., *Super funds miss mark in bias to equities*, Australian Financial Review, 14 August 2012.

1406 For example, the ASX All Ordinaries Index represents the 500 largest companies listed on the ASX. Market capitalisation is the only eligibility requirement. An underperforming stock that is losing its market share would be eventually be removed from the index. See: http://www.asx.com.au/products/capitalisation-indices.htm#all_ordinaries_index.

1407 NERA, *Historical estimates of the market risk premium*, February 2015, p. 12. Also see NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, p. 14.

Satchell's conclusion (a reiteration of McKenzie and Partington's 2012 conclusion) that:[1408]

> The widespread current practice is to use unadjusted geometric and arithmetic averages. Given the current state of knowledge, we see no strong case to depart from this common practice and recommend the use of both of these metrics, tempered by an understanding of their inherent biases.

C.1.4 Historical data

To date, we have used historical excess returns estimated by Brailsford, Handley and Maheswaran (Brailsford et al.) and updated from time to time by Handley.[1409] Brailsford et al. produced a comprehensive study that a peer reviewed academic journal published. This study found that, 'estimates based on data before 1958 should be treated with caution because of concerns over data quality and the imprecision of the underlying series'.[1410] This finding, in part, informs our position to consider different sampling periods.

In their study, Brailsford et al. extensively considered issues concerning early data. Specifically:[1411]

- The Sydney Stock Exchange (SSE) retrospectively constructed a stock accumulation index for the period 1882 to 1979. This included a historical dividend yield series constructed by Lamberton and the SSE for the period 1882 to 1955 and 1956 to 1961 respectively.[1412] These series represent the simple, unweighted average yield on dividend paying shares only. Unweighted yields are biased towards high yielding small stocks, compared to the value weighted yield. Further, excluding non-dividend paying shares will also overstate the yield.
- Brailsford et al. confirmed with the ASX that, due to the upwards bias in early data, the ASX made an adjustment. Specifically, the ASX stated:[1413]

> It was concluded that the real weighted dividend yield was probably overstated about a third on average and therefore the [Lamberton/SSE yield] series was

1408 Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 17.

1409 Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, pp. 73–97; J. Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012. (Handley, *Historical equity risk premium to 2011*, April 2012).

1410 Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, p. 75.

1411 Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, pp. 79–81.

1412 From July 1961, the series was calculated by the SSE on a monthly basis. (see Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, p. 79)

1413 Email correspondence from the ASX to Brailsford et al. dated 26 May 2004, reported in Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, p. 80.

> reduced by 25% in the early years of the accumulation index where we didn't have any other dividend yields to guide us.

- Further investigations by Brailsford et al. confirmed the ASX applied an adjustment factor of 0.75 for the period 1882 to 1964.[1414]
- Brailsford et al. investigated whether the adjustment applied by the ASX was reasonable. In doing this, they considered:[1415]
  - the views of the stock exchange itself (a credible source), as its staff determined and applied the adjustment factor to the dividend yield series
  - US studies, which have attempted to formulate dividend yield series over roughly comparable time periods
  - estimates of unweighted and weighted dividend yields for the UK stock market over the period 1872 to 1913
  - a more direct test by estimating the weighted dividend yield across all stocks listed on the SSE for February 1966 (the first month of decimal currency).
- On this basis they considered the adjustment was reasonable and concluded:[1416]

> On the basis of the above, it appears that an adjustment factor somewhere in the range of 0.65–0.75 would be defensible. We cannot be more specific, but note that there is no strong evidence to suggest that we should diverge from the currently used adjustment factor. Nonetheless, what this issue reveals is that these data and the equity premium obtained thereof should be treated with caution.

During the Guideline development process, the Energy Networks Association (ENA) engaged NERA, which proposed an alternative adjustment to the Lamberton/SSE dividend yield series.[1417] This was further advocated by NERA in its February 2015 report for several service providers.[1418] In our April/June 2015 final and preliminary decisions for several service providers, we considered NERA's adjustment was not warranted and did not lead to a material improvement in the quality of our data. This

1414 Brailsford et al. also stated that, ' Precise details of the adjustment for the period 1965–1973 are not available but appear to involve a reduction in the order of one-third, whereas the Statex yield series appears to be have been used for the period 1974–1979'. See Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, p. 80.

1415 Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, pp. 80–81.

1416 Brailsford, Handley, Maheswaran, ‘Re-examination of the historical equity risk premium in Australia’, *Accounting and Finance*, Vol. 48, 2008, p. 81.

1417 NERA, *The market risk premium, analysis in response to the AER’s draft rate of return guideline: A report for the Energy Networks Association*, 11 October 2013. (NERA, *Market risk premium for the ENA*, October 2013); NERA, *The market size and value premiums*, June 2013. This alternative adjustment was supported by SFG in its 2014 and 2015 reports for several service providers (see SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 49–50; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, pp. 49–52).

1418 NERA, *Historical estimates of the market risk premium*, February 2015, pp. i–vii.

material remains relevant.[1419] However, given NERA has submitted a further report on this issue, we have reviewed the material before us. NERA's June 2015 report makes a number of changes to its data, which results in a historical excess returns MRP estimate of 6.55 per cent for the period 1883 to 2014.[1420] We have considered this information and maintain our view from the April/June 2015 final and preliminary decisions. Our reasoning is set out below.

First, it is important to note that Brailsford et al. did not make an adjustment to the earlier data. It was the ASX (at that time, the SSE) that made the adjustment to the earlier data, and it is the ASX's adjustment that NERA is disputing. We consider the service providers and their consultants have been unclear on this distinction. For example:

- In its June 2014 report, SFG stated, 'Lamberton provides data on the average dividend yield for dividend-paying stocks. Brailsford et al make an adjustment to that data to account for non-dividend-paying stocks. The “adjustment in early years” was performed by Brailsford et al, not by any ASX source, as the Guideline materials claim'.[1421]
- In its February 2015 report, NERA acknowledged that Brailsford et al. did not make the adjustment to the Lamberton/SSE dividend yield series, stating, 'We note in our June 2013 report that Brailsford, Handley and Maheswaran make clear that the adjusted data were provided to them by an employee of the Australian Stock Exchange (ASX)'.[1422] However, in correspondence to the ASX dated 24 October 2014, NERA explained that there was controversy over whether (and if so, how) the Lamberton/SSE series should be adjusted. Following this, NERA reported that:[1423]

  > Associate Professor John Handley of the University of Melbourne, in a paper co-authored with Tim Brailsford and Krishnan Maheswaran, used a series that is based on the two series (price and dividend yields) with an adjustment made to Lamberton's series of dividend yields. **They multiplied the series of dividend yields that Lamberton had supplied by 0.75**. The AER has used this series and has claimed that the adjustment has the blessing of the ASX. [emphasis added]

- In February 2015, United Energy made a submission to the AER on historical excess returns estimates of the MRP. Attached to this submission was correspondence from Jones Day (retained by United Energy) to Standard and Poors, dated 26 March 2015. This correspondence applied similar wording to that

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[1419] See, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, pp.338–344.

[1420] NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, pp. 5, 8, 10.

[1421] SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, p. 50.

[1422] NERA, *Historical estimates of the market risk premium*, February 2015, p. 29.

[1423] United Energy, *Submission on the historical market risk premium (MRP), in response to the revised regulatory proposal for Jemena Gas Networks (JGN)*, 26 March 2015, exhibit 2, p. 2.

used by NERA, stating, 'The AER appears to rely on a paper co-authored with Tim Brailsford and Krishnan Maheswaran, that uses a series that is based on two data series with an adjustment made to Lamberton's series of dividend yields. They multiply the series of dividend yields that Lamberton provides by 0.75'.[1424]

Handley responded to this misconception multiple times. For example:

- In his October 2014 report, Handley stated:[1425]

> Before addressing NERA's analysis, it is appropriate to clarify a very important misconception concerning the adjustment. Contrary to the claim by SFG – and it is not clear whether this view is also shared by NERA – the adjustment was not something which BHM took upon themselves to apply to the Lamberton data. Rather, the data that the ASX provided to BHM had already had been adjusted by the ASX. In other words, the ASX had many years earlier decided in their knowledge and wisdom that some adjustment was necessary and it was the ASX who determined the amount and adjusted the data accordingly. BHM simply sought to confirm their understanding of the data series provided by the ASX by reconciling it back to original sources.

- In his May 2015 report, Handley stated:[1426]

> The inference in the first statement that the stock and dividend data underlying the Brailsford, Handley and Maheswaran (2008) – BHM – dataset is not genuine is incorrect and troubling. The claim (by NERA) in the second statement that BHM, rather than the ASX, made the adjustment to the dividend data is incorrect.

Partington and Satchell also considered United Energy's submission in their May 2015 report and stated that:[1427]

> There is an attempt to cast doubt on the adjusted data series that Brailsford et.al. use in computing the market risk premium and also questioning of the validity of their claims about the source of the adjustment. There is also questioning of the value of peer review in published work. We find little merit in these criticisms.

We consider the abovementioned inferences that the ASX did not make the adjustment to the Lamberton/SSE dividend yield series are unfounded. We note that in 2006,

1424 United Energy, *Submission on the historical market risk premium (MRP), in response to the revised regulatory proposal for Jemena Gas Networks (JGN)*, 26 March 2015, exhibit 3, p. 1.

1425 Handley, *Advice on the return on equity*, October 2014, p. 19

1426 Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, May 2015, p. 27.

1427 Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

Richard Fitzherbert (Fitzherbert) wrote an article for JASSA, the Finsia Journal of Applied Finance, on historical excess returns data. In this article, Fitzherbert stated:[1428]

> An important difficulty faced by early researchers such as Owen was the lack of market-weighted dividend data. More recently, the ASX Statistician (1996) compiled a quarterly accumulation index dating back to 1882 which corresponds with the ASX All Ordinaries accumulation index, which has been calculated daily since 1979. The dividend problem identified by Owen has been addressed by the ASX Statistician's accumulation index, but the availability of an accumulation index dating back to 1882 is relatively recent and not well known…A comparison of columns (2) and (3) – the total return of the ASX accumulation index compared to an estimate based on unweighted dividend yields – shows an average (and reasonably consistent) difference in total return of just under 2% per annum. On the basis of the limited comparison between the weighted dividend data from the Melbourne Stock Exchange and the unweighted Sydney data, this suggests that the dividend factor built into the recently compiled ASX accumulation index is more or less correct.

Second, with this background, it is clear NERA's submission that its adjustment is more accurate because it uses more than one data point is not correct.[1429] Brailsford et al. uses one data point as one method (of several) to check the reasonableness of the ASX adjustment. This does not mean the ASX adjustment itself is based on one data point.

Third, we consider NERA has not established that its adjustment is superior to the ASX adjustment.[1430] As Handley stated:[1431]

> There are two main problems with the NERA analysis. First, it is unreasonable to draw a conclusion about three-hundred data points from a sample of only seven of those data points. Second and more fundamentally, NERA has not reconciled their data back to the Lamberton data as illustrated below

We consider NERA has put considerable effort into reconciling its data back to Lamberton's, even though it cannot do this completely. However, we maintain our consideration that it is not reasonable to draw a conclusion about the adjustment factor for 300 data points from a sample of eight of those data points. This view is also supported by Lally in a 2014 report for the QCA. Lally considered NERA's adjustment is superior to that used by Brailsford et al. because it is based on an examination of seven (now eight) data points rather than one.[1432] We note that we disagree with this

[1428] Fitzherbert, *Australian equity returns: another look at the historical record*, JASSA, Issue 3, Spring 2006, pp. 20, 23.

[1429] See NERA, *Historical estimates of the market risk premium*, February 2015, p. vi.

[1430] In its June 2015 report, NERA analysed yield data for another month (December 1883) in addition to the seven months it analysed in its February 2015 report. See NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, p. 6.

[1431] Handley, *Further advice on the return on equity*, April 2015, p. 8.

[1432] Lally, *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, March 2014, p. 6.

view for the second reason discussed in this section. However, Lally also considered (and we agree) that:[1433]

> the seven years examined represent only seven of the 75 years in question. Thus, whilst they represent the best available estimate of the required correction to Lamberton's work, they are inadequate in any absolute sense, i.e., each of the 75 years ought to have been adjusted in this way.

Fourth, and arguably most important, the above discussion crystallises the central issue on the consideration of earlier data. That is, there are significant problems with the earlier data, regardless of which adjustment is used. This finding, in part, informs our position to consider different sampling periods. For example, Brailsford et al stated, 'estimates based on data before 1958 should be treated with caution because of concerns over data quality and the imprecision of the underlying series'.[1434] They specifically noted that:[1435]

- employing hindsight in sample selection commonly imparts an upward (survivorship) bias[1436]
- the Commercial and Industrial price index from 1875 to 1936 does not include the financial sector and, therefore, is not strictly comparable to the All Ordinary Shares price index that followed from 1936 to 1957
- the Commercial and Industrial price index from 1875 to 1936 suffers from narrow coverage—there are only five stocks in the index in 1875, 12 in 1905 and 47 in 1935
- Australian government stock price controls were in operation from November 1941 to February 1947 and, therefore, prices over this period were not fully market determined
- each of Lamberton's (1958) industry indices are value-weighted, but in forming the All Ordinary Shares index and the All Ordinary Shares (excluding Financial) index, the relevant component industry indices have been weighted according to their aggregate amount of paid up capital.

Brailsford et al. subsequently considered that:[1437]

> Although it is difficult to draw a conclusion on the extent to which the above issues impact on the observed rates of return on the equity index relative to the unobserved 'true' rates of return, a consequent bias leading to an overstatement of equity performance up to the mid-1950s is probable.

[1433] Lally, *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, March 2014, p. 6.

[1434] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 75.

[1435] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 76–77.

[1436] This survivorship bias is discussed further in section C.1.3.

[1437] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 77.

Lally held similar views in its 2014 report for the QCA. He considered both adjustments (NERA's and the ASX's) reflect adversely upon the quality of the earlier data (up to 1958).[1438] In his 2006 article, Fitzherbert also stated:[1439]

> there were special problems in calculating the pre-1937 data. The starting point was the average of the highest and lowest sale price for each stock for the month (Lamberton, 1958b). Other points worth noting are the small number of companies in the index in the early days and, at times, the high turnover of constituents.

Further, our consideration of different time (or sampling) periods, and averaging methods, in estimating the MRP from historical excess returns reduces the materiality of NERA's submission.[1440] Table 3-47 shows NERA's adjustment would only affect one of these time periods. When implemented, NERA's adjustment does not materially alter the estimates obtained from the full suite of estimation techniques. We also consider that concerns regarding the possible causes of upward bias in MRP estimates from historical excess returns are still applicable (see section C.1.3).[1441]

Table 3-47 Historical excess returns using NERA's adjustment to earlier data, 0.6 theta (per cent)

Sampling period	Arithmetic average (without NERA adjustment)	Arithmetic average (with NERA adjustment)
1883–2014	6.2	6.6
1937–2014	5.9	5.9
1958–2014	6.4	6.4
1980–2014	6.3	6.3
1988–2014	5.8	5.8

Source: AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 83; AER updates

As noted above, we also received a March 2015 submission from United Energy that supported NERA's views. In reference to the ASX adjustment, United Energy submitted that:[1442]

> The method does not provide a safe basis upon which to establish an arithmetic mean for the MRP for regulatory purposes.

1438 Lally, *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, March 2014, p. 6

1439 Fitzherbert, *Australian equity returns: another look at the historical record*, JASSA, Issue 3, Spring 2006, p. 22

1440 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 83–84.

1441 AER, *Explanatory statement: rate of return guideline (appendices)*, December 2013, pp. 79–80.

1442 United Energy, *Submission on the historical market risk premium (MRP), in response to the revised regulatory proposal for Jemena Gas Networks (JGN)*, 26 March 2015, p. 14.

We are not satisfied United Energy has provided sufficient evidence to support its submission. United Energy questioned the peer review process of the Accounting and Finance Journal (in which the Brailsford et al. study was published). It also submitted there is no evidence that the ASX (or Standard and Poors) has given its corporate endorsement to the series used by Brailsford et al.[1443] However, this information does not provide us with evidence to suggest the ASX's adjustment is erroneous. We responded to United Energy's submission in more detail in our final decision for JGN, and this material remains relevant.[1444]

Since our final decision for JGN, in light of United Energy's communications, we have made enquiries and have no reason to believe Brailsford et al.'s claim is incorrect. We remain satisfied Brailsford et al.'s claim that the ASX provided them the adjusted data is correct. We find the service providers repetition of this issue, which has been clearly addressed by Handley and us several times, does not add value to the regulatory process. This process is built on constructive engagement and robust testing of the substantive issue at hand.

C.2 Dividend growth models

We can use DGMs to derive the return on equity.[1445] DGMs derive the return on equity in a way that makes the forecast dividends for a business consistent with the market value of its equity.[1446] There are many ways to construct a DGM. We derive an estimate and range using our preferred construction of the DGM. The following equation depicts the DGM, which estimates *k*, the expected return on equity for the market portfolio:

$$P_c = \frac{m \times E(D_c)}{(1+k)^{m/2}} + \sum_{t=1}^{N} \frac{E(D_t)}{(1+k)^{m+t-0.5}} + \frac{\frac{E(D_N)(1+g)}{k-g}}{(1+k)^{m+N-0.5}}$$

Where: Pc is the current price of equity, for which we use the S&P/ASX 200 index as the proxy

E(Dc) is expected dividends per share for the current financial year[1447]

E(Dt) is expected dividends per share for the financial year t years after the current financial year

m is the fraction of the current financial year remaining, expressed as a decimal point

N is the time period after which dividend growth reverts to its long-term rate (for the two-stage model, N = 2, for the three-stage model N = 9)

g is the expected long term growth rate in nominal dividends per share

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1443 United Energy, *Submission on the historical market risk premium (MRP), in response to the revised regulatory proposal for Jemena Gas Networks (JGN)*, 26 March 2015, pp. 10–13.

1444 AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, pp. 341–343.

1445 For clarity, we use the term 'return on equity' in regards to market value. This is consistent with the rest of our decision, and the use of terminology in the rules. In its report on the DGM, SFG uses 'return on equity' in regards to book value and uses the term, 'cost of equity' with regards to market value.

1446 This is consistent with the finance principle that equilibrium stock prices are the present value of a stream of dividends. See Brigham, E.F., Daves, P.R. 2010, 'Intermediate Financial Management', Ed. 10, South-Western Cengage Learning, p. 161

1447 We sourced dividend forecasts from Bloomberg. We have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

k is the discount rate-that is, the return on equity.

Appendix B–DGM sets out detailed reasons for our preferred construction of the DGM. This construction is consistent with that set out in our Guideline.[1448]

Our preferred construction of the DGM produces an estimate of the MRP within the range of 7.5 to 8.6 per cent for the two months ending August 2015.[1449] Table 3-48 shows how we construct this range from DGM estimates under different assumptions.[1450]

Table 3-48 MRP estimates under dividend growth models, 0.6 theta (per cent)

Growth rate [a]	Two stage model	Three stage model
4.0	7.5	7.7
4.6	8.1	8.2
5.1	8.5	8.6

Source: Bloomberg, AER analysis.

Note: The range of the DGM estimates reflects our two and three stage DGMs and the range of Lally's estimates of the expected long term growth in real dividends per share. He suggests a range of 1.5 per cent, 2.0 per cent and 2.5 per cent. These estimates correspond to estimates of g, the expected long term growth in nominal dividends per share, of 4.0 per cent, 4.6 per cent and 5.1 per cent. See: Lally, *The Dividend Growth Model*, 4 March, 2013; Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013; and section B.2.1 of appendix B–DGM.

The DGM range is formed using a number of assumptions. We have conducted a sensitivity analysis in our appendix on the DGM (see section B.5). This shows that, like all DGM analyses, estimates vary considerably when we alter assumptions within a reasonable range. This is one of a number of limitations associated with practically implementing DGMs, and these are discussed in detail in appendix A–equity models, appendix B–DGM and under step two in section 3.4.1 of this attachment.

C.2.1 Reasons for our dividend growth model

1448 For more information on our preferred DGM construction, see: AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 114–125. Note that since publishing our Guideline we have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

1449 This end date is close as practical to the publication of this decision and encompasses the final and placeholder risk free rate averaging periods we adopt for the SA/Qld DNSPs and Vic DNSPs respectively.

1450 The range of the DGM estimates reflects our two and three stage DGMs and the range of estimates of the expected long term growth rate in nominal dividends per share that we consider.

Several service providers have proposed applying an alternative version of the DGM, which we have regard to (see appendix B–DGM).[1451] However, we consider our DGM construction preferable for estimating the MRP in the regulatory context. This is for the following reasons:

- When developing the Guideline, we developed our preferred construction of the DGM in consultation with stakeholders. Following this, we engaged experts to critically review our construction of the DGM.[1452] We consider their advice suggested that, overall, our construction of the DGM is reasonable.[1453]
- We have considered various submissions on our construction of the DGM during the Guideline development process and as a part of our recent decisions for several service providers published in April/June 2015.[1454] These submissions have not satisfied us that there are good reasons to depart from our construction of the DGM, which we consider to be more suitable for regulatory purposes (see appendix B–DGM).
- We consider our estimated long term growth rate of nominal dividends per share of 4.6 per cent to be reasonable, if not 'somewhat on the generous side'.[1455] We base

[1451] SA Power Networks, Energex, Ergon Energy, ActewAGL, AGN, APTNT, Jemena Electricity Networks, CitiPower, Powercor, UE and AusNet Services submitted we consider SFG's DGM (in estimating the MRP and/or as part of multiple model approaches to determine either the return on equity or the equity beta for use in the SLCAPM). They did this by submitting SFG's reports in which it uses its own DGM construction, or by directly proposing SFG's DGM in their proposals or revised proposals (for example, Energex, *Revised regulatory proposal*, July 2015, p. 96; APTNT, *Access arrangement information*, August 2015, p. 24). SFG's DGM is set out in: SFG, *Alternative versions of the dividend discount model and the implied cost of equity: Report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, Transend and TransGrid*, 15 May 2014 (SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014); and SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013. SFG again proposed its DGM construction in its 2015 report: SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, AusNet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015, section 5 (SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015). SA Power Networks, Ergon Energy, ActewAGL, AGN, Jemena Electricity Networks, CitiPower, Powercor, United Energy and AusNet Services submitted SFG's February 2015 report.

[1452] McKenzie and Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December 2013; Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013.

[1453] For example, McKenzie and Partington found our 'implementation of a two stage model is a reasonable, transparent and easily reproducible' and recommended we consider a transition to long term growth (which we subsequently adopted). See McKenzie and Partington, *The DGM*, December 2013, p. 24.

[1454] See SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013; SFG, *Reconciliation of dividend discount model estimate with those compiled by the AER*, 10 October 2013; SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015.

[1455] McKenzie, Partington, *The DGM*, December 2013, p. 15. McKenzie and Partington find the average of the long term dividend growth rate estimates they consider is 3.73 per cent (3.78 per cent excluding the most extreme values).

this estimate on expert advice by Lally.[1456] See section B.2.1 of appendix B–DGM for how Lally produces this estimate.

Further, we have assessed SFG's and our construction of the DGM against our criteria (see section B.2.7 of appendix B–DGM). This analysis explains why we are satisfied our construction of the DGM is more robust than SFG's construction.

C.3 Survey evidence

Survey estimates explore investor expectations about the MRP. They achieve this by directly asking investors and market practitioners what their expectations are and/or what they apply in practice. We place some reliance on survey estimates in estimating the MRP. Our assessment of survey evidence against the criteria set out in the Guideline informs our use of this information.[1457]

Table 3-49 sets out key findings from market surveys published since 2013. Estimates from these surveys cluster around 6.0 per cent. The 2015 survey estimates are generally equal to or lower than their 2013 and 2014 counterparts. This provides some evidence to suggest that investor expectations of the MRP have not increased, and may have eased.

Table 3-49 Key findings from recent MRP surveys

Survey	Numbers of responses	Mean (%)	Median (%)	Mode (%)
Fernandez et al (2013)	73	5.9	6.0	N/A
KPMG (2013)[b]	19	N/A	6.0	6.0
Fernandez et al (2013)	17	6.8	5.8	N/A
Asher and Hickling (2013)	46	4.8	5.0	6.0
Fernandez et al (2014)	93[a]	5.9	6.0	N/A
Asher and Hickling (2015)	27[c]	4.4	4.6	6.0[d]
Fernandez et al (2015)	40	6.0	5.1	N/A
KPMG (2015)	~27[e]	N/A	6.0	6.0

Sources: Several survey reports.[1458]

[1456] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, p. 14.

[1457] For our assessment, see steps one and two in section 3.4.1 of this attachment.

[1458] KPMG, *Australian valuation practices survey 2015*, May 2015; Fernandez, Ortiz, Acin, *Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey*, April 2015; Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015; Fernandez, Linares, Acín, *Market Risk Premium used in 88 countries in 2014*, IESE Business School, June 2014; Asher and Hickling, *Equity Risk Premium Survey*, Actuary

Notes: a) The 2014 survey did not report the response rate. AER staff obtained this information from Professor Fernandez via email correspondence on 22 July 2014.

b) While this survey had 23 market participants, 19 specified what MRP they used.

c) The response rate for this survey is lower than the response rate in previous Asher and Hickling surveys because the survey took place from 5 December 2014 to 14 December 2014, which was very close to Christmas.

d) AER staff obtained this information from Associate Professor Anthony Asher via email correspondence on 17 September 2015.

e) The KPMG (2015) survey had 29 market participants, but figure 24 indicates that not all the market participants gave a response for the MRP. However, visual inspection indicates that the response rate was approximately 27.

We recognise the Tribunal has in the past made comments on several factors that should be considered when using survey evidence to estimate the MRP.[1459] It stated:[1460]

> Consideration must be given at least to the types of questions asked, the wording of those questions, the sample of respondents, the number of respondents, the number of non-respondents and the timing of the survey. Problems in any of these can lead to the survey results being largely valueless or potentially inaccurate.

We apply the Tribunal's criteria to the survey evidence we consider. We note that triangulation across surveys can reduce the limitations associated with particular survey evidence.[1461] We consider the surveys we rely on are reasonably consistent with the Tribunal's criteria for the following reasons:

- Timing of the survey—we consider the timing of each survey is clear in all but two surveys we consider, and the earliest survey we consider was published in January 2013 but sent out its questionnaires in May and June 2012.[1462]

Australia, December 2013; Fernandez, Arguirreamalloa and Linares, *Market Risk Premium and Risk Free Rate used for 51 countries in 2013*, IESE Business School, June 2013; KPMG, *Valuation Practices Survey 2013*, February 2013; Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 82 Countries in 2012*, IESE Business School, January 2013.

1459 In its 2014 and 2015 reports, SFG has raised this as a reason for why we should not place any reliance on MRP estimates from survey evidence. See: SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 66–71; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 42–47; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 26.

1460 Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 11 January 2012, paragraphs 165–166.

1461 McKenzie and Partington considered triangulation increases their confidence in the results from survey evidence. McKenzie and Partington, *Supplementary report on the MRP*, February 2012, pp. 17, 19–20.

1462 The KPMG valuation practices surveys do not clearly state the time period over which the survey was made. Fernandez, Ortiz, Acin, *Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey*, April 2015, p. 2; Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015, p. 1; Fernandez, Linares, Acín, *Market Risk Premium used in 88 countries in 2014*, IESE Business School, June 2014, p. 2; Asher and Hickling, *Equity Risk Premium Survey*, Actuary Australia, December 2013, p. 26; Fernandez, Arguirreamalloa and Linares, *Market Risk Premium and Risk Free Rate used for 51 countries in 2013*, IESE

- Sample of respondents—financial managers and analysts, expert valuers, actuaries, finance academics, investment banks, professional services firms and infrastructure funds were among the target respondents of surveys. These professionals apply the MRP, so we consider the surveys' target populations can make informed judgments about the MRP. Each survey also sets out the selection of the sample surveyed (or respondents).[1463]
- Wording of survey questionnaires—we consider the adequacy of survey wording can be subjective to judge and often relies on the quality of the authors. However, we also consider confidence in this area can be enhanced when the work is published in a refereed academic journal, or when the survey is repeated.[1464] All but one survey we consider has been repeated at least three times.[1465]
- Survey response rate and non-response bias—McKenzie and Partington suggested a sample size of more than 30 is sufficiently large statistically so a representative sample of 30 respondents is expected to be adequate.[1466] Four of the surveys we consider have over 30 respondents (see Table 3-49).[1467]

We also note, while one could consider independent valuation reports a type of survey evidence, we do not use this information to inform our estimate of the MRP. Rather, we use this information to inform the overall return on equity.[1468] In its 2014 reports for several service providers, SFG submitted that we used this information to inform our MRP in the Guideline.[1469] SFG based this on the reliance we gave to the surveys, Ernst & Young (2012) and KPMG (2013).[1470] In this decision, we only consider MRP survey evidence from 2013. Further, we note that KPMG (2013) is not an independent

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Business School, June 2013, p. 2; Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 82 Countries in 2012*, IESE Business School, January 2013, p. 2.

1463 KPMG, *Australian valuation practices survey 2015*, May 2015, p. 2; Fernandez, Ortiz, Acin, *Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey*, April 2015, p. 3; Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015, p. 1; Fernandez, Linares, Acín, *Market Risk Premium used in 88 countries in 2014*, IESE Business School, June 2014, p. 2; Asher and Hickling, *Equity Risk Premium Survey*, Actuary Australia, December 2013, p. 26; Fernandez, Arguirreamalloa and Linares, *Market Risk Premium and Risk Free Rate used for 51 countries in 2013*, IESE Business School, June 2013, p. 2; KPMG, *Valuation Practices Survey 2013*, February 2013, p. 2; Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 82 Countries in 2012*, IESE Business School, January 2013, p. 2.

1464 AER, *Access arrangement draft decision: Multinet Gas (DB No. 1) Pty Ltd Multinet Gas (DB No. 2) Pty Ltd 2013–17—Part 3 appendices*, September 2012, p. 32.

1465 We consider four Fernandez et al. surveys in our sample (and more have been published prior to 2013). The 2014 Asher and Hickling survey is the fourth year for which they had done the survey (see: Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015, p. 1).

1466 McKenzie and Partington, *Supplementary report on the MRP*, February 2012, pp. 17–18.

1467 See AER, *Access arrangement draft decision: Multinet Gas (DB No. 1) Pty Ltd Multinet Gas (DB No. 2) Pty Ltd 2013–17—Part 3 appendices*, September 2012, pp. 33–34 for more information on Graham and Harvey's findings on sample representiveness and non-response bias.

1468 See steps one and two of this attachment.

1469 SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, p. 74; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 50.

1470 Ernst & Young, *Market evidence on the cost of equity*, 8 November 2012; KPMG, *Valuation Practices Survey 2013*, February 2013.

valuation report, nor does it summarise independent valuation reports. Rather, it is a survey of methodologies adopted by Australian financial analysts and corporate financiers.[1471]

In its 2015 report, SFG submitted that survey evidence does not provide relevant evidence for estimating the MRP because the evidence suggests market participants are simply regurgitating historical excess returns.[1472] We do not agree with SFG's view. We are estimating the expected MRP. We consider survey estimates reflect investors' expectations of the MRP. What evidence investors use to form their expectations is their choice and, in our view, does not deem these estimates irrelevant.

Several service providers also submitted that the surveys we use do not appear to have been undertaken in compliance with the Federal Court guidelines for conducting surveys. This is because they were not consulted by the conductors of the surveys before the surveys were administered.[1473] We are undertaking a regulatory process and we draw on a broad range of material to inform our decision about the rate of return as required by the rules. Much of this material is prepared by market participants for practical purposes and it would be unreasonable to expect that all material we consider would be prepared in compliance with the Federal Court guidelines. We carefully consider the merits of all of the material available to us in our process.

C.4 Conditioning variables

Conditioning variables are variables that can be used to make adjustments to the average historical excess return, or in other words, condition it. We consider three types of conditioning variables: dividend yields, credit spreads and implied volatility.

We do not consider conditioning variables provide reliable estimates of the MRP on their own. However, this information is relevant and may be useful for indicating changes in general market conditions.[1474] This can be valuable in complying with the NER and NGR requirement to have regard to the prevailing conditions in the market for equity funds.[1475] Our assessment of conditioning variables against our criteria informs this position.[1476] From this assessment, we found there are some important limitations

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1471 KPMG, *Valuation Practices Survey 2013*, February 2013, p. 1.

1472 SFG, *The required return on equity for the benchmark efficient entity*, February 2015, p. 26. Also, in a subsequent 2015 report for JGN, SFG submitted that survey evidence reflects historical information because the surveys we consider 'almost invariably' report an MRP of 6.0 per cent (see: SFG, *Cost of equity: Update for Jemena Gas Networks' averaging period —19 January to 16 February 2015*, 27 March 2015, p. 7). United Energy also submitted that respondents may be providing estimates of the MRP that are based on the geometric mean of a sample of annual returns to the market portfolio (see United Energy, Regulatory proposal: Attachment—Rate of return on equity, April 2015, p. 86).

1473 See, for example, AusNet Services, *Regulatory proposal*, 30 April 2015, p. 324; United Energy, *Regulatory proposal: Attachment—Return on equity*, April 2015, section 2.7.7.3; Jemena Electricity Networks, *Regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, p. 75; Federal Court of Australia (PA Keane Chief Justice), *Practice note CM 13: Survey evidence*, 1 August 2011.

1474 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 93–100.

1475 NER cll. 6.5.2(g), 6A.6.2(g); NGR r. 87(7).

1476 See steps one and two in section 3.4.1 of this attachment.

to this source of evidence. However, we also found this information valuable for detecting changes in market conditions.

Further, considering conditioning variables symmetrically through time will avoid bias in regulatory outcomes. This is important because, since the weighted average cost of capital (WACC) review in 2009, various service providers have presented this information asymmetrically. For example, in periods where the implied volatility suggested the MRP should be significantly above the long term average, service providers relied upon this evidence.[1477] However, when implied volatility estimates fell in 2013, service providers did not propose we consider this evidence.[1478]

For the reasons set out below, we consider that, overall, the conditioning variables appear fairly stable and close to their long term averages. This is particularly apparent when compared with the sharp increases in these variables seen between 2008–13, which were likely associated with the height of the Global Financial Crisis (GFC) and European debt crisis. Therefore, we consider the conditioning variables do not support a change in the MRP above or below that implied by its long term average.

It is important to note that we are estimating a 10 year forward looking MRP with regard to prevailing conditions in the market for equity funds. This is not equivalent to estimating a short term MRP. In this context, prevailing conditions can be considered 'prevailing expectations' over the relevant forward looking timeframe, which is 10 years. Therefore, we consider short term fluctuations in conditioning variables should be treated with caution.

In its February and June 2015 reports, Gray and Hall (as SFG and Frontier) submitted that if conditioning variables are to be used in estimating the MRP, the risk free rate should be included among them.[1479] We did not agree with this submission in our April/June 2015 final and preliminary decisions, and we do not agree with it for this decision.[1480] This is primarily because the evidence before us is insufficient to satisfy us that there is a clear relationship between the 10 year forward looking risk free rate and MRP (see section C.7). Moreover, we have regard to the possibility of an inverse relationship between the risk free rate and MRP when we consider the Wright approach at the overall return on equity level (steps four and five of our foundation model approach).

In its June 2015 report, Gray and Hall (as Frontier) submitted that:[1481]

1477 See, for example, AER, *Final decision: Envestra Ltd access arrangement proposal for the SA gas network 2011–2016*, June 2011, pp. 195–197; VAA, *MRP for Envestra*, March 2011, p. 4.

1478 We note that, during the Guideline development process in 2013, the ENA submitted there is a high degree of uncertainty over the relevance of implied volatility. See ENA, *Response to the draft guideline*, October 2013, p. 47.

1479 SFG, *The required return on equity for the benchmark efficient entity*, February 2015, p. 27; Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 63.

1480 See, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, p. 351.

1481 Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, p. 44.

> In summary, the AER states or demonstrates (or both) that all of its conditioning variables either remained constant or increased between its November 2014 draft decisions and its recent final decisions. This all points towards, if anything, an increase in the MRP over the relevant period.

We disagree with this submission because Gray and Hall have mischaracterised how we consider conditioning variables. We do not consider conditioning variables in relation to their levels in a previous decision. We consider conditioning variables more holistically, generally in relation to their long term averages. We then consider whether they support a change in the MRP above or below that implied by its long term average. SFG appeared to agree with this consideration of conditioning variables in a 2014 report to the Economic Regulation Authority (ERA), which was submitted to us by APTNT (Amadeus gas pipeline) with its access arrangement proposal. In this report, SFG stated:[1482]

> In our view, IPART (2013) sets out the proper use of indicator variables in the regulatory setting. They consider indicator variables relative to their historical distribution to provide some indication of where the MRP might be relative to its historical distribution.

C.4.1 Dividend yields

We use dividend yields as a directional indicator of the MRP.[1483] We consider this information by comparing current dividend yields with the average dividend yield through time.[1484] Figure 3-21 shows dividend yields against their historical average up to 28 July 2015.[1485]

Figure 3-21 shows dividend yields are close to their long term average and there is no discernible trend. These have been relatively steady over the last two years (approximately).

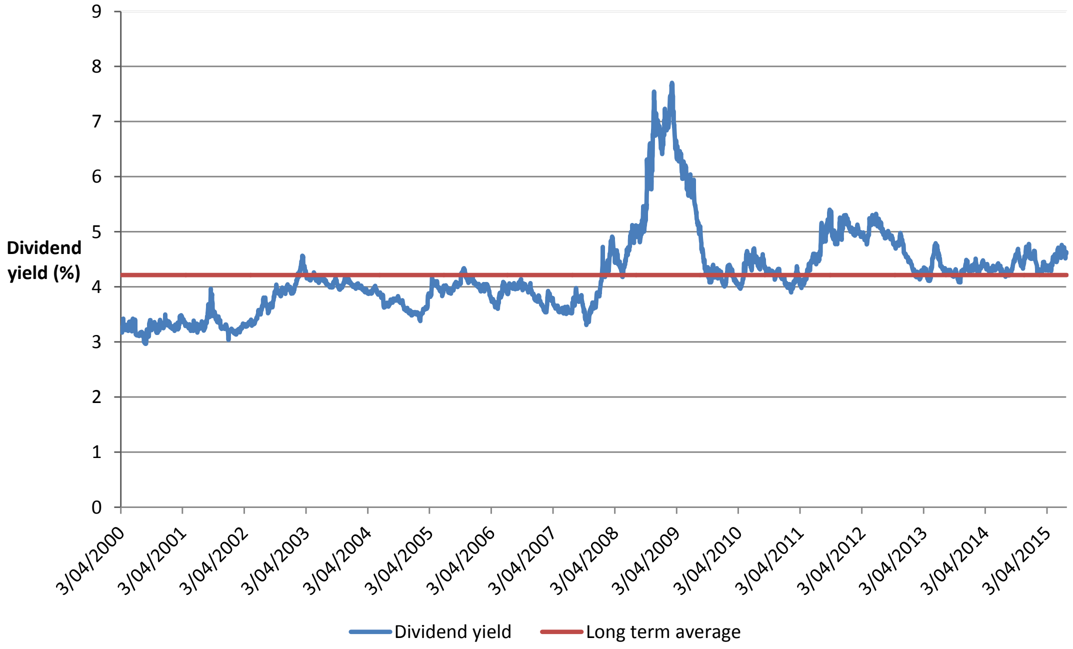
1482 SFG, *The required return on equity: Response to ATCO Gas Draft Decision—Report for ATCO Gas Australia*, 24 November 2014, p. 24

1483 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 94.

1484 For a similar approach, see SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, p. 13.

1485 This is the end date of the risk free rate averaging period we adopt for the SA/Qld DNSPs (1 July 2015 to 28 July 2015).

Figure 3-21 Dividend yields



Source: Bloomberg, AER analysis.

In its January and April 2015 reports for several service providers, CEG submitted that dividend yields have risen relative to pre-GFC levels. CEG stated that this implies 'the MRP measured relative to CGS has risen by a more than offsetting amount than the fall in CGS'.[1486] We do not agree with this submission. Figure 3-21 shows dividend yields up to 28 July 2015. This figure shows that even though dividend yields appear slightly higher than their pre-2007 levels, they remain close to their long term average and have been for the last two years (approximately). They do not appear to have increased as CGS yields have decreased.

Upon further analysis, it appears that CEG's submission may be based on an interpretation of dividend yields at the return on equity, rather than the MRP, level. Even if this is the case, we continue to disagree with CEG's submission. We consider dividend yields at the MRP level, as discussed in steps one and two of section 3.4.1. In the Guideline we considered this issue and stated that:[1487]

> there is some empirical support for dividend yields as a predictor of equity returns and excess returns. However, the bulk of the empirical support is for dividend yields informing the MRP. Regulated businesses and their consultants have proposed dividend yields as a useful indicator for the MRP in the past. As such, we consider these estimates are fit for the purpose of informing the MRP.

[1486] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 26–27; CEG, *Measuring risk free rates and expected inflation*, April 2015, p. 22.

[1487] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 93–94.

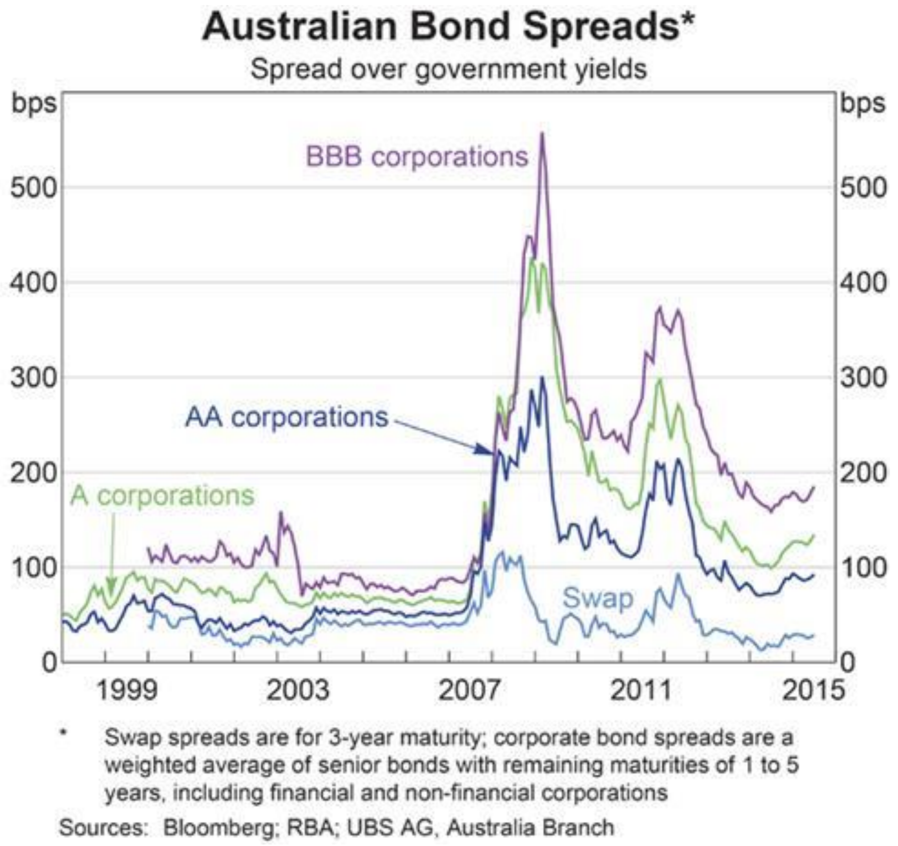
C.4.2 Credit spreads

Credit spreads are the spreads between the risk free rate and the return on debt for different debt instruments. We use credit spreads as a directional indicator of the MRP.[1488] We consider this information can be used to indicate changes in market conditions. That is, to indicate whether spreads are widening, stabilising or falling.

Figure 3-22 shows credit spreads for a range of debt instruments over yields on CGS. The RBA publishes this graph monthly and Figure 3-22 shows credit spreads up to the end of July 2015 (approximately). These credit spreads were showing a clear downward trend from approximately 2012 before widening slightly in recent times.

Most credit spreads are also above their pre-2007 levels, while the swap rate spread is at or below its pre-2007 levels. In essence, lower quality debt is further from pre-2007 levels than higher quality debt. However, the credit spreads are all substantially lower than they were between 2008 and 2013.

Figure 3-22 Australian bond spreads over government yields



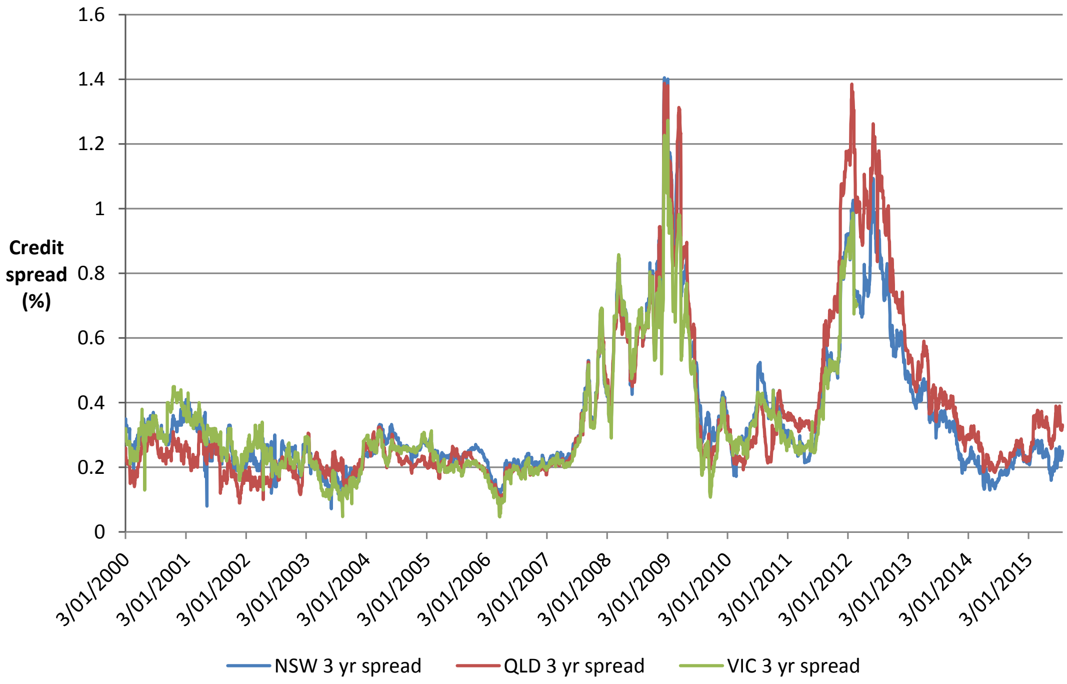
Source: RBA, Chart Pack, August 2015 (data updated to end of July 2015, approx.).

Note: Swap spreads are for a 3 year maturity. Corporate bonds are a weighted average of senior bonds with remaining maturities of 1 to 5 years and include financial and non-financial corporates.

1488 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 96.

Figure 3-23 shows the spread between state government debt and CGS up to 28 July 2015. This uses maturities of three years as more data are available. Figure 3-23 shows that credit spreads were falling since late 2012, and are now around their pre-2007 levels with no discernible trend.

Figure 3-23 State government bond spreads over government yields



Source: RBA, AER analysis.

C.4.3 Implied volatility

The implied volatility approach is based on an assumption that the MRP is the price of risk multiplied by the volume of risk (volatility).[1489] In the past, Value Adviser Associates (VAA) submitted on behalf of a service provider that we apply an implied volatility 'glide path' to 10 years.[1490] This is because implied volatility generates an MRP estimate that has the same horizon as the underlying options. In the Guideline, we considered a 'glide path' to extend the estimate to a horizon of 10 years.[1491] However, the Guideline also specified we would only use this information as a directional indicator. As such, we do not use a point estimate from implied volatility to inform our MRP estimate.

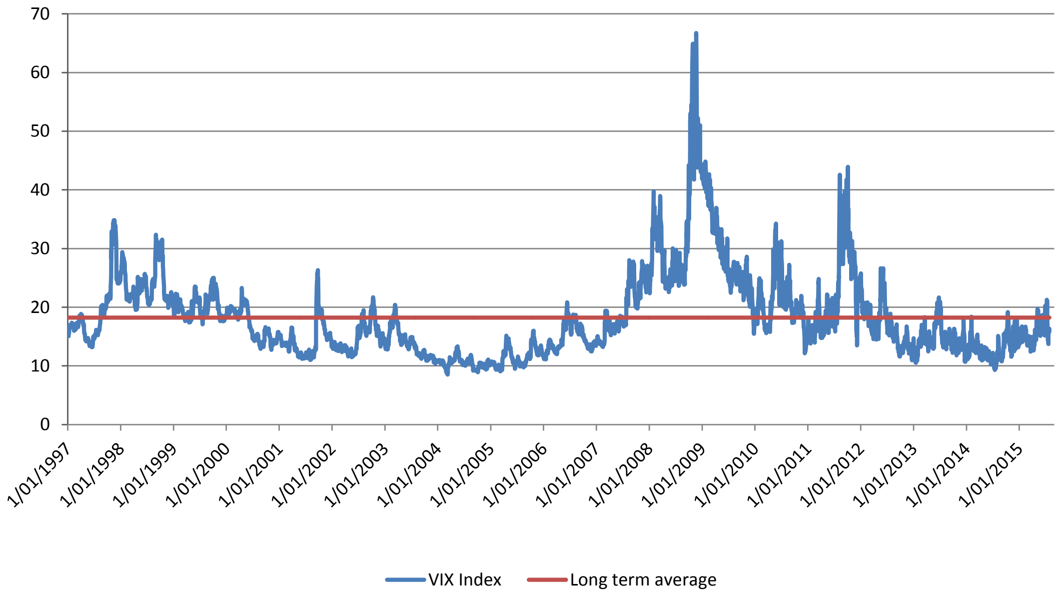
1489 This was based on Merton, R.C., 'On Estimating the Expected Return on the Market: An Exploratory Investigation', *Journal of Financial Economics*, 1980, Vol. 8, pp. 323–361.

1490 We have corrected for some errors in VAA's approach. See AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 98–99. For VAA's approach, see VAA, *MRP for Envestra*, March 2011.

1491 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 98–99.

Implied volatility was high during the global financial crisis (GFC) and the height of the European debt crisis. However, recent implied volatility levels have generally been below the long run average of 18.2 per cent (measured from the start of the data series in 1997). On 28 July 2015, the ASX200 implied volatility index (VIX) was 16.3 per cent. Using the same averaging period as the risk free rate, the ASX200 VIX was 17.4 per cent.[1492] Over the year ending 28 July 2015, the ASX200 VIX was 15.0 per cent. Figure 3-24 shows the value of this measure of implied volatility relative to its long run average level from the start of the data series in 1997 to 28 July 2015. Together, we consider the implied volatility evidence suggests the MRP is below, but close to, its historical average level.

Figure 3-24 Implied volatility (VIX) over time



Source: ASX200 VIX volatility index, sourced via Bloomberg cost AS51VIX from 2/1/2008 and CITJAVIX prior to 2/1/2008.

C.5 Recent decisions by Australian regulators

In the Guideline, we proposed to review the MRPs in recent Australian regulatory decisions at the time of each decision.[1493] This provides a comparison of what other regulators consider to be a reasonable estimate of the MRP. This information provides a check on how we are considering information before us.

1492 This averaging period is from 1 July 2015 to 28 July 2015.

1493 AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, pp. 100–102.

Table 3-50 sets out the MRPs adopted by other Australian regulators responsible for economic regulation across the electricity, water, rail and telecommunications industries. The most recent MRP estimate from each regulator is:[1494]

- ACCC—6.0 per cent[1495]
- ERA—7.6 per cent
- NT Utilities Commission—6.0 per cent
- QCA—6.5 per cent
- IPART—7.2 per cent (mid-point)
- ESCV—6.0 per cent
- TER—6.0 per cent
- ESCOSA—6.0 per cent.

Table 3-50 Recent regulatory decisions

Regulator	Decision date	Sector	MRP (%)
ERA	June 2015	Gas	7.6
QCA	May 2015	Water	6.5
ESCV	April 2015	Water	6.0
TER	April 2015	Water	6.0
ESCOSA	March 2015	Water	6.0
ACCC	March 2015	Telecom	6.0
ESCV	February 2015	Water	6.0
IPART	February 2015	General/policy	7.2 (mid-point), using 6.0 (10 year), 8.3 (40 day end 31 January 2015)
QCA	February 2015	Water	6.5
TER	January 2015	Water	6.0

1494 See Table 3-50 below for references.

1495 We note that this estimate is based on the ACCC's draft decision on the fixed line services supplied by Telstra (ACCC, *Public inquiry into final service determinations for fixed line services—Primary price terms: Draft decision*, March 2015, p. 82). The ACCC released its final decision on October 2015, which maintained its MRP estimate of 6.0 per cent (ACCC, *Public inquiry into final service determinations for fixed line services: Final decision*, October 2015, p. 67). However, we consider information up to the end of July 2015 for the SA/Qld DNSPs and the end of August 2015 for the Victorian DNSPs in estimating the MRP. This is reasonably consistent with the risk free rate averaging periods we use for these NSPs. Therefore, we do not include the ACCC's final decision in our analysis.

Regulator	Decision date	Sector	MRP (%)
ERA	November 2014	Rail	7.9
ERA	October 2014	Rail	6.0
ERA	October 2014	Gas	5.5
QCA	September 2014	Water	6.5
QCA	September 2014	Rail	6.5
QCA	August 2014	General/policy	6.5
IPART	July 2014	Rail	Mid-point WACC, using 5.5–6.5 (long-term), 7.6–8.7 (current market data)
ACCC	June 2014	Water	6.0
IPART	June 2014	Water	Mid-point WACC, using 5.5–6.5 (10 year), 7.2–8.6 (40 day end 12 May 2014)
NTUC	April 2014	Electricity	6.0
ERA	July 2013	Rail	6.0
ESCV	June 2013	Water	6.0
IPART	June 2013	Water	Mid-point WACC, using 5.5–6.5 (long), 7.6 (short)
ESCOSA	May 2013	Water	6.0
IPART	May 2013	Water	Mid-point WACC, using 5.5–6.5 (long), 7.4 (short)
QCA	April 2013	Water	6.0
ERA	March 2013	Water	6.0

Source: Independent Pricing and Regulatory Tribunal (IPART), Economic Regulation Authority (ERA), Essential Services Commission of Victoria (ESCV), Essential Services Commission of South Australia (ESCOSA), Queensland Competition Authority (QCA), Northern Territory Utilities Commission (NTUC), Tasmanian Economic Regulator (TER).[1496]

[1496] ERA, *Final decision on proposed revisions to the access arrangement for the mid-west and south-west gas distribution systems*, 30 June 2015, p. 187; QCA, *Final report: Gladstone area water board price monitoring 2015–2020*, May 2015, p. 53; ESCV, *Melbourne Water 2016 price review—Guidance paper*, April 2015, p. 28; TER *Final report: 2015 price determination investigation—Regulated water and sewerage services in Tasmania*, April 2015,

C.6 Adjusting for imputation credits in the MRP

Insofar as investors value imputation credits, the definition of the equity risk premium in SLCAPM should account for the capitalised value of personal tax credits. This is because under an imputation tax system, some personal tax payments will be capitalised into the risk premium.[1497]

The risk premium will reduce when some personal tax payments are capitalised into it. Therefore, we need to adjust the MRP to include personal tax credits. This adjustment is required to calculate the return on equity that reflects an after-company tax but before-personal tax return. This is to be consistent with the return on capital and cash flows which are defined on an after company tax but before personal tax basis.[1498] It is also a requirement in the NER and NGR.[1499]

We discussed this issue and responded to the service providers' views in detail in April/June 2015 final and preliminary decisions.[1500] We do not consider the service providers have submitted new analysis to support their views. Therefore, we maintain our views and reasoning from these decisions. This is reproduced below.

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p. 46; ESCOSA, *SA Water regulatory rate of return 2016–2020: Final report to the Treasurer*, March 2015, pp. 64–65 ; ACCC, *Public inquiry into final service determinations for fixed line services—Primary price terms: Draft decision*, March 2015, p. 82; ESCV, *Proposed approach to Melbourne Water's 2016 water price review—Consultation paper*, February 2015, p. 39; IPART, Fact *sheet: WACC biannual update*, February 2015, p. 2; QCA, *Draft report: Gladstone area water board price monitoring 2015–2020*, February 2015, p. 42; TER *Draft report: 2015 price determination investigation—Regulated water and sewerage services*, January 2015, p. 41; ERA, *Revised draft decision: Review of the method for estimating the weighted average cost of capital for the regulated rail networks*, 28 November 2014, p. 98; ERA, *Determination on the 2014 weighted average cost of capital for the freight and urban railway networks*, 24 October 2014, p. 5; ERA, *Draft decision on proposed revisions to the access arrangement for the mid-west and south-west gas distribution system—Submitted by ATCO Gas Australia Pty Ltd*, 14 October 2014, p. 168; QCA, *Final report: SEQ Retail Water long-term regulatory framework—Weighted average cost of capital (WACC)*, September 2014, p. 18; QCA, *Draft decision: Aurizon Network 2014 draft access undertaking—Maximum allowable revenue*, September 2014, p. 237; QCA, *Final decision: Cost of capital market parameters*, August 2014, p. 59; IPART, *NSW rail access undertaking review of the rate of return and remaining mine life—Transport final report and decision*, July 2014, p. 13; ACCC, *Final decision on State Water pricing application 2014–15—2016–17*, June 2014, p. 37; IPART, *Essential Energy's water and sewerage services in Broken Hill—Final report*, June 2014, p. 165; NTUC, *Network price determination, Part A—Statement of reasons*, April 2014, p. 120; ERA, *Determination on the 2013 WACC for the freight and urban railway networks*, July 2013; ESC, *Price review 2013: Greater metropolitan water businesses—Final decision*, June 2013; ESC, *Price review: Regional urban water businesses—Final decision*, June 2013; ESC, *Price review 2013: Rural water businesses—Final decision*, June 2013; IPART, *Hunter Water Corporation: Final report*, June 2013, p. 193; IPART, *Gosford City Council and Wyong Shire Council, Water—Final Report*, May 2013; ESCOSA, *SA Water's water and sewerage revenues 2013/14–2015/16*, May 2013; QCA, *Final report: Seqwater irrigation price review 2013-17*, vol. 1, April 2013; ERA, *Inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and the Busselton Water Board*, March 2013.

1497 Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, May 1994, 34, p. 1.

1498 Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, May 1994, 34, pp. 1, 10.

1499 NER, cl. 6.5.2(d)(2), 6A.6.2(d)(2); NGR, r. 87(4)(b).

1500 See, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, section C.6, pp. 358–371.

C.6.1 Adjustment to historical excess returns

Post-imputation (July 1987) returns consist of capital gains, dividends and the value of attached imputation credits. However, stock accumulation indices in Australia only include returns from dividends and capital gains. Therefore, market indices implicitly attribute no value to imputation credits distributed to investors. We estimate investors value distributed franking credits at 60 per cent of their face value (see attachment 4—value of imputation credits). Therefore, we must add back the value of imputation credits to the stock accumulation index. Otherwise, we will underestimate the after-corporate, before-personal tax return on equity.[1501]

We use the methodology applied by Brailsford et al to adjust our historical excess returns estimates for the value of imputation credits. Brailsford et al. estimated a series for the value of imputation credits. This entailed the following:[1502]

- Estimating an annual series of imputation credit yields applicable to the underlying stock index.
    - For the period 1998 to 2005, using the weighted average imputation credit yield on the Australian ASX All Ordinaries index for the 12 months ending December of each year. Brailsford et al. sourced these data from the Australian Taxation Office (ATO).
    - Estimating the weighted average imputation credit yield, ct for each year, t for the period 1988 to 1997. This is because the relevant ATO data are unavailable prior to 1998.[1503]
- Adjusting the series of estimated imputation credit yields for the amount that investors value them (theta). Our adjustment is based on investors valuing distributed franking credits at 60 per cent of their face value.

The methodology applied by Brailsford et al. entails calculating the total value of returns using actual market returns, dividends and imputation credits (adjusted for the amount that investors value them).[1504] As such, we have confidence in these estimates. We note that Handley also applied this methodology when he updated the Brailsford et al. study.[1505]

[1501] Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, 1994, 34, 1–17.

[1502] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 84–85.

[1503] This is calculated using the model: ct = pt × dt × [Tt/(1-Tt)]. This is where dt is the annual dividend yield implied from the Historical Stock Price Index and the Historical Stock Accumulation Index. Further, pt is the average proportion franked (75%) and Tt is the tax rate at which dividends are franked (the statutory tax rate for the relevant year).

[1504] This is known as 'the utilisation rate' or 'theta' (θ).

[1505] Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012; Handley, *An estimate of the historical equity risk premium for the period 1883 to 2010*, January 2011.

NERA also applied the Brailsford et al. methodology to adjust its historical excess returns estimates for the value of imputation credits.[1506] The majority of service providers proposed NERA's historical excess returns estimate.[1507] This adjustment is also consistent with our adjustment to account for imputation credits in the DGM.

C.6.2 Adjustment to the dividend growth model

We also incorporate the value of imputation credits in our DGM. Under DGMs, the price of a share is equal to the discounted stream of expected future dividends per share into perpetuity.[1508] Therefore, under the DGM, the benefits of imputation credits are accounted for using the following equation:

$$Dividend\ including\ imputation\ benefits = Cash\ dividends \times \left[1 + \frac{\rho \times \theta \times \tau}{1 - \tau}\right]$$

Where: τ is the corporate tax rate, which equal 30 per cent.

ρ is the proportion of dividends that are franked, which is 0.75

θ is the utilisation rate, which is 0.6

This is theoretically sound because only dividends (not capital gains) come with imputation credits. Further, Lally reviewed this adjustment and concurred with it. He also agreed a reasonable estimate of the proportion of fully franked dividends is 0.75, which we draw from the empirical study produced by Brailsford et al.[1509] Therefore, we have some confidence in this method, which entails adjusting dividends directly for the value of imputation credits.

C.6.3 SFG's adjustments

In providing an estimate of the MRP, SFG undertook a number of adjustments to account for the value of imputation credits. We discuss these below.

[1506] NERA, *The market, size and value premiums*, June 2013, p. 46; NERA, *Memo on revised MRP estimates*, 14 November 2014, p. 1; NERA, *Historical estimates of the market risk premium*, February 2015, pp. 40–41; NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, p. 4.

[1507] Energex, Ergon Energy, SAPN, United Energy, AusNet Services, Jemena Electricity Networks, CitiPower, Powercor, ActewAGL and AGN submitted NERA, *Historical estimates of the market risk premium*, February 2015 with their proposals, revised proposals or during a period for submissions. NERA updates its historical excess returns estimate in its June 2015 report using the same methodology as described in its February 2015 report (see NERA, *Further assessment of the historical MRP: Response to the AER's final decisions for the NSW and ACT electricity distributors*, June 2015, p. 4). Energex, Ergon Energy, SAPN, United Energy, Jemena Electricity Networks, ActewAGL and AGN submitted NERA's June 2015 report with their proposals, revised proposals or during a period for submissions.

[1508] Discounting is the process of adjusting each cash flow for the time value of money and for risk. See AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 114.

[1509] Lally, *Review of the AER's proposed DGM*, December 2013, p. 14. Reference to Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 85.

Adjusting the dividend growth model

In its 2014 and 2015 reports for several service providers, SFG estimated the MRP implied by a DGM. For these estimates, SFG applied an adjustment for imputation credits, which it considered uses Officer's (1994) formula.[1510] SFG provided a worked example of this adjustment as follows:[1511]

$$Market\ ROE\ with\ imputation\ benefits = Market\ ROE\ excluding\ imputation\ benefits\ \times \left[1 + \frac{\gamma\tau}{1-\tau}\right]$$

$$Market\ ROE\ with\ imputation\ benefits = 10.12\% \times \left[1 + \frac{0.5 \times 0.3}{1-0.3}\right] = 12.29\%$$

SFG then derived an MRP with imputation benefits by deducting the risk free rate from the market return on equity with imputation credits. That is, the MRP would equal $12.29\% - 4.12\% = 8.17\%$. Updating SFG's worked example for a gamma of 0.4 yields an MRP estimate of 7.73 per cent.[1512]

This adjustment differs from the adjustment typically used in the past, and to that in the Guideline.[1513] We did not agree with this proposed departure from the Guideline in our April/June 2015 final and preliminary decisions, and we continue to disagree with it in this decision. Our reasoning is as follows:

- SFG's suggested adjustment grosses up the entire return and incorporates it into the MRP. This is consistent with 100 per cent of the return coming from dividend income. However, returns are comprised of both dividends and capital gains. Therefore, we consider this is likely to overestimate the MRP. In his report to the Queensland Competition Authority (QCA), Lally commented on the same adjustment; which SFG proposed:[1514]

> the process for adjusting for imputation credits presumes that there are no expected capital gains, i.e., expected returns to equity holders take the form of only dividends and imputation credits. However, the empirical evidence refutes

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1510 SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 41, 73; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 49; SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 61; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 17–21.

1511 SFG assumes an ex-imputation MRP of 6.0 per cent, a risk free rate of 4.12 per cent and a gamma of 0.5. Also, we have rearranged the equation in SFG's report: $ROE\ with\ imputation\ benefits = ROE\ excluding\ imputation\ benefits \div [(1-T)/(1-T(1-\gamma))]$. See SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 41, 73.

1512 Under this approach, when gamma equals 0.4, the return on equity with imputation credits equals $10.12 * [1 + (0.4 * 0.3)/(1-0.3)] = 11.85$. Deducting a risk free rate of 4.12 per cent results in an MRP of 7.73 per cent.

1513 This is the adjustment set out by Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 73–97.

1514 Lally, *Response to submissions on the risk-free rate and the MRP*, October 2013, p. 14. In response to SFG, *Response to the QCA Discussion Paper: Report for Aurizon Ltd*, 2013.

this assumption and the result is that the modified MRP estimate using this approach would be too high.

- The Officer (1994) formula, when applied as SFG proposed, only holds in perpetuity.[1515] This can create an internal inconsistency because SFG has proposed we apply a perpetuity formula to non-perpetuity returns estimated from DGMs (as well as market surveys and independent expert reports).[1516] McKenzie and Partington advised that it is problematic to gross up a post-tax return to get a pre-tax return because the adjustment applied in the Officer (1994) formula, 'can only be relied on for perpetual cash flows'.[1517] Handley also observed:[1518]

> The conversion formula [SFG refers to] is indeed appropriate in the setting that Officer (1994) considers but is in general not correct in non-perpetuity settings. In this case, it is appropriate to use theta to directly gross-up the imputation credits associated with the dividend component of the return rather than grossing-up the entire return.

- SFG's suggested adjustment is inconsistent with the adjustment we and service providers apply to estimate historical excess returns.
- SFG's main reason for proposing this alternative adjustment appears to be that SFG considers it is more consistent with how we adjust for imputation credits in the post-tax revenue model (PTRM).[1519] We have a number of concerns with SFG's reasoning (see section C.6.4).

Adjusting survey evidence

In its 2014 and 2015 reports, SFG proposed adjusting MRP estimates from market surveys using the same method it used to adjust MRP estimates from DGMs.[1520] We did not agree with this position in our April/June 2015 final and preliminary decisions, and we do not agree with this position for this decision. This is for the following reasons:

1515 A perpetuity is a special case of an annuity where the life of the equal cashflows is infinite. See Bishop, S., Faff, R., Oliver, B, Twite, G, *Corporate finance*, Ed. 5, 2004, Pearson Prentice Hall, p. 50.

1516 In contrast, where we consider imputation-exclusive returns arising from the DGM, we recognise that this is not a perpetuity and only adjust the dividend component. This recognises returns are comprised of both dividends and capital gains in practice.

1517 McKenzie and Partington, *Report to the AER: The DGM*, December 2013, p. 24.

1518 Handley, *Advice on the return on equity*, 16 October 2014, p. 22.

1519 SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 62–63; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 17; SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, p. 41.

1520 SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 71, 78; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 47–49; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 26. SFG did not provide any new information in its 2015 report (relative to its 2014 reports) to support its position on adjusting MRP estimates in market surveys for the value of imputation credits.

- Truong, Partington and Peat suggested survey respondents do not adjust for imputation credits if they consider rate of return estimates already account for imputation credits.[1521]
- Survey respondents may use their understanding of long run historic average returns in forming their MRP estimates. If so, the adjustment for imputation credits is only required if respondents attach significant weight to the post imputation period and if the estimate of average returns for that period is lower due to the effect of imputation credits.[1522]
- McKenzie and Partington advised:[1523]

> Given that we don't really know whether survey responses do, or do not, allow for imputation credits and given that any adjustment for imputation would likely lie within the margin of measurement error, it seems best to take the survey evidence at face value, but tempered by the uncertainty about whether an imputation adjustment is needed.

- In his advice to the QCA, Lally advised:[1524]

> Furthermore, even if practitioners in general do not take account of imputation in the sense of explicitly allowing for it in their modelling, they are likely to have been influenced to some degree by the 6% estimate generally used by Australian regulators and this estimate does incorporate the effects of imputation.

Even if we assume survey respondents exclude the value of imputation credits, we would not agree with making the adjustment as SFG has proposed. We set out our reasons for this position under 'adjusting the dividend growth model' in section C.6.3.

Adjusting independent valuation reports

We do not use independent valuation reports to inform our estimate of the MRP.[1525] In its 2014 and 2015 reports, SFG proposed adjusting MRPs estimated in independent valuation reports for the value of imputation credits using the same method it used to adjust MRP estimates from DGMs.[1526] We did not consider it necessary to adjust these estimates for our purposes in the April/June 2015 final and preliminary decisions, and we maintain this position for this decision. We have formed this view because we only

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1521 Truong, Partington, Peat, 'Cost of capital estimation and capital budgeting practice in Australia', *Australian Journal of Management*, 2008, 33, pp. 95–121.

1522 McKenzie and Partington, *Supplementary report on the equity MRP*, February 2012, pp. 16–17.

1523 McKenzie and Partington, *Supplementary report on the equity MRP*, February 2012, p. 17.

1524 Lally, *Response to submissions on the risk-free rate and the MRP*, October 2013, p. 15.

1525 See steps one and two in section 3.4.1 of this attachment.

1526 SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 71, 78; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 53–54; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 27. SFG did not provide any new information in its 2015 report (relative to its 2014 reports) to support its position on adjusting MRP estimates in independent expert reports for the value of imputation credits.

use independent valuation reports to compare current return on equity estimates to a baseline value (directional information).[1527] Since we are only interested in the relative value of these estimates, as long as the return on equity in independent expert reports is measured consistently, this would not raise any concerns. As such, we consider there is little value in adjusting these estimates for the value of imputation credits.

We base our decision to only use independent valuation reports for directional information on the following:[1528]

- when firms undertaking valuations have regard to current market conditions, they may make unexplained adjustments to their assumptions and point estimates
- there may be important idiosyncrasies in the analysis within independent valuation reports.[1529]

However, since some service providers proposed we use this information to derive a point in time estimate, we have considered what kind of adjustment might be appropriate. SFG applied the adjustment discussed in section C.6.3. We do not agree with applying this adjustment. We set out our reasons for this position under 'adjusting the dividend growth model' in section C.6.3.

Our discussion of independent valuation reports in step four of our foundation model approach shows, for comparative purposes, return on equity estimates that are both adjusted for dividend imputation and unadjusted.[1530] For this purpose,[1531] we have adjusted the return on equity estimates from independent valuation reports by grossing up the valuer's market risk premium estimate by an amount equal to the average franking rebate yield (as published by the ATO) multiplied by the franking credit utilisation rate.[1532]

C.6.4 Internal consistency

We do not agree with the upward adjustment SFG applied to its return on equity estimates from the DGM, independent expert reports and market surveys.[1533] SFG

[1527] AER, *Explanatory statement rate of return guideline*, 17 December 2013, p. 61.

[1528] See steps one and two in section 3.4.1 of this attachment.

[1529] CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, February 2013.

[1530] See step four in section 3.4.1 of this attachment. Gray and Hall (previously SFG, now Frontier), disagreed with our consideration of return on equity estimates (from independent valuation reports) that are both adjusted for dividend imputation and unadjusted. We respond to this view in section E.6 of appendix E—other information.

[1531] Our discussion under step two in section 3.4.1 and in appendix E outlines our concerns with grossing up return on equity estimates from independent valuation reports to account for dividend imputation.

[1532] This is also the approach adopted by Brailsford, Handley, and Maheswaran (2012) when estimating historical excess returns.

[1533] See SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 41, 71–73, 78–79; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 47–49, 53; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 26–27; SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, pp. 61–63; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 17–21.

applied a formula to adjust for imputation credits because it considers these estimation methods produce a return on equity that excludes the value of imputation benefits.[1534] The relevant value is the return on equity including the value investors receive from imputation credits. SFG adjusted its starting estimates using the Officer (1994) relationship:[1535]

$$ROE\ including\ imputation\ benefits = ROE\ excluding\ imputation\ benefits \times \left[1 + \frac{\gamma T}{1-T}\right]$$

Where: ROE is the return on equity and T is the standard corporate tax rate (in SFG's implementation)

This differs from the formula we use to incorporate the value investors receive from imputation credits. We do not apply the Officer (1994) formula in these instances for the reasons outlined in section C.6.3.[1536]

SFG appears to justify using the Officer (1994) adjustment on the basis that we make the same adjustment in our PTRM, and that consistency with the PTRM is the key consideration.[1537] We consider it is important to adjust our MRP estimates for imputation credits in a manner that is theoretically correct (that is, recognising returns are non-perpetual and comprised of both dividends and capital gains in practice). We recognise the Officer framework underlies our treatment of imputation credits, including our derivation of discount rates and cash flows. However, we consider our PTRM does not apply the Officer relationship in the manner SFG described.[1538] Namely, the PTRM does not strictly apply the Officer formula, but instead explicitly models the non-perpetuity aspect that causes the formula to not apply. For example, SFG's position differs from ours in the following respects:

- The PTRM does not scale down the imputation-inclusive return on equity using the Officer formula to produce an imputation-exclusive return on equity. Rather, the PTRM takes the imputation-inclusive return on equity as a starting input. That is, the PTRM provides the entire imputation-inclusive return on equity in the return on capital building block. It then undertakes a bottom-up assessment of taxable income and the resulting imputation credits to determine what value the equity holders will receive from this source.[1539] The PTRM deducts this amount from the

[1534] We do not agree, as set out in the previous section.

[1535] R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and Finance*, May 1994.

[1536] Under the heading 'Adjusting the dividend growth model'.

[1537] That is, SFG does not state that its approach is theoretically correct. See: SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 17–20; SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 63. SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013, p. 39.

[1538] *Appendix A: Transmission post-tax revenue model – Version 2*, December 2010, https://www.aer.gov.au/node/9926; *Appendix B: Amended distribution post-tax revenue model (PTRM)*, 19 June 2009, https://www.aer.gov.au/node/7003.

[1539] The value ascribed to imputation credits (gamma) is an input into the PTRM.

tax building block to ensure that equity investors receive (in total) the target imputation-inclusive return on equity.[1540]

- The bottom-up approach we apply in the PTRM produces different results to what arise when applying the Officer (1994) formula in a top-down fashion, as per SFG's implementation. Specifically:
  - If we populate our PTRM with non-perpetuity inputs, the bottom-up process in the PTRM will not systematically determine an imputation-exclusive return on equity that matches the theoretical top-down perpetuity formula adjustment that SFG proposes. Rather, the PTRM calculation will reflect the particular tax situation of the firm. That is, the PTRM determines the value of imputation credits from the imputation credits the firm generates (equal to the tax paid) and the degree to which investors value those imputation credits.[1541] This differs from the outcome produced in SFG's example proof in its 2013 report.[1542] In that example, SFG demonstrated that the PTRM’s bottom-up calculation provided the same outcome as a top-down theoretical adjustment, in line with the Officer (1994) formula. However, this outcome was dependent on the example inputs SFG selected (which were perpetuity-consistent).[1543] This reflects our adoption of the Officer framework as a base for the model.
  - In practice, we populate the PTRM with non-perpetuity inputs. For example, carryover tax losses may mean the business will pay no tax in a regulatory control or access arrangement period. In this case, the PTRM correctly determines that there will be no imputation credits to distribute. Therefore, the imputation-exclusive return to equity holders would equal the entire imputation-inclusive return on equity. If the PTRM was effectively applying the Officer (1994) formula, as stated by SFG, a significant proportion of the overall return would come from imputation credits—but it does not.[1544]
  - Our practice of populating the PTRM with non-perpetuity inputs is demonstrated in Table 3-51. This table compares the value equity investors receive from imputation credits produced by the PTRM with that produced under the theoretical Officer (1994) formula for a number of service

[1540] If this was not deducted, equity holders would receive double compensation for the value of imputation credits; once in the return on capital building block, and once in the tax building block.

[1541] The degree to which investors value imputation credits is consistent with the gamma parameter in the PTRM. We define the imputation credit distribution rate of the benchmark firm to equal the market wide imputation credit distribution rate. Similarly, we define value of a received credit to the benchmark firm’s investors to be equal to the market-wide average.

[1542] SFG, *Dividend discount model estimate of the cost of equity*, 19 June 2013, pp. 37–40.

[1543] SFG explicitly assumes regulatory depreciation will equal tax depreciation—or equivalently that assets never depreciate, as in a perpetuity. There is no capex, and SFG also appears to assume that there is no inflation (since otherwise the real straight-line depreciation approach embedded in the PTRM would cause regulatory and tax depreciation to differ). SFG, *Dividend discount model estimate of the cost of equity*, 19 June 2013, pp. 37–38.

[1544] More generally, this counter-example shows that the effective tax rate will be used instead of the standard corporate tax rate as in the SFG report.

providers, as per SFG's report. In the PTRM, the value equity investors receive from imputation credits will be the difference between the effective post-tax return on equity with and without imputation credits.[1545] In Table 3-51, we express these as a percentage return to the equity holder relative to their overall equity investment—that is, an imputation credit yield. In Table 3-51, the imputation credit yields calculated by the PTRM differ from the Officer theoretical adjustment. This reflects the 'real world' application of the Officer framework in the PTRM—not the strict application of a perpetuity formula.

Table 3-51 Imputation credit yields calculated in the PTRM and by the Officer formula (%)

Network	Return on equity (imputation inclusive)	PTRM calculated imputation credit yield	Officer (SFG) formula imputation credit yield	Difference
ActewAGL distribution	8.10	1.24	1.19	0.06
ActewAGL transmission	8.10	1.07	1.19	–0.11
Ausgrid distribution	8.10	0.93	1.19	–0.25
Ausgrid transmission	8.10	0.75	1.19	–0.43
Directlink	8.10	1.12	1.19	–0.06
Endeavour Energy	8.10	1.16	1.19	–0.02
Essential Energy	8.10	0.95	1.19	–0.24
TasNetworks	8.10	0.78	1.19	–0.40
TransGrid	8.10	1.09	1.19	–0.09
Average	8.10	1.01	1.19	–0.17

Source: AER analysis.

Notes: This table shows figures from the draft decisions we published in November 2014, where gamma is set to 0.4. It does not show JGN because JGN does not use our standard PTRM. We have not updated this table for the current service providers because it would not change the substantive point, and these numbers are referenced in SFG's latest (February 2015) report on this issue.

[1545] Cells E60 and E61 on the analysis tab on the standard transmission PTRM.

SFG's latest (February 2015) report on this issue appears to accept that the AER's PTRM does not apply the Officer perpetuity formula, unless the PTRM is altered so that tax depreciation equals regulatory depreciation.[1546] SFG considers that this 'simple change' is incidental to the core issue, and so contends that the AER is indeed applying the Officer perpetuity in the PTRM to (inconsistently) scale returns to businesses.[1547]

We understand that, if all areas of the model that deal with modelling the specific tax situation of the firm are removed, it will produce the Officer perpetuity result.[1548] This is entirely consistent with the November 2014 draft decisions, April/June 2015 final and preliminary decisions, and our reasoning above. However, this is not an incidental change, as per SFG's February 2015 report. Rather, it goes to the fundamental reason why our approach is reasonable, and SFG's approach is not.[1549]

The Officer perpetuity framework, by construction, will always apply the statutory tax rate.[1550] However, beyond a perpetuity framework, the effective tax rate can differ from the statutory tax rate.[1551] The effective tax rate will usually be below the statutory tax rate by a substantial margin. In the real world, the main reason for this is that the Australian Tax Office (ATO) permits firms to depreciate their assets for tax purposes faster than they depreciate in economic terms. This leads to a lower assessment of taxable income, a lower tax assessment and a lower effective tax rate.[1552] Any change to the effective tax rate directly affects the imputation credit yield, because it affects the generation of imputation credits themselves. If less tax is paid, less imputation credits are generated.

SFG's 'simple change' is to set the effective tax rate back to the statutory tax rate.[1553] In other words, it reverses the relevant reason why the perpetuity framework will not

1546 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 17–21.

1547 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 19.

1548 The SFG report focuses on the difference between tax depreciation and regulatory depreciation, but there are a number of other aspects of the PTRM which also have the same effect. Any aspect of the PTRM which causes the effective tax rate to differ from the statutory tax rate is relevant. These include the depreciation on the tax asset base, capital contributions, some incentive payments, and carry forward losses. Not all of these appear to be understood in SFG's report.

1549 Compare with SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 20 (paragraph 113).

1550 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and Finance*, May 1994., pp. 4, 13. This flows from the perpetuity definition, and in the worked example, since 13.58 / (39.96 – 5.14) = 39 per cent, the effective tax rate equals the statutory tax rate (as it must).

1551 Of course, the statutory tax rate may coincide with the effective tax rate, but this is a rare event.

1552 Note that, because the tax depreciation at the start of an asset's life is higher (than economic depreciation), the tax depreciation at the end of an asset's life is lower (than economic depreciation). However, because the ATO does not adjust for the time value of money, there is a net reduction in tax across the entire asset life cycle. This effect is enhanced by a growing asset base.

1553 SFG has adopted a proof-by-example approach in its report on this matter, and the single change it makes to TransGrid would not work for other NSPs' PTRMs. However, if all necessary changes were made in other PTRMs hold in the real world. If this is done, the AER's standard PTRM then shows a result consistent with the theoretical formula—which demonstrates that it correctly implements the Officer framework. All this supports the idea that the AER's standard PTRM appropriately models the particular tax situation of the firm, building on the best available framework, and reflecting the real world where non-perpetuity inputs are required.[1554]

With this background, it is then clearer what SFG's 2015 report means when it alleges there is an inconsistency. SFG considers that, as a proportion of total return, the return from imputation credits for the benchmark firm (as modelled in the PTRM) must equal the return from imputation credits for the market as a whole (in the dividend discount model).[1555]

Our estimate of gamma for the benchmark firm (used in the PTRM) reflects market wide averages.[1556] Gamma encompasses the distribution of imputation credits and their valuation once received. In these respects, the benchmark firm will always match the market average.

However, prior to the distribution of imputation credits, they must be created by the payment of tax. Where firms pay different amounts of tax relative to their earnings, they are said to have different effective tax rates. Hence, SFG's consistency requirement is that the effective tax rate for the benchmark firm (as modelled in the PTRM) must equal the effective tax rate for the whole market.[1557]

We do not consider that the effective tax rate for the benchmark firm must equal the market wide effective tax rate. There will be a large spread of effective tax rates across the entire market, so there is no conceptual problem with the effective tax rate for an individual firm differing from the market average. Such an approach aligns with the actual tax circumstances of the firm.[1558]

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so that the effective tax rate equals the statutory tax rate, the result demonstrated for TransGrid would hold. Finally, note that SFG's analysis does not address how we might reconcile the statutory tax rate with the market wide effective tax rate.

1554 That is, the rules set by the ATO governing the calculation of deprecation for tax purposes are different to the rules governing the calculation of depreciation for regulatory purposes. Every network service provider will separately track the two forms of depreciation.

1555 SFG focuses on the simplest case, where the return for the benchmark firm equals the return on the market, In this case, the imputation credit yield for the benchmark firm will equal the market wide average imputation credit yield. SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 18–20.

1556 While an alternative approach could have been taken, we adopted this approach after extensive consultation with stakeholders.

1557 SFG's whole-of-market illustrative example (paragraphs 106, 114) also appears to be incorrect because it assumes that, for the entire market, tax depreciation is equal to regulatory depreciation.

1558 That is, the rules set by the ATO governing the calculation of deprecation for tax purposes are different to the rules governing the calculation of depreciation for regulatory purposes. Every network service provider will separately track the two forms of depreciation.

We consider there is no inconsistency, because we use the appropriate figure in each context. It is correct, when preparing a market wide dividend discount model, to use the effective tax rate for the entire market.[1559] Similarly, it is correct, within the standard PTRM for an individual network service provider, to use the effective tax rate for that firm, having regard to its particular tax situation.[1560]

C.6.5 Assessment against our criteria

We must have regard to relevant estimation methods, financial models, market data and other evidence.[1561] In the Guideline, we proposed using criteria to assess the merits of the various sources of information in setting the allowed rate of return.[1562] Since service providers proposed an alternative adjustment for imputation credits (see section C.6.3), we have had regard to this as an estimation method. Table 3-52 sets out the assessment of our imputation adjustment and SFG's alternative adjustment against the criteria set out in the Guideline.

Table 3-52 Assessment of imputation adjustments against criteria

Criteria[1563]	AER adjustment	SFG's adjustment
Where applicable, reflective of economic and finance principles and market information. Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data	Adjusting the MRP for the benefits of imputation credits is consistent with economic and finance principles. The adjustment applied by Brailsford, et al. is sound and well accepted.[1564] This is consistent with theory and empirical analysis indicating market returns comprise of dividends and capital gains.	Adjusting the MRP for the benefits of imputation credits is consistent with economic and finance principles. The Officer (1994) framework is sound and well accepted.[1565] However, we consider there are problems with applying the formula from Officer (1994) in the way SFG has proposed. SFG's application assumes market returns only include

1559 Note that although the statutory tax rate appears in the formula, our imputation adjustment in the dividend discount model uses the level of dividends and level of franking observed across the entire market (and hence tax paid across the entire market).

1560 This is still a benchmark assessment. The benchmark definition encompasses many characteristics, but still has regard to the specific circumstances of the firm (for instance, the size and age of its asset base).

1561 NER, cl. 6.5.2(e)(1); NER, cl. 6A.6.2(e)(1); NGR, r. 87(5)(a).

1562 AER, *Rate of return guideline*, 17 December 2013, p. 6.

1563 This table does not include the criteria for models and market data. These criteria do not apply to this source of information—which is essentially an adjustment formula, based on a theoretical principle.

1564 Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 84–85; Lally, Review of the AER's proposed DGM, December 2013, p. 14.

1565 Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, May 1994, 34.

Criteria[1563]	AER adjustment	SFG's adjustment
		dividends, whereas empirical analysis indicates these also include capital gains.
Fit for purpose. That is, use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose. Also, promote simple over complex approaches where appropriate	We base this adjustment on a formula that experts apply to adjust dividend cash flows directly. It can equally apply to the dividend component in our DGM and is therefore fit for purpose.	SFG's proposed use of the Officer (1994) framework differs from how we apply it in the PTRM. SFG's proposed adjustment formula entails applying a formula derived from a perpetuity to adjust a non-perpetuity. We do not consider this to be fit for purpose as it could produce unusual results.
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible datasets	The adjustment is transparent and replicable.	The adjustment is transparent and replicable. Applying the adjustment as SFG has suggested is likely inconsistent with data indicating returns include both dividends and capital gains.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	The adjustment does not hinder regulatory outcomes from reflecting changing market conditions.	The adjustment does not hinder regulatory outcomes from reflecting changing market conditions.

Source: AER analysis.

C.7 Potential relationships between the MRP and risk free rate

The evidence has not satisfied us that there is a clear relationship (positive or negative) between the 10 year forward looking risk free rate and MRP, in general or in the current market. In their 2015 reports, Partington and Satchell supported our view,[1566] stating:[1567]

1566 Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 71–74; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, pp. 17–18.

1567 Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

> There is a possibility that current low interest rates could result in higher equity risk premiums, but we do not think this is likely and more importantly we have seen no convincing evidence that this is the case.

In section A.2, we considered a number of submissions that our foundation model approach does not produce a return on equity estimate that is reflective of prevailing market conditions. Many of these submissions considered that:

- there is a general inverse relationship between the risk free rate and MRP, and/or
- recent decreases in the risk free rate (as proxied by CGS yields) have been associated with an increase in the MRP.

We have carefully considered theses submissions. However, we do not consider they provide sufficient evidence to indicate a clear relationship between the 10 year forward looking risk free rate and MRP. We discuss our reasoning in the sections below.

C.7.1 General relationship

Several service providers have submitted there is, in general, an inverse relationship between the risk free rate and MRP.[1568] We assessed this issue at length in the Guideline and 2013 Victorian gas decisions, and this material remains relevant.[1569] In this material, we considered:

- the theoretical argument for an inverse relationship between the MRP and risk free rate
- the academic research on the topic
- the empirical evidence presented by the service providers and their consultants.

On the basis of the available evidence and submissions, we considered there is no clear relationship between the 10 year forward looking risk free rate and MRP. We maintain this consideration in this decision. In their 2013 report, McKenzie and Partington undertook a comprehensive literature review and found there is evidence that supports both a positive and negative relationship.[1570] McKenzie and Partington

[1568] See, for example, AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, pp. 314–315; United Energy, *2016 to 2020 regulatory proposal: Attachment—Return on equity*, April 2015, pp. 64–65; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 211 (Powercor's regulatory proposal on the return on equity appears to be identical in substance to CitiPower's); Jemena Electricity Networks, *2016-20 electricity distribution price review regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, pp. 56–57.

[1569] See AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, pp. 104–110; AER, *Access arrangement draft decision: Multinet Gas (DB No. 1) Pty Ltd Multinet Gas (DB No. 2) Pty Ltd 2013–17—Part 2: Attachments*, September 2012, pp. 100–107; AER, *Access arrangement final decision: Multinet Gas (DB No. 1) Pty Ltd Multinet Gas (DB No. 2) Pty Ltd 2013–17—Part 3: Appendices*, March 2013, pp. 31–35; AER, *Access arrangement final decision: APA GasNet Australia (Operations) Pty Ltd 2013–17: Part 3—Appendices*, March 2013, pp. 32–38.

[1570] McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, pp. 6, 24.

also found there was some support in the literature for an oscillating relationship (that is, the relationship is at times positive and at other times negative).

Further, Partington and Satchell considered this issue in relation to a March 2015 report submitted by Gray and Hall (previously SFG, now Frontier) for JGN. They stated:[1571]

> If we consider a simple example of mean-variance analysis with a riskless asset, it is straightforward to show that a fall in interest rates leads to a fall in the expected rate of return of the market portfolio, which in this context, coincides with the Markowitz portfolio. This result tells us that negative correlation between interest rates and the expected rate of return is clearly not a feature of all models. We do not dispute that there exist models where this phenomenon may occur; however we are not convinced that the claims for a negative relationship have a compelling quality about them. Furthermore, if a change in interest rates were offset by a change in the market risk premium, thus holding the expected return on equity constant, then holding expected cash flow constant the value of the market would be independent of interest rate changes. This is a proposition that few would accept.

The Consumer Challenge Panel (CCP) also considered this issue, and the view that the return on equity may be stable over time. It stated, 'There is no a priori reason for assuming this negative correlation, and even less information to explain why the market should consistently respond to low interest rates by increasing their perception of risk'.[1572]

C.7.2 Current relationship

In a number of reports for several service providers, CEG, Gray and Hall (as SFG and Frontier), NERA and Incenta Economic Consulting submitted that recent decreases in the risk free rate (as proxied by CGS yields) have been associated with an increase in the MRP.[1573]

[1571] Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 18.

[1572] CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, p. 51.

[1573] CEG, *WACC estimates: A report for the NSW DNSPs*, May 2014, pp. 53–62; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, section 4 and appendix A; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 53–54, 57, 78; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, pp. 22–23, 27–29, 34; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, February 2015, pp. 27–28; Incenta, *Update of evidence on the required return on equity from independent expert reports*, May 2014, pp. 8–10, 13–15; Incenta, *Further update on the required return on equity from independent expert reports: Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks, and United Energy*, February 2015, pp. 3–6, 11–12 (Incenta, *Further update on the required return on equity from independent expert reports*, February 2015); SFG, *Cost of equity: Update report for Jemena Gas Networks' averaging period—19 January to 16 February 2015*, 27 March 2015, pp. 7, 11; RBA, *Global and domestic influences on the Australian bond market*, The service providers have submitted several explanations to support their view that the MRP has increased with recent decreases in the risk free rate. We set these out in Table 3-38 in section A.2, which we reproduce as Table 3-53 below.

Table 3-53 Current service providers' main explanations to support current inverse relationship between the risk free rate and MRP

Explanation	Considered in this section
There has been a 'flight to quality' or a portfolio shift towards government bonds and away from risky equity	Section C.7 of appendix C—MRP
Hurdle rates used to evaluate business investment opportunities (and earnings yields) have not decreased with the risk free rate	Section C.7 of appendix C—MRP
DGM estimates show that the MRP has increased as the risk free rate has decreased	Section C.7 of appendix C—MRP
Independent expert reports demonstrate a current inverse relationship between the risk free rate and MRP	Section E.7 of appendix E—other information

Source: AER analysis

We do not consider there is sufficient evidence to indicate a clear relationship between the 10 year forward looking risk free rate and MRP. We provide our reasoning in the sections below. In particular, we respond to the three explanations set out in Table 3-53 that are relevant to this section.

Flight to quality

Table 3-54 shows how SFG's MRP and risk free rate estimates have varied over its expert reports from May 2014 to May 2015. It is clear from this table that SFG's MRP estimates have increased as its risk free rate estimates have decreased. SFG submitted that this is consistent with current market conditions, which indicate a flight to quality period.[1574]

Speech by Guy Debelle, 16 March 2015; Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 8, 31–34; Frontier Economics, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015, pp. 1–6, 28–29; CEG, *Measuring risk free rates and expected inflation*, April 2015, pp. 1–8; NERA, *The relation between the market risk premium and risk-free rate: Evidence from independent expert reports*, April 2015, pp. iv–v, 10–11; NERA, *Energy regulation insights: European regulators' WACC decisions risk undermining investment decisions*, Issue 41, February 2015; RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015; RBA (Glenn Stevens), *Speech: The world economy and Australia*, 21 April 2015.

1574 SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, p. 28.

Table 3-54 MRP estimates from SFG's reports

SFG report date	MRP estimate (%)	Risk free rate estimate (%)
27 May 2014	7.21	4.12
14 August 2014	7.57	3.63
28 August 2014	7.57	3.63
8 September 2014	7.72	3.43
19 January 2015	7.92	3.08
30 January 2015	7.92	3.08
13 February 2015	8.17	2.64
25 February 2015	8.17	2.64
19 May 2015	8.23	2.55

Source: SFG reports[1575]

A 'flight to quality' or 'flight to safety' is usually associated with a view that there is increased risk aversion across the economy and therefore an increased MRP expected by investors. However, in his 2015 report, Partington advised that periods of low interest rates can also cause investors to engage in a 'search for yield', which can lead to a decrease in the MRP expected by investors.[1576] He stated:[1577]

> There is also a widespread view that investors are engaged in a “search for yield”. This “search for yield” story has two versions. In both versions investors are taking on extra risk. The first version is that the low return on debt is causing investors to switch into shares with high dividend yields, resulting in a price premium for such shares. The second version is that in a search for higher yields investors are more willing to take on riskier investments. In other words, they are accepting a lower risk premium.

1575 SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 8, 84; SFG, *Estimating the required return on equity: Report for Energex*, August 2014, pp. 20, 57; SFG, *Updated estimate of the required return on equity: Draft report for Ergon*, 14 August 2014, pp. 2, 4; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 8 September 2014, pp. 2, 4; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 42; SFG, *The required return on equity: Initial review of the AER draft decisions: Report for Energex*, 30 January 2015, p. 43; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 33; SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 33; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 19 May 2015, p. 4.

1576 Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

1577 Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

The RBA has also commented on the potential presence of a search for yield in a May 2015 speech, stating:[1578]

> The second issue is the effect of low interest rates on asset prices. Just as low interest rates increase the value of future liabilities, they increase the value of a given stream of future revenue from any asset. The result is higher asset prices. Another way of looking at this is that faced with low returns on risk-free assets, investors have sought other assets, and in so doing they have pushed up the prices of these assets. A good example of this is commercial property, where investors have been attracted by the relatively high yields, pushing prices up even though rents are declining

And more specifically to Australian equity prices in a March 2015 speech submitted by SA Power Networks:[1579]

> The lower interest rates have boosted domestic asset prices, with both property and equity prices recording strong gains recently (Graph 8). The low interest rates globally have also worked to push up Australian asset prices.

Moreover, current market evidence does not appear to be consistent with the view that there is a widespread flight to quality among investors. This can be seen in our consideration of conditioning variables and survey evidence. For example, during the GFC (where there might have been periods of widespread flight to quality) we saw a:

- decrease in CGS yields[1580]
- sharp and relatively prolonged increases in conditioning variables; dividend yields, credit spreads and implied volatility (see Figure 3-21 to Figure 3-24).

However, more recently we have seen a:

- decrease in CGS yields[1581]
- limited movement in conditioning variables, which, overall, have remained fairly steady and close to their long term averages (see Figure 3-21 to Figure 3-24).

Partington considered that 'the general and very substantial decline in credit spreads since the GFC seems inconsistent with increasing risk aversion'.[1582] Partington also noted that we should be cautious in using this evidence to infer a decrease in the MRP.[1583] This is because movements in the credit spread do not necessarily have direct parallels in movements of the equity risk premium.

1578 RBA, *Managing two transitions*, speech by Phillip Lowe, 18 May 2015.

1579 RBA, *Low inflation in a world of monetary stimulus*, speech by Phillip Lowe, 5 March 2015.

1580 See RBA, *Chart pack: 10-year Australian government bond yield*, October 2015.

1581 See RBA, *Chart pack: 10-year Australian government bond yield*, October 2015.

1582 Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 74.

1583 Partington however noted that in previous regulatory determinations, regulated businesses and their consultants were arguing for a high equity risk premium because credit spreads were high as a consequence of GFC. See: Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 73–74.

In its January and April 2015 reports, CEG submitted that the factors driving down government bond yields have not similarly affected the return on equity. The factors CEG identified revolve around investment portfolio shifts towards safe government bonds and away from risky equity.[1584] This is similar in effect to the flight to quality concept, but does not necessarily imply a flight to quality as it could simply represent a change in investor preferences. Based on its analysis, CEG recommended making upward adjustments to prevailing estimates of the risk free rate and historical excess returns estimates of the MRP.[1585]

We have carefully considered this information. However, we do not consider CEG has demonstrated a flight to quality or portfolio shift in Australia. This is because:

- CEG has not been able to point to an indicator that demonstrates a portfolio shift from equity to CGS in Australia. Instead it has pointed to a number of partial indicators, which may or may not demonstrate that there has been such a shift. For example:
    - While CEG tried to point to higher foreign holdings of CGS as evidence of a portfolio shift, we consider this is not determinative of either a portfolio shift or a flight to quality. We also note CEG hasn’t been able to show that foreign holdings of equity are unchanged (or have decreased).
    - On the impact of Basel III, CEG has pointed to a statement by the RBA in a December 2014 speech to support of its claim that the implementation of Basel III liquidity requirements is ‘depressing CGS yields relative to the levels that they would otherwise have been’.[1586] However, CEG failed to include the statement that followed its quoted passage, where the RBA stated, 'Overall, the impact of the LCR on market pricing is relatively small. The larger changes have been around deposit pricing and the terms and conditions of deposits'.[1587] Also, Graph 3 from the same speech shows that equity accounts for a very small proportion of the funding composition of banks in Australia, and has been largely unchanged since 2009. Therefore, we consider use of this RBA speech to suggest Basel requirements are causing a portfolio shift from equity to CGS in Australia would be misleading.
- We do not consider CEG's analysis of CGS betas provide sufficient evidence of a flight to quality or portfolio shift from equity to CGS in Australia.[1588] In their 2015 report, Partington and Satchell considered this issue, stating:[1589]

[1584] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 23–27, 59–71, CEG, *Measuring risk free rates and expected inflation*, April 2015, pp. 10–28, 46–57.

[1585] CEG, *Measuring risk free rates and expected inflation*, April 2015, pp. 24–26. We discuss and respond to these recommendations under step 3 of section 3.4.1 (under the risk free rate heading) and section C.1.1 of this appendix.

[1586] CEG, *Measuring risk free rates and expected inflation*, April 2015, pp. 22–23.

[1587] RBA, *Liquidity*, Speech by Guy Debelle, 16 December 2014.

[1588] We also discuss CEG's analysis of CGS betas in step three of section 3.4.1, under the heading 'risk free rate'.

[1589] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 27–28.

> It has been common practice to assume that the beta of government debt is zero. Indeed, it is relatively common practice to assume that the beta of risky corporate debt is zero. Both the AER and consultants to the regulated businesses have made this assumption in the past in relation to the relevering formulas for equity betas. Our view is that corporate debt betas are not likely to be zero, but they are likely to be small and the betas for government bonds are likely to be smaller still, if not zero. The ongoing debate about the magnitude of equity betas for the regulated businesses highlights the difficulties in obtaining precise estimates of beta. The difficulties of obtaining a precise estimate of beta are likely to be even greater when the beta to be estimated is of small magnitude. Since, the betas of government bonds have been little studied, little is known about their empirical properties. However, on the basis of what we know about varying estimates of equity betas, it would probably be unwise to rely exclusively on CEG's (2015, β) estimate. It seems plausible that government bond betas measured relative to the equity market may well have been negative in recent times, but how robust is the magnitude of the estimate? In any event, as we discuss below if the return on government bonds is treated as risky, the equity market is no longer the correct portfolio to estimate betas against.
>
> …In CEG's (2015, β) approach government bonds are risky assets, so the market portfolio for risky assets includes both equities and government bonds. As we no longer have a riskless asset we also need to utilise a zero-beta CAPM. We show below, under reasonable assumptions, that the resulting cost of equity is likely to be lower than under the current application of the CAPM.

- We do not agree with CEG's use of dividend yields to conclude the MRP has increased by a more than offsetting amount than the fall in CGS. We set out reasoning for this position in section C.4.1.

We are not satisfied that there is evidence of a widespread flight to quality among investors in the current market. We consider the evidence presented by the service providers is inconclusive, and there are conflicting views on whether investors are searching for yield or quality. Even the IMF report referred to by CEG in its April 2015 report has regard to the possibility of a search for yield in the current market, stating:[1590]

> An environment of continued low real (and nominal) interest rates might also induce investors and financial institutions more broadly to search for higher real (and nominal) yields by taking on more risk.

We also consider that, even if there was evidence of a widespread flight to quality among investors, there is a potential for regulated infrastructure firms/assets to be included in the category of high quality, safe investments. These firms are subject to very limited competition, have regulated cash flows and are protected from sunk investment through the roll forward of the regulatory asset base (RAB). In this

[1590] IMF, *World economic outlook: Chapter 3—Perspectives on global real interest rates*, April 2014, p. 18.

scenario, the required rate of return for a benchmark efficient entity would likely decrease.

Hurdle rates and earnings yields

Several service providers submitted a recent RBA Bulletin article which considered hurdle rates used to evaluate business investment opportunities have remained largely unchanged, even as interest rates have decreased.[1591] They submitted this is evidence that the return on equity has not decreased with recent decreases in the risk free rate (that is, there has been an offsetting increase in the MRP).

To assess this submission, we must consider whether hurdle rates are a reliable indicator of the return on equity required by shareholders (or equity holders) in the context of our regulatory task.

Under the NER/NGR, the allowed rate of return for a regulatory year must be a weighted average of the return on equity and return on debt, which is a weighted average cost of capital (WACC).[1592] The NER/NGR requires us to determine a return on equity that is commensurate with the efficient financing costs of a benchmark efficient entity. It also requires us to have regard to prevailing market conditions when estimating the return on equity.[1593] In this context, we do not consider hurdle rates are a reliable indicator of the return on equity.

A hurdle rate is a rate of return that firms/managers use when deciding whether or not to invest in capital projects. It is a key input into discount cash flow and payback period evaluation tools. In theory, the hurdle rate should reflect the cost of acquiring finance for the project (that is, the firm's cost of capital)[1594] at the time the evaluation is undertaken.[1595] However, a number of studies have found that, in practice, hurdle rates tend to:

- Differ from the cost of capital. For example:
    - the RBA found that hurdle rates are often several percentage points above the WACC,[1596] with hurdle rates of around 15 per cent being 'quite common'[1597]

[1591] RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015; RBA (Glenn Stevens), *Speech: The world economy and Australia*, 21 April 2015.

[1592] NER, cl. 6.5.2(d); NER, cl. 6A.6.2(d); NGR, r. 87(4).

[1593] NER, cl. 6.5.2(f–g); NER, cl. 6A.6.2(f–g); NGR, r. 87(6–7).

[1594] Although, if the systematic risk of the project differs from that of the firm, then the hurdle rate for the project may be above or below the firm's cost of capital. See Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill Australia: Tenth edition, 2009, pp. 431–432.

[1595] RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015, pp. 2–3; Dews, Hawkins and Horton (RBA), *Measuring the cost of capital in Australia*, June 1992, p. 2.

[1596] The weighted average cost of capital (WACC) is often used to estimate the cost of capital. See Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill Australia: Tenth edition, 2009, p. 447.

[1597] RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015, p. 3.

  - Deloitte, in its 2014 Chief Financial Officer (CFO) survey, found that approximately two-thirds of respondents used a hurdle rate one to five per cent higher than their WACC.[1598]

- Be updated infrequently. For example:
  - the RBA found that hurdle rates are not changed often and in some instances have not been altered for at least several years[1599]
  - Deloitte, in its 2014 CFO survey, found that close to 50 per cent of respondents said they very rarely changed their hurdle rate, if ever.[1600]

A number of reasons have been proffered to explain these findings, including:

- some firms use 'rules of thumb' rather than calculations of discounted cash flows in determining hurdle rates for capital projects[1601]
- hurdle rates may be adjusted upwards by firms to reflect the uncertainty surrounding cash flow projections and/or the irreversibility of decisions[1602]
- hurdle rates may be used as a capital rationing device and so deliberately set above the cost of capital[1603]
- hurdle rates can be influenced by the strategic incentives that decision makers have within a firm[1604]
- hurdle rates can be lower than the cost of capital in the absence of competitive market pressures or if firms are pursuing strategic objectives[1605]
- managers can view changes in the observed cost of debt as temporary as so may be unwilling to alter hurdle rates[1606]
- keeping hurdle rates constant can act as an automatic time-varying risk adjustment[1607]
- for firms with a high cost of capital, incremental adjustments to the hurdle rate may be unlikely to have a material effect on the investment decision[1608]

1598 Deloitte, *CFO survey: Looking beyond the clouds*, Q3 2014, p. 18.

1599 RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015, p. 3.

1600 Deloitte, *CFO survey: Looking beyond the clouds*, Q3 2014, p. 19.

1601 Dews, Hawkins and Horton (RBA), *Measuring the cost of capital in Australia*, June 1992, p. 22.

1602 RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015, p. 3; Driver and Temple, Why do hurdle rates differ from the cost of capital?, *Cambridge journal of economics*, 34(3), 2010, p. 516.

1603 Mcdonald, *Real options and rules of thumb in capital budgeting*, Oxford University, 2000, p. 1.

1604 Driver and Temple, Why do hurdle rates differ from the cost of capital?, *Cambridge journal of economics*, 34(3), 2010, p. 517.

1605 Driver and Temple, Why do hurdle rates differ from the cost of capital?, *Cambridge journal of economics*, 34(3), 2010, p. 516.

1606 RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015, p. 4.

1607 RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015, p. 4.

1608 RBA (Lane and Rosewall), *Bulletin: Firms' investment decisions and interest rates*, June 2015, p. 4.

Based on this analysis, we consider little, if any, reliance can be placed on hurdle rates as a reliable indicator of the required return on equity. Evidence from the RBA and Deloitte indicates hurdle rates are often set above the WACC and are updated infrequently. This means they are unlikely to be commensurate with the efficient financing costs of the benchmark efficient entity or reflective of prevailing conditions in the market for equity funds.

- In addition, we note the following statement from the RBA in a May 2015 speech:[1609]

> One issue that this raises is what is the appropriate hurdle rate of return in a world of persistently low interest rates? Each CFO will no doubt have a different answer to this, but in a world of persistently low interest rates, it may well turn out that the average answer is – or should be – lower than it used to be.

Several service providers also submitted an RBA speech in April 2015, which considered that earnings yields have remained largely unchanged, even as interest rates have decreased. The RBA Governor suggests this is one possible explanation for the low rate of capital investment spending by businesses globally, stating:[1610]

> The possibility that, de facto, the risk premium being required by those who make decisions about real capital investment has risen by the same amount that the riskless rates affected by central banks have fallen may help to explain why we observe a pick-up in financial risk-taking, but considerably less effect, so far, on 'real economy' risk-taking.

We are not satisfied this provides sufficient evidence of an inverse relationship between the 10 year forward looking risk free rate and the MRP in the current market. Moreover, these statements by the RBA may not be applicable to the required rate of return in financial markets. As Partington and Satchell stated in their October 2015 report:[1611]

> Governor Stevens comment that there is a pick-up in financial risk taking suggests a reducing risk premium in financial markets, which is the risk premium relevant to the determination of the weighted average cost of capital.

Partington and Satchell also stated that:[1612]

> With regard to the risk premium that managers are requiring to undertake new projects this may have become disconnected from the risk premium in financial markets, but this does not change the market risk premium, or the return required by the suppliers of capital (the WACC). The alternative explanation, for the failure of reduced interest rates to stimulate investment, is pessimism on

[1609] RBA, *Managing two transitions*, speech by Phillip Lowe, 18 May 2015.

[1610] RBA, *The world economy and Australia*, speech by Glenn Stevens, 21 April 2015.

[1611] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 34.

[1612] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 34.

the part of managers about the returns that new investments are likely generate in a world where growth rates are not expected to be strong.

DGM estimates

Several service providers submitted that DGM estimates of the MRP have increased with recent decreases in the risk free rate, which indicates an inverse relationship between the risk free rate and MRP in the current market.[1613]

In its June 2015 report, Gray and Hall (previously SFG, now Frontier) submitted that DGMs estimate the MRP implied by equity prices.[1614] It considered our approach does not give sufficient weight to DGM evidence. As a consequence, our MRP and return on equity estimates do not adequately reflect the signal from the equity market, and are 'overwhelmed' by information from the government bond market.[1615].

We consider Gray and Hall's conclusions are based on two incorrect premises:[1616]

- a decision rule for the AER's estimation of the MRP—namely:
    - the AER sets an MRP of 6.0 per cent when its DGM estimates are less than 6.5 per cent, and
    - the AER sets an MRP of 6.5 per cent when its DGM estimates are greater than 6.5 per cent
- a view that DGM estimates are a reliable indicator of the MRP in prevailing market conditions, in particular, the MRP implied by equity prices.

Gray and Hall's first premise is a mischaracterisation of our approach to estimating the MRP. Our approach to estimating a range and point estimate for the MRP is set out in section C.8. This section demonstrated that we consider a range of conceptual and empirical evidence in estimating the MRP. This evidence comes from historical excess returns, DGM estimates, survey evidence, conditioning variables, and we have some regard to recent decisions by Australian regulators. We consider, given the uncertainty in MRP estimation, we must exercise our regulatory judgement to determine the MRP

1613 See, for example, ActewAGL, *Access arrangement information for the 2016-21 ACT, Queanbeyan and Palerang access arrangement: Appendix 8.02—Return on equity detailed proposal*, June 2015, pp. 42–43; AGN, *2016/17 to 2020/21 access arrangement information: Attachment 10.1—Rate of return*, July 2015, pp. 31–32; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 323; United Energy, *2016 to 2020 regulatory proposal: Attachment—Return on equity*, April 2015, section 2.7.7.2; Jemena Electricity Networks, *2016-20 electricity distribution price review regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, p. 74; Ergon Energy, *Submission to the AER on its Preliminary Determination: Rate of return—Cost of equity*, July 2015, pp. 16, 30; Energex, *2015-20 revised regulatory proposa*l, July 2015, pp. 91, 93–94; SAPN, *Revised regulatory proposal*, July 2015, pp. 347–348, 360–361; CitiPower and Powercor, *Submission in relation to the current regulatory determination processes for SAPN, Energex, Ergon Energy, AGN and ActewAGL*, 24 July 2015, pp. 16–17.

1614 Frontier, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015, p. 28. We determined that the authors of this report are Gray and Hall through an information request to Ergon Energy (see Ergon Energy, *AER information request: AER Ergon 102*, 7 October 2015).

1615 Frontier, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015, pp. 1–2, 28.

1616 Frontier, *Cost of equity estimates over time: a report prepared for Ergon Energy*, June 2015, pp. 1–3, 28.

point estimate from within the range. This does not lend itself to the decision rule Gray and Hall have described.

We also do not agree with Gray and Hall's second premise. While we consider our DGM is theoretically sound, there are many limitations in practically implementing this model. For example, we consider our, and other, DGMs are likely to produce upward biased estimates of the MRP in the current market.[1617] We also consider our, and other, DGMs may not accurately track changes in the return on equity for the market.[1618] See section B.5 of appendix B–DGM for a more detailed discussion of the limitations of DGMs. In their October 2015 report, Partington and Satchell supported this view, stating:[1619]

> There are several possible variants of the DGM model that can be used and several ways such models may be implemented. This can make a substantial difference, as can be seen in Frontier (2015, Time) by comparing the estimates reported for the AER in Figure 2 and the Bloomberg model in Figure 4. It is also well established that the inputs used in the implementation of DGM models, which are analysts' forecasts of earnings, dividends and target prices, are upward biased. Furthermore it is clear that there has been extensive debate about what the appropriate long term growth rate should be. See, for example, McKenzie and Partington (2013, DGM) Table 2, where alternative forecasts of the long term growth rate vary from 0.31% to 6.5%. Neither is this value necessarily a constant. As we have also pointed out, rather than providing a good tracker of required returns as prices change, the DGM is an unreliable tracker because of sticky dividends.
>
> …Our conclusion in this respect has not changed. In determining the market risk premium, it takes an extremely hopeful view about the properties of the DGM estimate to contemplate weighting it, as Frontier does, at 50%.

Further, we do not consider DGMs provide reliable estimates of the MRP implied by equity (or share) prices, or reliable signals from the equity market. We consider DGMs estimate the MRP implied by the particular DGM used given its construction, inputs and assumptions. While the share price is one input in a DGM, it is not the only input. Also, the estimates produced from DGMs are highly sensitive to its underlying assumptions, some of which are unlikely to hold in reality. For example, our three stage DGM assumes investors in the equity market have the following expectations:[1620]

- expected dividends are reflected by analyst forecasts

[1617] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 26–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50, 59; Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6.

[1618] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 31–32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51.

[1619] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 43–44.

[1620] See appendix B—DGM for a more detailed analysis of our and SFG's DGMs.

- dividend growth in year three is equal to the geometric average of the growth from the current dividend to the expected dividend in two years' time
- dividend growth will change linearly from year three to 4.6 per cent in year 10 (transition to long term dividend growth, similar to SFG's DGM)
- investors' required return on equity for a one year investment in the same as their required return on equity for a 10, 20 or 100 year investment (no term structure, similar to SFG's DGM).

We understand all models contain simplifying assumptions, and we do not consider DGMs should be excluded from MRP estimation. However, we consider Gray and Hall do not have adequate regard to the limitations and input assumptions of DGMs. Partington and Satchell supported this view, stating:[1621]

> Frontier's (2015, Time) complaint is that not enough weight is being given to the "market cost of equity implied by share prices" or the "market signal". These are labels for the application of some form of the dividend growth model (DGM) over a two month period to derive an implied market risk premium. Accurately tracking changes in the market risk premium using the DGM and two months of data is a fanciful notion. To suggest that this is the market signal is a very long stretch indeed.

C.8 Selection of range and point estimate

We adopt an MRP point estimate of 6.5 from a range of 5.0 to 8.6 per cent.[1622] We are satisfied an MRP of 6.5 provides for a return on equity that contributes to achieving the allowed rate of return objective and has regard to prevailing conditions in the market for equity funds.[1623]

The MRP cannot be directly observed and there is no consensus among experts on which method produces the best estimate of the MRP.[1624] Therefore, we consider a range of conceptual and empirical evidence in estimating the MRP. This evidence comes from historical excess returns, DGM estimates, survey evidence and conditioning variables. We also have regard to recent decisions by Australian regulators.[1625]

1621 Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 42.

1622 We use information up to the end of July 2015, and use a two month averaging period of July–August 2015 for our DGM estimates of the MRP. This is reasonably consistent with the risk free rate averaging period we adopt for the SA/Qld DNSPs (1 July 2015 to 28 July 2015).

1623 NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

1624 See Damodaran, *Equity risk premiums: determinants, estimation and implications - the 2012 edition*, March 2012, p. 93. He also noted: 'No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate'.

1625 AER, *Rate of return guideline*, 17 December 2013, p. 16.

C.8.1 Selection of range

Based on the evidence before us, we consider a range of 5.0 to 8.6 per cent is reasonable for the MRP under current market conditions. This is because:

- The geometric average historical excess return currently provides the lowest estimate of the MRP with a range of 3.9 to 4.9 per cent. McKenzie and Partington advised that 'the unbiased estimator of the MRP lies between the arithmetic average and the geometric average'.[1626] Therefore, while we have regard to geometric averages, we consider a reasonable estimate of the lower bound will be above the geometric average.[1627] Therefore, we apply a lower bound estimate of 5.0 per cent.[1628]
- Our DGM currently provides the highest estimate of the MRP at about 8.6 per cent, using the upper bound of our assumptions concerning the long term dividend growth rate.[1629] We apply this as the upper bound for the range.

We note the upper and lower bound estimates reflect the evidence before us and may change over time. This is consistent with having regard to prevailing conditions in the market for equity funds.[1630] The upper bound of the MRP range has not changed from the April/June 2015 final and preliminary decisions.[1631]

C.8.2 Selection of point estimate

Given the uncertainty in MRP estimation, we must exercise our regulatory judgement to determine the MRP point estimate from within the range. In deciding upon our point estimate of 6.5 per cent, we have considered the following sources of evidence:

- Historical excess returns—these estimates provide a range of 5.8 to 6.4 per cent if calculated using arithmetic averages and a range of 3.9 to 4.9 per cent if calculated

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1626 McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 5.

1627 AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 83; AER, *Draft decision: SPI Networks access arrangemen*t, September 2012, Appendix B.2.1.

1628 In our final and preliminary decisions published in April/June 2015, we stated that, 'Consistent with the worked example in the Guideline, we set the bottom of the range as 20 basis points above the highest estimate from the range of geometric averages'. In the Guideline, we chose 5.0 as the bottom of the historical excess returns range instead of 4.8 because we recognised that estimating the rate of return for a service provider is not a precise science. We considered there is a limit to the specificity for which estimates of the return on equity can be determined (see AER, *Explanatory statement rate of return guideline,* 17 December 2013, pp. 64–65). Consistent with this reasoning, we do not set the bottom of the range as 20 basis points above the highest estimate from the range of geometric averages. Instead, we have regard to the geometric and arithmetic average estimates in determining a reasonable range.

1629 As such, this is a conservatively high estimate using our construction of the DGM. This estimate is for the two months ending August 2015.

1630 NER, cll. 6.5.2(g); NER, cll. 6A.6.2(g); NGR, rr. 87(7).

1631 See, for example, AER, *Preliminary decision: SA Power Networks distribution determination 2015–16 to 2019–20: Attachment 3—Rate of return*, April 2015, p. 33. The DGM estimates are the same across the 11 final and preliminary decisions because we used the same averaging period (January–February 2015).

using geometric averages. We consider 5.0 to 6.5 per cent a reasonable range and 6.0 per cent a reasonable point estimate based on this source of evidence.

- DGMs—these estimates, from two applications of the DGM and a range of inputs, suggest a range of 7.5 to 8.6 per cent for the two months to end August 2015.[1632]
- Survey evidence—surveys of market practitioners indicate that MRPs applied in Australia cluster around 6.0 per cent.[1633] This holds when considering averages, medians and modes across surveys.
- Conditioning variables—we consider the conditioning variables do not support an increase (or decrease) in the MRP above (or below) that implied by historical excess returns.[1634]
- We also have regard to recent decisions among Australian regulators—the majority of other regulators adopted an MRP estimate of 6.0 in their most recent decision or update. The range of MRP estimates adopted by each regulator's most recent decision or update is 6.0 to 7.6 per cent. The average of these decisions is 6.4 per cent.[1635]

We have also considered:

- Tribunal decisions—the Tribunal upheld our approach to estimating the MRP when APA GasNet appealed our decision in 2013.[1636] The MRP approach brought before the Tribunal was similar to that applied in this decision.[1637]
- The potential for a relationship between the risk free rate and the MRP—the evidence has not satisfied us that there is a clear relationship (positive or negative) between the 10 year forward looking risk free rate and MRP, in general or in the current market.[1638]
- Submissions received (from service providers and other stakeholders)—service providers have generally proposed an MRP at or above 6.5 per cent, and other stakeholders have generally recommended an MRP at or below 6.5 per cent.[1639]

Figure 3-25 displays our estimates of the MRP using historical excess returns, DGMs, surveys and other regulators' decisions. The squares represent point estimates, the

[1632] This end date is close as practical to the publication of this decision and encompasses the final and placeholder risk free rate averaging periods we adopt for the SA/Qld DNSPs and Vic DNSPs respectively.

[1633] See section C.3 for the full list of surveys (with references).

[1634] See section C.4 for more information on, and charts of, the conditioning variables.

[1635] See section C.5 for more information on, and references to, the other Australian regulators' MRP estimates we consider.

[1636] Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8*, 18 September 2013, Para 308.

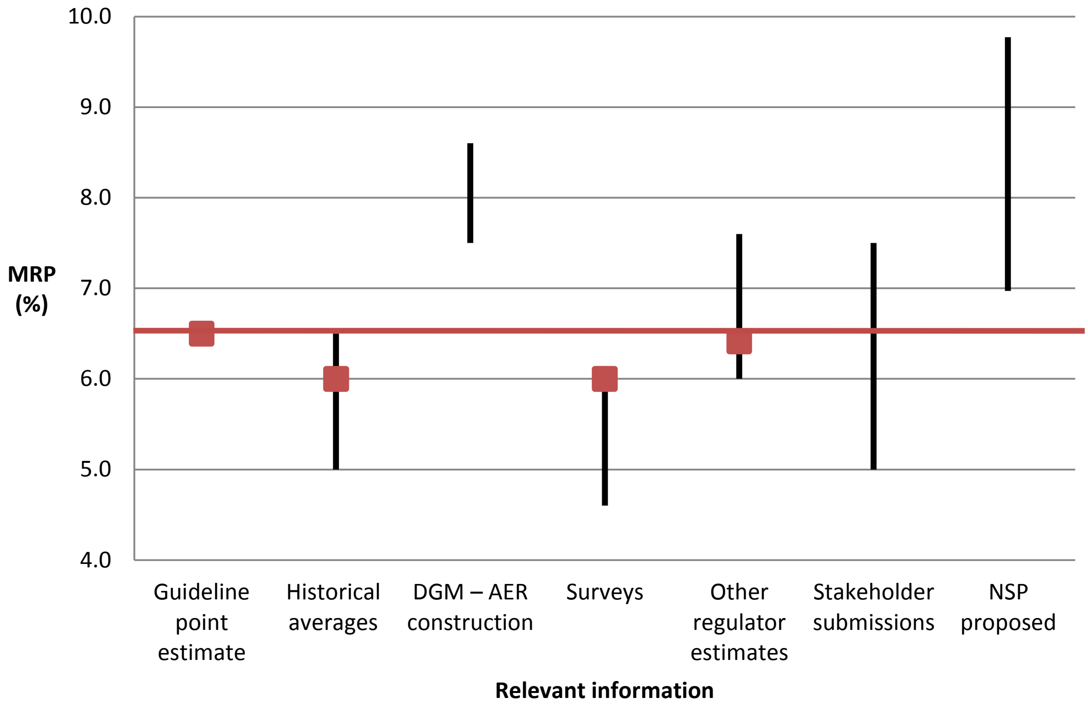
[1637] The most notable change to our approach is that we now place more reliance on DGMs than using them as a cross check.

[1638] See section C.7.

[1639] See discussion under 'Views of service providers and other stakeholders' for more information and references.

vertical lines represent ranges and the red horizontal line represents our point estimate of 6.5 per cent.[1640]

Figure 3-25 Empirical estimates of the MRP against our point estimate of 6.5 (per cent)



Source: AER analysis

Note: The average of each state regulator's most recent decision/update on the MRP forms the point estimate (6.4 per cent) for other regulator estimates. The top of this range is 7.6 per cent—the latest estimate of the MRP applied by the ERA. The bottom of this range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC, TER and the ACCC.[1641] The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network (or pipeline), and as such it does not include submissions from NSPs. The bottom and top of the stakeholder range comes from the CCP and Chamber of Commerce and Industry Queensland (CCIQ) respectively.[1642] The bottom and top of the service provider proposed range comes from APTNT's (Amadeus gas pipeline) proposal.[1643]

1640 See appendix C–MRP for more information on these sources of information, and the ranges and point estimates we consider are consistent with these sources of information.

1641 See section C.5 of appendix C—MRP for full reference list.

1642 The CCP (subpanel 2) submitted we should use an MRP of 5.0 per cent and the CCIQ submitted that we should select an MRP point estimate from a range of 5.0–7.5 per cent. See CCP2 (Hugh Grant), *AER preliminary 2015-20 revenue determinations Energex and Ergon Energy revised revenue proposals*, 3 September 2015, p. 14; CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16.

1643 APTNT proposed an MRP range of 6.97 to 9.77 per cent based on the Wright approach. See: APTNT, *Amadeus gas pipeline: Access arrangement proposal (information)*, August 2015, p, 21.

Figure 3-25 shows that while DGM estimates indicate an MRP above 6.5 per cent, historical excess returns indicate an MRP of around 6.0 per cent. The other evidence we consider is consistent with an MRP of between 6.0 and 6.5 per cent.[1644]

We assigned a role to each source of relevant material for estimating the MRP in step two of our foundation model approach (see section 3.4.1). In determining these roles we assessed the merits and limitations of each source. We consider a reasonable application of this material is as follows:

- We place most reliance on historical excess returns. Therefore, we use this information to determine a baseline estimate of the MRP. We consider 6.0 per cent is, at this time, a reasonable point estimate based on this source of evidence.
- We place less reliance on our DGM estimates of the MRP. This information indicates whether we should select an MRP point estimate above or below the baseline estimate.
- We place some reliance on the other information (survey evidence and conditioning variables). This information, in conjunction with DGM evidence, helps to indicate how far above or below the baseline estimate the MRP point estimate should be. We use other Australian regulators' MRP estimates as a cross check on how we consider information.

In applying this approach to the evidence before us for this decision, we consider:

- 6.0 per cent is a reasonable point estimate based on historical excess returns evidence.
- Our DGM estimates (for the two months to end August 2015) range from 7.5 to 8.6 per cent. This indicates that there is evidence, at this time, supporting an MRP point estimate above 6.0 per cent.
- Survey evidence and conditioning variables are generally consistent with the baseline estimate of 6.0 per cent.

We also consider that, since our Guideline application in December 2013, the increase in MRP estimates derived from the DGM has largely been the result of a decrease in the risk free rate. Other inputs to the DGM have remained relatively steady. Figure 3-26 shows movements in the key DGM inputs (dividend forecasts and share price) and risk free rate since our Guideline application. We are not confident that the recent increases in our DGM estimates of the MRP necessarily reflect an increase in the 'true' expected 10 year forward looking MRP. This is because:[1645]

[1644] Figure 3-25 does not include evidence from conditioning variables because we do not derive quantitative estimates of the MRP from this source of evidence. However, we consider the conditioning variables we analyse do not support an increase (or decrease) in the MRP above (or below) that implied by historical excess returns (see section C.4).

[1645] We provide more detail on each of these reasons in under step three of section 3.4.1 of this attachment.

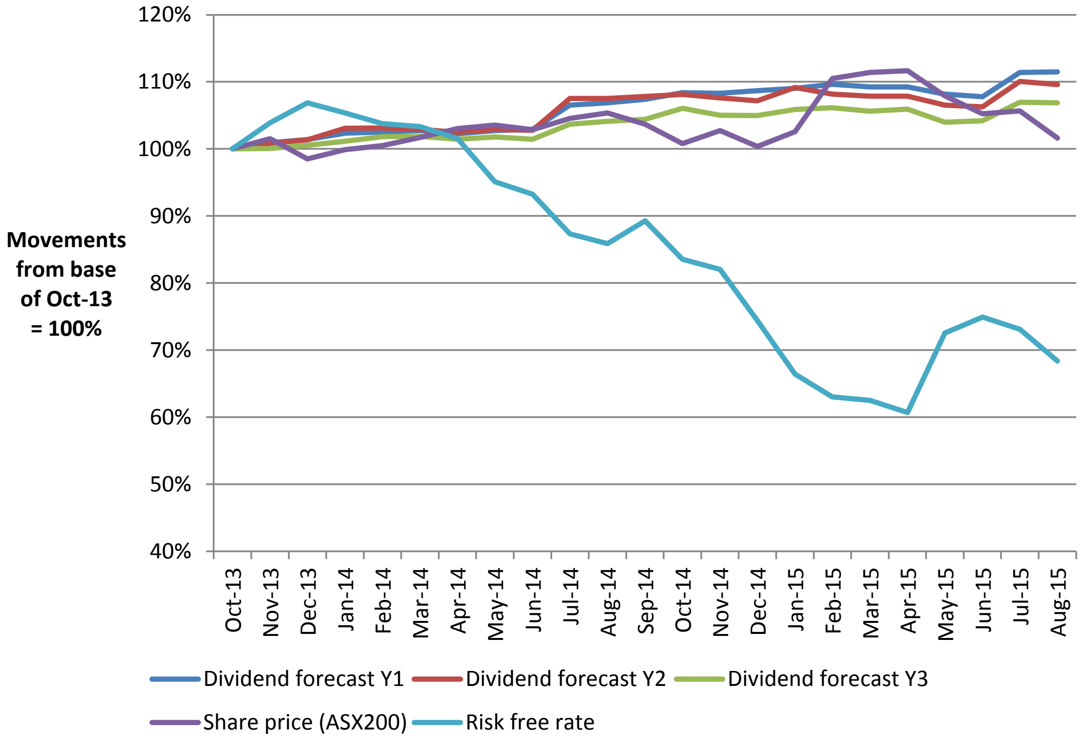
- We use conditioning variables as a directional indicator for the MRP because of their potential to detect changing market conditions. We consider, overall, these do not indicate a sustained change in market conditions, and consequently, the MRP (see section C.4). Also, the 2015 survey estimates we consider are generally equal to or lower than their 2013 and 2014 counterparts (see section C.3). These are different outcomes to our DGM estimates of the MRP.
- While we consider our DGM is theoretically sound, there are many limitations in practically implementing this model. For example, we consider our, and other, DGMs are likely to produce upward biased estimates of the MRP in the current market.[1646] We also consider our, and other, DGMs may not accurately track changes in the return on equity for the market.[1647] See section B.5 of appendix B–DGM for a more detailed discussion of sources of potential upward bias in our, and other, DGMs.
- We do not consider there is a clear relationship (positive or negative) between the 10 year forward looking risk free rate and MRP (see section C.7). Partington considered it is unlikely that the MRP has increased in response to recent decreases in the risk free rate. He stated '[t]he low bond rates tell us that the required return for low risk assets is low'.[1648] This is the benchmark rate against which other risky assets are priced to attract equity funds.

[1646] McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 26–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50, 59; Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

[1647] McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 31–32; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 51. Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

[1648] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72. In their May 2015 report, Partington and Satchell reiterated that they consider the argument of an inverse relation between the market risk premium and interest rates to have little merit (see: Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, pp. 17–18). Also see Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 17.

Figure 3-26 Movements in DGM inputs and risk free rate



Source: AER analysis.

We are satisfied that the information set out above, at this time, could justify an MRP point estimate above the baseline of 6.0 per cent. However, we are not satisfied that it supports an MRP point estimate above the top of the range implied by historical excess returns (the source of evidence we place most reliance on). Therefore, we are satisfied that an MRP point estimate of 6.5 per cent reasonably reflects prevailing conditions in the market for equity funds and provides for a return on equity that contributes to the achievement of the allowed rate of return objective.[1649] It also provides a balance between the views of services providers and other stakeholders.

Views of service providers and other stakeholders

In this final decision, we have regard to the views of service providers and other stakeholders. We consider an MRP point estimate of 6.5 per cent provides a balance between the views of service providers and other stakeholders.

The service providers have generally proposed an MRP above 6.5 per cent. For example:

- Most service providers have relied on Gray and Hall's (as SFG) weighted average method to estimate the MRP, which has produced MRP estimates in the range of

[1649] NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

7.21 to 8.23 per cent over the period May 2014 to May 2015.[1650] This weighted average method places most reliance on MRP estimates from its own DGM construction (50 per cent). It also places reliance on MRP estimates from historical excess returns (20 per cent), the Wright approach (20 per cent) and independent valuation reports (10 per cent).

- APTNT (Amadeus gas pipeline) proposed an MRP range of 6.97 to 9.77 per cent based on the Wright approach.[1651]

Stakeholder submissions (excluding submissions by service providers) generally supported an MRP at or below 6.5 per cent. For example:

- The Consumer Challenge Panel (CCP), the Energy Users Association of Australia (EUAA) and Victorian Energy Consumer and User Alliance (VECUA) recommended an MRP of 5.0 per cent, at the bottom of the range determined in the Guideline.[1652] This appears to be based on outcome-based considerations regarding the profitability and low risk of service providers and decisions made by other regulators, as well as a view that the AER should exercise its discretion in a more balanced manner.
- The South Australian Council of Social Services (SACOSS) commissioned an independent analysis from the South Australian Centre for Economic Studies (SACES). SACES found that '…the appropriate point estimate for the market risk premium should be slightly lower than the 6.5 per cent adopted by the AER; somewhere between 6.2 per cent and 6.4 per cent would seem to better reflect the underlying data and its limitations'.[1653]
- The Queensland Council of Social Service (QCOSS) recommended an MRP of 6.0 per cent.[1654] This is based on advice from the Engineroom Consulting (Engineroom). Engineroom recommended the MRP be estimated by 'regression of a series of market data over an historical period of more than 50 years'.

[1650] SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 8, 84; SFG, *Estimating the required return on equity: Report for Energex*, August 2014, pp. 20, 57; SFG, *Updated estimate of the required return on equity: Draft report for Ergon*, 14 August 2014, pp. 2, 4; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 8 September 2014, pp. 2, 4; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 42; SFG, *The required return on equity: Initial review of the AER draft decisions: Report for Energex*, 30 January 2015, p. 43; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 33; SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 33; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 19 May 2015, p. 4.

[1651] APTNT (Amadeus gas pipeline), *Access arrangement information*, August 2015, p. 21.

[1652] CCP2 (Hugh Grant), *AER preliminary 2015-20 revenue determinations Energex and Ergon Energy revised revenue proposals*, 3 September 2015, p. 14; Energy Users Association of Australia, *Submission to AER draft determination and Energex's revised revenue proposal 2015 to 2020*, 24 July 2015, p.11; Victorian Energy Consumer and User Alliance, *Submission to the AER Victorian Distribution Networks' 2016-20 Revenue Proposals*, 13 July 2015, p. 11.

[1653] SACES (2015) *Analysis of AER Preliminary Decision on SA Power Networks 2015-20*, p. 3.

[1654] QCOSS, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, pp. 78–79 and Appendix 1: Technical advice on the regulated rate of return—Engineroom Consulting.

Engineroom considered the DGM model should not be used in estimating the MRP because it produces upward biased estimates.

- Origin Energy supported an MRP estimate of 6.5 per cent as this better reflects the efficient financing costs of a business exposed to the level of risk that applies to an Australian regulated network business.[1655]

In steps one and two of our foundation model approach (see section 3.4.1), we assess and give a role to each source of relevant material in estimating the MRP. We discuss:

- why we rely on more than historical excess returns estimates
- why we place less reliance on DGM estimates than historical excess returns estimates
- why we consider market surveys, conditioning variables and recent regulatory decisions provide valuable information for informing the estimate of the MRP
- why we consider the Wright approach and independent expert reports at the overall return on equity level (that is, in steps four and five).

In its 2015 reports, Gray and Hall (as SFG and Frontier) submitted that we have set a 'binding constraint' for the MRP at 6.5 per cent based on our favoured subset of evidence (historical excess returns).[1656] This is a mischaracterisation. We consider a range of information in estimating the MRP and we explain the application of our approach above. We are satisfied the information we consider in estimating the MRP, at this time, supports an MRP point estimate of 6.5 per cent.

We are estimating the 10 year forward looking MRP, which is an expectations based metric. The expected MRP is not necessarily equivalent to an MRP estimate derived from contemporaneous information, as investor expectations can be guided by different sources of information. In fact, some experts consider there is no better forecast of expected excess returns than the historical average.[1657]

In this appendix, we set out the reasoning for why we are satisfied that an MRP estimate of 6.5 per cent contributes to a rate of return that achieves the allowed rate of return objective and has regard to prevailing market conditions.[1658]

Both service providers and other stakeholders consider their recommended MRP estimates (which range from 5.0 to 8.23 per cent)[1659] contribute to the achievement of

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[1655] Origin Energy, *Submission to AER preliminary decision Qld electricity distributors*, 3 July 2015, p.11.

[1656] SFG, *The required return on equity for the benchmark efficient entity*, February 2015, p. 22; Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 40–47.

[1657] Dimson, Marsh and Staunton, *Credit Suisse Global Investment Returns Sourcebook 2012*, February 2012, p. 37.

[1658] NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

[1659] This excludes the MRP estimate of 0.2 per cent proposed by the Alliance of Electricity Consumers (AoEC). We consider this estimate to be unreasonably low and not supported with sufficient reasoning. The AoEC set the required return on the market equal to the average return on equity specified in the annual reports of eight Queensland government owned corporations over 2009–10 to 2013–14 (3.83 per cent). To estimate the MRP, it subtracted the risk free rate proposed by Ergon Energy (3.63 per cent) (see: Alliance of Electricity Consumers, the allowed rate of return objective. This highlights the divergence of views on estimating the MRP, even with the allowed rate of return objective as a common aim. Our MRP point estimate of 6.5 per cent lies between the estimates recommended by service providers and other stakeholders. Although our decision is based on the evidence before us and the achievement of the allowed rate of return objective, we consider it is important to be balanced and reasonable in our approach. This is particularly important given the divergence of views on how to best estimate the MRP.

Submission to Ergon Energy's regulatory proposal for 2015–20, 30 January 2015, p. 6). We do not consider it is appropriate to equate the average return on equity for eight businesses with the return on the market portfolio. Moreover, we do not consider a return on equity estimate based on eight Queensland government owned corporations is reflective of the return on equity for a benchmark efficient entity (which we define as a pure play regulated energy businesses operating within Australia). In its July 2015 submission, the AoEC considered the return on equity should equal the risk free rate based on a similar analysis of Queensland government owned corporations (Alliance of Electricity Consumers, *Submission to the AER's preliminary decision (Queensland)*, 3 July 2015, pp. 28–29). Again, we do not consider this approach is reasonable.

D Equity beta

The equity beta is a key input parameter in our foundation model, the Sharpe–Lintner capital asset pricing model (SLCAPM). It measures the sensitivity of an asset or business's returns to movements in the overall market returns (systematic or market risk).[1660] Because the SLCAPM works on the basis that investors can diversify away business–specific risk, only systematic risk is relevant for determining equity beta.[1661]

We adopt an equity beta point estimate of 0.7 from a range of 0.4 to 0.7 for a benchmark efficient entity. We consider an equity beta of 0.7 is reflective of the systematic risk a benchmark efficient entity is exposed to in providing regulated services. We are satisfied it is likely to contribute to the achievement of the allowed rate of return objective.[1662]

Our decision is based on the following analysis of the relevant information before us, having regard to regulatory precedent and the uncertainty inherent in estimating an unobservable parameter. On balance, we are not satisfied there is sufficient new evidence such that a departure from the Rate of Return Guideline (Guideline) approach for estimating equity beta would better achieve the allowed rate of return objective.[1663] This has the additional benefit of providing certainty and predictability for investors and other stakeholders.

This appendix sets out the reasoning behind our decision in detail. It also responds to the issues service providers have raised in their proposals and revised proposals.[1664] This appendix is structured as follows:

- conceptual analysis
- empirical analysis
- international empirical estimates
- the theory of the Black CAPM
- selection of range and point estimate.

[1660] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 21; Brealey, Myers, Partington, Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2000, p. 187.

[1661] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp. 21–22

[1662] NER, cll. 6.5.2(c) and 6A.6.2(c); NGR, rule 87(3).

[1663] AER, *Rate of return guideline*, December 2013, p. 15.

[1664] The service providers who submitted proposals are United Energy, AusNet Services, Jemena Electricity Networks (JEN), CitiPower, Powercor, ActewAGL Gas Distribution, Australian Gas Networks (AGN), and APTNT (Amadeus gas pipeline). The service providers who submitted revised proposals are Ergon Energy, Energex and SA Power Networks (SAPN).

D.1 Conceptual analysis

The main conceptual issue we consider in this section is whether we can form an overall view on the systematic risk for the benchmark efficient entity relative to the market average firm. As discussed in step two of section 3.4.1, our conceptual analysis is necessarily qualitative in nature and is therefore used as a cross–check against the empirically derived range. We also consider the risks to service providers arising from the development of 'disruptive technologies' and the comparative systematic risk of gas and electricity service providers.

We consider it is possible to determine a conceptual expectation of the systematic risk of the benchmark efficient entity relative to the market average firm. This then gives us some insight into where the equity beta for the benchmark efficient entity sits relative to the average equity beta across all firms in the market, which is 1.0 by definition.[1665] Our conceptual analysis indicates that the equity beta of a benchmark efficient entity will be less than 1.0. This implies that returns to a benchmark efficient entity vary less with economic conditions than returns for the market as a whole. Professor Michael McKenzie and Associate Professor Graham Partington (McKenzie and Partington) supported this conclusion in their October 2014 and April 2015 reports.[1666] In reviewing our approach for these decisions, Partington and Professor Stephen Satchell (Partington and Satchell) stated they have not changed their opinions.[1667]

We addressed this type of conceptual analysis at length in the Guideline and our 2012 decision for the Roma to Brisbane pipeline, as well as our April/June 2015 final and preliminary decisions. This material remains relevant.[1668] However, given submissions received, including a June 2015 report by Frontier Economics (Frontier), we have reviewed the material before us.

Two key types of systematic risk are relevant for this conceptual assessment: business risk and financial risk.

1665 More precisely, the value weighted average across all firms in the market is 1.0. As pointed out by McKenzie and Partington, the equal weighted average may not be 1.0, since larger firms may be unevenly distributed above or below 1.0. See: McKenzie and Partington, *Estimation of the equity beta (conceptual and econometric issues) for a gas regulatory process in 2012*, April 2012, p. 21. (McKenzie and Partington, *Estimation of equity beta*, April 2012)

1666 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014. This report was updated in 2015 (Partington, *Report to the AER: Return on equity (Updated)*, April 2015). The material on conceptual analysis is the same in both reports so any reference to McKenzie and Partington's 2014 report in this section also applies to Partington's 2015 report. Partington and Satchell provided another updated report in May 2015, which considered submissions to JGN's access arrangement review. They noted there is nothing in those submissions that would lead them to depart from the findings in McKenzie and Partington (2014) and Partington (2015). See: Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6. Therefore, references to McKenzie and Partington (2014) or Partington (2015) also apply to Partington and Satchell (2015).

1667 Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 15.

1668 AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 39–44; AER, *Draft decision: APT Petroleum Pipeline Pty Ltd, Access arrangement draft decision, Roma to Brisbane pipeline, 2012–13 to 2016–17*, April 2012, pp. 149–51, 315–319; AER, *Final decision: APT Petroleum Pipeline Pty Ltd, Access arrangement final decision, Roma to Brisbane Pipeline, 2012–13 to 2016–17*, August 2012, pp. 88–89.

D.1.1 Business risk

Business risk in this context is referring to the systematic risk exposure of the underlying business assets.[1669] It is generally accepted that the benchmark efficient entity has lower business risk than the market average firm.[1670] We consider that business risk for the benchmark efficient entity will be very low for the following reasons:[1671]

- There are a number of inherent characteristics of an energy transportation network that lead to low systematic risk exposure. For example, operation of a natural monopoly and provision of an essential service.
- The structure of the regulatory regime insulates service providers from systematic risk. For example, the regulatory regime provides for revenue cap regulation, tariff variation mechanisms and cost pass through mechanisms. The regime also provides for tariff structures that include fixed charges and protection of sunk investment through rolling forward the regulatory asset base (RAB).

We consider the broad category of business risk can be disaggregated into further subcategories of risk. In their 2012 report to the AER, McKenzie and Partington disaggregated business risk into intrinsic (or economic) risk and operational risk.[1672] Intrinsic risk relates to how the business cycle impacts on a firm's sales and operational risk relates to a firm's operating leverage (that is, the proportion of fixed to variable costs). McKenzie and Partington considered that operational risk for the benchmark efficient entity would be above the market average, given the high proportion of fixed costs (relative to variable costs) for energy networks.[1673] However, the overall business risk would still be low because the benchmark efficient entity could mitigate the effect of this cost structure through the use of fixed charges. McKenzie and Partington also considered that intrinsic risk for the benchmark efficient entity

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[1669] We note business risk in this context is only systematic/market risk and does not include firm specific risk that can be diversified away.

[1670] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 6, 10; SFG, *Equity beta: Report for Jemena Gas Networks, ActewAGL and Networks NSW*, May 2014, pp. 17–18. (SFG, *Equity beta*, May 2014); SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 60; SFG, *Beta and the Black capital asset pricing model: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015, p. 42 (SFG, *Beta and the Black capital asset pricing model*, 13 February 2015); SFG, *Equity beta report prepared for APT Petroleum Pipelines Ltd*, October 2011, p. 11; McKenzie and Partington, *Report to the AER: Risk, asset pricing models and WACC*, June 2013, p. 11; Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 64. McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 11. Origin Energy, *Submission to NSW distribution network service providers regulatory proposals for 2014–19*, August 2014, p. 7.

[1671] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 40–41. Also see: Frontier Economics, *Assessing risk for regulated energy networks*, July 2013; McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

[1672] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 5–6. See also: McKenzie and Partington, *Report to the AER: Risk, asset pricing models and WACC*, June 2013, p. 11.

[1673] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 7, 14.

would be very low because it is insulated from the business cycle for reasons described above (for example, the regulatory regime and low price elasticity of demand).[1674]

In their 2012 report, one of McKenzie and Partington's key conclusions was that the intrinsic risk of a firm is the 'primary, if not sole, driver of its systematic risk'.[1675] In their 2014 (and 2015) report, McKenzie and Partington reiterated this conclusion and cited a number of published academic articles to support their view.[1676] On the basis of this information, we consider the intrinsic business risk of a firm is the primary driver of its systematic risk, and that this intrinsic risk is low for the benchmark efficient entity (relative to the market average firm). The Consumer Challenge Panel (CCP), in a 2015 submission, supported this view.[1677]

D.1.2 Financial risk

Financial risk relates to the additional systematic risk exposure that arises from the debt holdings of a firm. The underlying principle is that, since payments to debt holders take precedence over payments to equity holders, the systematic risk exposure for equity holders (that is, the equity beta) increases as the firm issues more debt. It is generally accepted that the benchmark efficient entity has higher financial risk than the market average firm.[1678] The key characteristic causing this higher financial risk is the relatively high financial leverage (gearing) for the benchmark efficient entity (60 per cent) relative to the market average firm (roughly 30 to 35 per cent).

However, the exact relationship between financial risk and financial leverage is not straightforward. In their 2012 report, McKenzie and Partington discussed the limitations of various linear and nonlinear leverage formulae.[1679] They considered that, overall, increased financial leverage increases the financial and therefore systematic risk facing equity (that is, the equity beta). However, they cautioned against any claim that the exact nature of this relationship might be known. This suggests that the high financial leverage of the benchmark efficient entity (relative to the market average) does not necessarily result in an equivalently high exposure to financial risk. For instance, in their 2014 (and 2015) report, McKenzie and Partington noted that, for energy network businesses, the likelihood of bankruptcy as leverage increases is low

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[1674] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 6, 15.

[1675] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 14.

[1676] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 32.

[1677] CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, pp. 39-40

[1678] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 7, 10; SFG, *Equity beta*, May 2014, pp. 17–18; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 60; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 42; SFG, *Equity beta report prepared for APT Petroleum Pipelines Ltd*, October 2011, p. 11.

[1679] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 7–13.

(to the extent that the business is able to pass on borrowing costs to consumers).[1680] In their 2013 report, McKenzie and Partington also noted that, given the low default risk in regulated energy network businesses, the financial risk effects are 'unlikely to be substantive in normal market conditions'.[1681]

In our April/June 2015 final and preliminary decisions, we considered a 2013 report prepared by Frontier.[1682] We stated that Frontier disaggregated financial risk (arising as a consequence of how the business' activities are funded) into five different subcategories, and classified most of these as low or medium relative to other businesses in the economy.[1683] In its June 2015 report, Frontier submitted that we misunderstood its intention, stating:[1684]

> We did not seek to decompose the systematic risk component attributable to leverage into five neat subcategories of systematic risk. Our objective was to enumerate the distinct sources of risk that may potentially contribute to the total risk (i.e., systematic and non-systematic) that regulated energy networks may face.

Frontier's statement appears to be based on a misunderstanding. In our April/June 2015 final and preliminary decisions, we noted that Frontier's 2013 report included both systematic and non-systematic risks. We also noted that only the former is relevant for the estimation of equity beta.[1685] There appears to be no disagreement on that point. We then stated 'Frontier disaggregated financial risk (arising as a consequence of how the business' activities are funded) into five different categories'.[1686] It is unclear why Frontier considers that we sought to 'decompose the systematic risk component attributable to leverage into five neat sub categories of systematic risk'.[1687] Our objective was to consider the types of risk that could impact the systematic risk of a benchmark efficient entity. Hence, the discussion of financial risks listed in Frontier's 2013 report. Moreover, we did not state or intend to give the impression, as stated by Frontier (2015), that '…these five risks collectively make up the systematic risks associated with leverage…'.[1688]

[1680] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 11; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 31–32.

[1681] McKenzie and Partington, *Report to the AER: Risk, asset pricing models and WACC*, June 2013, pp. 11–12.

[1682] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013.

[1683] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, pp. 9, 65. See, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, p. 397.

[1684] Frontier Economics, *Review of the AER's conceptual analysis for equity beta: Report prepared for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon, Energex, Jemena Electricity Networks, Powercor Australia, SA Power Networks and United Energy*, June 2015, p. 8 (Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015).

[1685] See, for example AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, p. 397, footnote 1546.

[1686] AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, p. 397.

[1687] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 8.

[1688] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 8

Frontier, in its 2015 report, also submitted that financial leverage increases the financial risk of a firm, regardless of the likelihood of bankruptcy.[1689] It submitted that this is because financial leverage, of itself, increases the volatility of cash flows to equity. We agree with this submission, as do Partington and Satchell.[1690]

Importantly, Frontier's views in its June 2015 report do not change our key conclusion on financial risk, which is that while financial leverage increases financial risk, the exact relationship between the two is not straightforward. We do not consider we have overstated the complexity of this relationship, and make our overall systematic risk assessment with regard to both business and financial risk (see section D.1.3).[1691]

Frontier (2015) did not move away from its 2013 report where it assessed the level of risk (under the sub category financial risks) for regulated Australian energy network businesses relative to other businesses in the economy as:[1692]

- low risk—default risk, financial counterparty risk, and illiquidity risk (for large networks)
- medium risk—refinancing risk
- medium to high risk—interest rate reset risk,[1693] and illiquidity risk (for small networks).

On the basis of the information set out above, we consider that although the benchmark efficient entity has high financial leverage (relative to the market average firm), this does not necessarily imply it has an equivalently high exposure to financial risk. We consider McKenzie and Partington's 2014 (and 2015) report supports this position.

D.1.3 Overall systematic risk assessment

The conceptual assessment of equity beta relative to the market average is determined by the direction and relative magnitude of these two systematic risk factors: business risk and financial risk.

We consider the above assessment of business risk and financial risk for the benchmark efficient entity suggests that the intrinsic business risk of a firm is the main driver of its systematic risk. We expect the benchmark efficient entity to have low intrinsic risk exposure (relative to the market average). We also consider the high

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1689 Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 12.

1690 Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 39.

1691 Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, pp. 10–12.

1692 Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 65.

1693 when the Frontier report assessed interest rate reset risk as 'medium to high', it did so on the basis that the regulated return on debt would continue to be set using an 'on the day' approach (see Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 64). Later in that report, Frontier acknowledges that our implementation of a trailing average approach would reduce interest rate reset risk (see Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 74).

financial leverage of the benchmark efficient entity (relative to the market average) does not necessarily correspond to an equivalently high exposure to financial risk. Therefore, on the basis of this information, we consider there are reasonable conceptual grounds to expect the overall systematic risk for the benchmark efficient entity to be below that of the market average firm. This leads to our expectation that the equity beta of the benchmark efficient entity will be below 1.0.

This conclusion is supported by McKenzie and Partington in their 2012 conceptual assessment:[1694]

> Taken together, the previous conceptual discussion clearly provides evidence to suggest that the theoretical beta of the benchmark firm is very low. While it is difficult to provide a point estimate of beta, based on these considerations, it is hard to think of an industry that is more insulated from the business cycle due to inelastic demand and a fixed component to their pricing structure. In this case, one would expect the beta to be among the lowest possible and this conclusion would apply equally irrespective as to whether the benchmark firm is a regulated energy network or a regulated gas transmission pipeline.

In their 2014 (and 2015) report, McKenzie and Partington reviewed the available evidence and confirmed the conclusions made on their conceptual assessment of equity beta outlined in their 2012 report.[1695]

We have also received a number of stakeholder submissions in 2014 and 2015 that suggest regulated energy network service providers face very low levels of systematic risk. For example, Engineroom Consulting (on behalf of the Queensland Council of Social Service) submitted that electricity distribution businesses are 'low risk businesses relative to the overall market'.[1696] Origin also submitted that, for energy network businesses, increases in financial risk as leverage increases is relatively low. It submitted that this is largely because of the minimal risks in the current regulatory framework and the ability of the businesses to effectively pass on borrowing costs to consumers.[1697]

These submissions indicate there is widespread consideration that regulated energy network firms (or service providers) operating within Australian face low overall levels of systematic risk.

Based on the available evidence, we consider there are reasonable conceptual grounds to expect that the equity beta for a benchmark efficient entity will be below 1.0.

1694 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.

1695 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 11–12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 31–32.

1696 QCOSS, Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20, 30 January 2015, p. 71. Also see CCIQ, *Submission to the Australian Energy Regulator on the preliminary determinations for Ergon Energy and Energex revenue determination*, 3 July 2015, pp. 3–4.

1697 Origin Energy*, Submission to AER preliminary decision Qld electricity distributors*, 3 July 2015, pp. 11–12; Origin Energy*, Submission to AER preliminary decision SAPN*, 3 July 2015, p. 9; Origin Energy*, Submission to Victorian electricity distributors regulatory proposals*, 3 July 2015, pp. 10–11.

However, in its 2014 reports for several service providers, SFG Consulting (SFG) submitted that it is not possible to conceptualise which component of systematic risk dominates the other. SFG considered there are a number of problems with our conceptual analysis, including:[1698]

- It is an empirical (not conceptual) analysis, as McKenzie and Partington consider empirical literature to support their conclusions. SFG considered an empirical analysis cannot be used to form a conceptual view. Frontier, in its June 2015 report, expressed a similar view.[1699]
- It implies the effect of leverage on equity beta is weaker than (and inconsistent with) that implied by the formula the AER uses to de-lever and re-lever its raw equity beta estimates.
- It is wrong, because the empirical evidence and expert reports relied upon by the AER have been misinterpreted.

We consider that SFG's distinction between empirical and conceptual analysis is a matter of labelling that does not affect the substantive content of the analysis. We note our conceptual analysis is not restricted to pure theoretical analysis. It is analysis based on a concept to be explored, rather than a methodology to provide or determine best outputs (in this case, parameter estimates). Findings from different information sources (including academic empirical literature) can be used to explore the concept and draw conclusions. Moreover, in their 2014 (and 2015) report, McKenzie and Partington reiterated the conceptual conclusions made in their 2012 report and specifically stated that they 'provide a clear conceptual analysis' of the logic underlying their views.[1700]

In relation to SFG's view on the effect of leverage on equity beta, we consider the exact nature of the relationship between financial leverage and equity beta is not straightforward and cannot be known with certainty. We use the Brealey–Myers formula to de-lever and re-lever raw empirical estimates to a benchmark gearing level (60 per cent), specified as follows:

$$\beta_E = \beta_A \left(1 + \frac{D}{E}\right)$$

where

[1698] SFG, *Equity beta*, May 2014, p. 18; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 60. SFG summarises and directly references SFG's 2014 equity beta report in SFG, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon and Transend*, 27 May 2014, pp. 84–85 (SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014). Therefore, any references we make to SFG, *Equity beta*, May 2014 also apply to the service providers who submitted SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014 (including SAPN).

[1699] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 6.

[1700] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 32.

- β_e is the equity beta
- β_a is the un-levered asset beta, and
- $\frac{D}{E}$ is the debt to equity ratio.

We adjust the raw (that is, not de-levered and re-levered) empirical equity beta estimates for leverage because it improves the alignment of our estimates with the benchmark efficient entity. However, we have regard to both raw and leverage adjusted (or re-levered) equity beta estimates because we acknowledge the uncertainty inherent in assuming a particular relationship between financial leverage and equity beta. In their 2014 (and 2015) report, McKenzie and Partington noted the above formula assumes a debt beta of zero, which may not be a correct assumption.[1701] Introducing a positive debt beta would result in lower re-levered equity beta estimates when the benchmark gearing is higher than the observed (or actual) gearing of the firm or industry. They also noted the relationship between financial leverage and equity beta becomes more complicated when taxes and other relevant factors are considered, stating:[1702]

> In short, there are so many twists and turns that the de-leveraging and re-levering exercise can take you to a range of different destinations depending on what you assume.

Therefore, we acknowledge this formula may not necessarily produce an exact representation of the circumstances of a particular business. However, it is important to note that the average gearing of our comparator set of Australian energy network firms is similar to our benchmark gearing of 60 per cent. This means the choice of whether or not to adjust raw equity beta estimates for leverage is unlikely to be material on the average of individual firm estimates we consider in section D.2.

In relation to SFG's views on our interpretation of empirical evidence, we do not consider the empirical evidence referred to by McKenzie and Partington in their 2012 report has been misinterpreted. SFG referred to the following two sources of empirical information:[1703]

- US industry beta tables presented by Aswath Damodaran (Damodaran), Professor of Finance at New York University

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[1701] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 10; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 30.

[1702] McKenzie, Partington, *Estimation of equity beta*, April 2012, p. 11; McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 11; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 31.

[1703] SFG, *Equity beta*, May 2014, pp. 19–20; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 61–62. For the Damodaran data refer to the 'Updated data' link and the archived '*Levered and Unlevered Betas by Industry*' at http://people.stern.nyu.edu/adamodar/. McKenzie and Partington refer to the 2012 update values, which uses end of 2011 market price data. Also see: Schlueter and Sievers, *Determinants of market beta: the impacts of firm-specific accounting figures and market conditions*, forthcoming in Review of Quantitative Finance and Accounting, 2014.

- a forthcoming journal article (previously a working paper) by Tobias Schlueter and Soenke Sievers (Schlueter and Sievers).

McKenzie and Partington used the Damodaran data to show that equity betas for water, gas and electricity utilities are among the lowest of all industries analysed, while the debt to equity ratios for these industries are among the highest (as at the end of 2011).[1704] They did not de-lever and re-lever the observed equity beta estimates and did not assess the magnitude of the estimates. McKenzie and Partington used this dataset to perform a simple comparative exercise and highlight the basic point that 'utility betas are likely to be amongst the lowest of all industries'.[1705]

We consider SFG's analysis of the Damodaran data is a significant departure from the intention of McKenzie and Partington's analysis. SFG adjusted the raw US equity beta estimates to a benchmark gearing of 60 per cent and asserted the Damodaran data supports an equity beta 'well above 1' for energy utilities.[1706] In addition to this mischaracterisation of McKenzie and Partington's analysis, we consider there are a number of problems with SFG's analysis:

- Its re-levered equity beta estimates are incorrect. The correctly adjusted estimates (to a gearing level of 60 per cent) are set out in Table 3-55, using the Brealey–Myers formula (specified above).
- Adjusting these raw equity beta estimates for leverage may introduce material error. As discussed above, the Brealey–Myers formula may not be a precise representation of the relationship between financial leverage and equity beta. However, the Australian energy firms in our comparator set have gearing levels that are clustered around the benchmark level, and as such our re-levered estimates (on average) do not differ materially from the raw estimates. This is not the case for the utility industries in Damodaran's dataset because they have average industry gearing levels well below our benchmark level of gearing (60 per cent, which equates to a debt–to–equity ratio of 150 per cent). If the Brealey–Myers formula is inaccurate, then these re-levered US equity beta estimates (to 60 per cent gearing) are likely to contain material error. We consider these figures clearly demonstrate that the observed (or raw) equity betas for US utilities are well below the beta of the market (which is 1.0 by definition).

1704 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.

1705 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 11; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 31.

1706 SFG, *Equity beta*, May 2014, p. 19; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 61.

Table 3-55 Damodaran's raw and re-levered US equity beta estimates by industry (as at the end of 2011)

Industry	Observed (or raw) equity beta	Observed D/E (%)	Re-levered equity beta (D/E = 150%)
Water utility	0.66	81	0.91
Natural gas utility	0.66	67	0.99
Electric utility (east)	0.70	66	1.05
Electric utility (west)	0.75	85	1.02
Electric utility (central)	0.75	86	1.01

Source: AER analysis; Damodaran, *Updated data: The Data page*, *Levered and Unlevered Betas by Industry*, Stern school of Business New York University, last updated January 2014, viewed 6 November 2014, see link: <http://people.stern.nyu.edu/adamodar/>

Note: 'Natural gas utility' and 'water utility' have the lowest observed equity betas (0.66) out of all the industries presented in Damodaran's table. 'Public/private equity' has the highest observed equity beta, at 2.18, and 'Engineering and const.' has the median observed equity beta, at 1.22.

We consider the US energy utility firms are likely to carry greater risk than Australian energy network firms. This is because they are subject to different regulatory protections and many are vertically integrated.[1707] That is, they perform other activities in addition to energy distribution and transmission services, such as energy retail and distribution services. These other activities are often subject to greater competition and carry greater systematic risk. Therefore, we consider the US utility equity beta estimates are likely to be higher than those of Australian energy network firms.[1708] Nevertheless, as noted above, Damodaran's estimates show that US utilities still have observed (or raw) equity beta estimates well below 1.0 and among the lowest of all US industries.

In regards to the forthcoming Schlueter and Sievers article, we are satisfied that it suggests intrinsic business risk is the main component of equity beta. SFG consider the evidence from the Schlueter and Sievers article does not apply to utilities and is

[1707] CEG, *Equity beta from US companies*, June 2013, p. 20; AER, *Equity beta issues paper*, October 2013, p. 34.

[1708] In the rate of return guideline, we found the average equity beta of 56 US energy utilities (identified by CEG) was greater than the average equity beta of 18 US utilities identified by ACG as 'almost exclusively electricity and/or gas distribution and transmission businesses'. See: AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 62–63. Also see: ACG, *Beta for regulated electricity transmission and distribution: Report to Energy Network Association, Grid Australia and APIA*, September 2008, p. 18; CEG, *Information on equity beta from US companies*, June 2013; SFG, *Regression-based estimates of risk parameters*, June 2013, p. 19.

irrelevant because it is based on accounting data.[1709] We consider SFG has mischaracterised the evidence in the Schlueter and Sievers article. In their 2014 (and 2015) report, McKenzie and Partington made the following points:[1710]

- The Schlueter and Sievers article is based on accounting data, but this has no impact on the conclusions drawn. In fact, the authors motivate their article by discussing general academic literature in this area.
- The evidence from the Schlueter and Sievers article is applicable to utilities. The Table 1 referred to by SFG is a table of summary statistics and the determinants of equity beta are not presented in this table. The article is a cross–sectional study across all industries. However, Schlueter and Sievers attempt to provide individual industry information by performing a robustness test that includes industry indicator variables in all their regressions. This robustness test confirms their results, indicating that intrinsic risk is the main component of equity beta for all industries.

SFG also submitted we have misinterpreted the intention of the 2013 Frontier report.[1711] We do not agree with SFG and respond to this view in section D.1.2.

In its 2015 report for several service providers, SFG again disagreed with our conceptual analysis. It submitted that:[1712]

- Leverage is a more accurate term than financial risk because the term financial risk is subject to misinterpretation and equity beta depends directly on leverage. What the AER calls financial risk is actually a component of business risk with a 'financial flavour'.

[1709] SFG, *Equity beta*, May 2014, pp. 19–20; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 61–62.

[1710] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 32.

[1711] SFG, *Equity beta*, May 2014, pp. 20–21; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 62–63.

[1712] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 41–45 (appendix 3). SFG directly references SFG's 2015 beta and Black CAPM report in SFG, *The required return on equity for the benchmark efficient entity: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015, p. 19 (SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015); SFG, *The required return on equity for the benchmark efficient entity: Report for Ausgrid, Endeavour Energy and Essential Energy*, 12 March 2015, p. 19 (SFG, *The required return on equity for the benchmark efficient entity*, 12 March 2015); and SFG, *The required return on equity for the benchmark efficient entity: Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 25 February 2015, p. 19 (SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015). Therefore, any references we make to SFG, *Beta and the Black capital asset pricing model*, 13 February 2015 also apply to the service providers who submitted the SFG, *The required return on equity for the benchmark efficient entity* reports. Also, any references we make to SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015 in this appendix applies to SFG, *The required return on equity for the benchmark efficient entity*, 12 March 2015 and SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, as the reports are very similar.

- If the benchmark efficient entity has an equity beta less than 1.0, then, according to the Brealey–Myers formula, its business risk would have to be less than 0.4. There is no conceptual way to determine if this is the case.
- It continues to consider the empirical evidence and expert reports we rely upon have been misinterpreted.

We disagree with SFG's views. We consider SFG has misunderstood the point of our conceptual analysis by focussing on formulae (particularly the Brealey–Myers formula) that directly relate financial leverage to equity beta. We consider a more holistic view of systematic risk. We also consider that, irrespective of the conceptual debate, the Australian empirical evidence supports an equity beta below 1.0 for the benchmark efficient entity (see section D.2).

Equity beta measures the systematic risk of a firm relative to the market as a whole. We consider:

- systematic risk can be broken down into business risk and financial risk
- financial risk relates to the indebtedness, or financial leverage, of a firm[1713]
- financial risk increases with financial leverage because the likelihood of equity holders being repaid falls, all else equal (Frontier agrees with this)[1714]
- while financial leverage, of itself, increases the volatility of cash flows to equity holders, there are other risks that can contribute to the falling likelihood of equity holders being repaid as financial leverage increases.

Therefore, we do not agree with SFG's submission that leverage is a 'more accurate term' than financial risk.[1715] We do not consider the two are equivalent concepts, or that financial risk is a component of business risk. We consider financial risk increases as financial leverage increases, but we do not know the exact nature of this relationship. McKenzie and Partington agreed with our view.[1716] Our overall assessment of business risk and financial risk leads us to our expectation that the systematic risk of the benchmark efficient entity is less than the market average firm. Our reasoning for this view is explained in detail above and supported by McKenzie and Partington.[1717]

We also continue to disagree with SFG on the empirical evidence referred to by McKenzie and Partington in their 2012 report. We consider McKenzie and Partington have not misinterpreted this evidence for the reasons set out above. We consider:

- SFG has again mischaracterised the intention of McKenzie and Partington's analysis in relation to the Damodaran data (which we describe above). SFG has also incorrectly stated we show that the re-levered Damodaran equity beta

[1713] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

[1714] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 8.

[1715] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 41.

[1716] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 8–10.

[1717] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.

estimates suggest the benchmark efficient entity would have a beta close to the market average firm.[1718] We show the re-levered estimates because we consider SFG presented incorrect re-levered estimates in its 2014 reports.[1719]

- The evidence from the Schlueter and Sievers article does apply to utilities because the article is a cross–sectional study across all industries.[1720] Schlueter and Sievers' robustness test confirms their results. These results indicate that intrinsic risk is the main component of equity beta for all industries.

In its June 2015 report, Frontier criticised our consideration of Damodaran's raw equity beta estimates for US utilities.[1721] It submitted we should only consider re-levered equity beta estimates. We respond to this view in section D.3.

Frontier also submitted that our conceptual analysis of systematic risk is likely to be counterproductive to good regulatory decisions.[1722] We disagree with this view. Frontier's analysis appears to be based on a misunderstanding of the role of our conceptual analysis. We have not used our conceptual analysis in the manner that Frontier speculates.[1723] We reiterate what was said above and in our April/June 2015 final and preliminary decisions. Conceptual analysis gives us some insight into where the equity beta for the benchmark efficient entity sits relative to the average equity beta across all firms in the market, which is 1.0 by definition.

Based on the available evidence, including the recent expert report from McKenzie and Partington, we consider there are reasonable conceptual grounds to expect the equity beta of a benchmark efficient entity will be below 1.0, which applies equally to gas and electricity network service providers. However, we recognise the limitations of this approach. The conceptual analysis does not indicate the magnitude of the difference between the benchmark efficient entity and the market average (1.0).

1718 SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 45.

1719 We discuss this above

1720 In its 2014 reports, SFG also submitted that the Schlueter and Sievers article is irrelevant because it uses accounting data (see: SFG, *Equity beta*, May 2014, pp. 19–20; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 62). We do not agree with this view. McKenzie and Partington stated ' the fact that Schlueter and Sievers (2014) is based on accounting data is irrelevant…In fact, Schlueter and Sievers (2014) motivate their paper by drawing on the general literature '. See: McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 32.

1721 Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, pp. 14–18.

1722 Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 7.

1723 That is, Frontier suggests it could potentially be used to rule out sound empirical evidence and/or may support empirical estimates that are not robust or reliable (see Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 7).

D.1.4 Disruptive technologies

Several service providers submitted that we have not adequately accounted for the recent risks arising from disruptive technologies.[1724] These service providers submitted that developments in distributed generation, smart technology and power storage may allow consumers to disconnect from the grid, which could threaten the role of energy networks. They referred to a number of articles describing various disruptive technologies and their impact on the energy sector. They also submitted a June 2015 report by Frontier, which considered this issue.[1725] Frontier submitted that, given recent developments, its assessment of the risk to service providers from disruptive technologies had increased since its 2013 report.[1726]

We recognise disruptive technologies such as solar panels, smart technology and power storage may be changing the way consumers produce and consume electricity. We also recognise this could have an effect on how consumers make use of network infrastructure and may increase some risks faced by service providers. However, in determining whether this increased risk needs to be accounted for in the equity beta (or the rate of return generally), we must consider whether the risk is systematic.

We do not consider the risk arising from disruptive technologies can be reasonably classified as systematic risk. In his April 2015 report, Partington supported this view.[1727] We have considered Frontier's submission that 'this is too strong a claim to make', but its reasoning has not changed our view.[1728] Systematic risk is risk which affects the market as a whole (such as macroeconomic conditions and interest rate risk). We consider developments in disruptive technologies such as distributed generation, smart technology and power storage are unlikely to have significant effects outside the energy sector. In their October 2015 report, Partington and Satchell stated:[1729]

> A systematic risk is one that investors cannot diversify away. The impact of disruptive technology on the returns to the regulated businesses can clearly be seen to be diversifiable. A simple diversification strategy would be for investors to invest in disruptive technology firms and/or the physical assets, and more

[1724] See, for example, ActewAGL, *Access arrangement information for the 2016-21 ACT, Queanbeyan and Palerang access arrangement: Appendix 8.02—Return on equity detailed proposal*, June 2015, p. 34; AGN, *2016/17 to 2020/21 access arrangement information: Attachment 10.1—Rate of return*, July 2015, pp. 29–30; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 316; United Energy, *2016 to 2020 regulatory proposal: Attachment—Return on equity*, April 2015, section 2; CitiPower, *Regulatory proposal 2016-2020*, April 2015, section 12.2 (Powercor's regulatory proposal on the return on equity appears to be identical in substance to CitiPower's); Jemena Electricity Networks, *2016-20 electricity distribution price review regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, section 2; Ergon Energy, *Submission to the AER on its Preliminary Determination: Rate of return—Cost of equity*, July 2015, pp. 11–14; SAPN, *Revised regulatory proposal*, July 2015, pp. 337, 344–347.

[1725] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, pp. 20–26.

[1726] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 23.

[1727] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 77–78.

[1728] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, pp. 23–24.

[1729] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 39.

> generally invest in stocks that have a positive covariance of returns with respect to the returns of disruptive technology investments.

We do not consider the risks arising from disruptive technologies in the energy sector should be accounted for in the equity beta (or the rate of return generally) for a benchmark efficient entity.[1730]

We recognise the development of disruptive technologies in the Australian energy sector may create some non-systematic risk to the cash flows of energy network businesses. We consider these can be more appropriately compensated through regulated cash flows (such as accelerated depreciation of assets). Partington agreed with this view, stating that:[1731]

> The appropriate way to adjust to for disruptive technology is therefore to adjust the cash flow. To the extent that the result of disruptive technology is stranded assets, then the effective economic life of the asset is reduced and/or its residual value is less than originally assumed. Consequently, one way to allow for the impact on cash flow is to increase the regulatory depreciation allowance.

More recently, Partington and Satchell have reiterated that:[1732]

> We agree with the AER, that any adjustment for the impact of disruptive technology should be made by adjustment to the cash flows, for example by increasing the depreciation allowance. We suggest that this could be done if and when there is some more substantive evidence of the impact, such as companies making announcements to shareholders about asset value impairment, writing down asset values and seeking to minimise new capital expenditures.

The CCP agreed with Partington and Satchell, and stated that:[1733]

> We are also not aware of announcements by the listed utility companies to the effect that they expect a decline in the future value of their company. Most listed utilities are forecasting continued growth in the value of their assets and seem confident in continuing to promote their steady cash flows, dividend growth and stable regulatory environment (see section 3 above).

[1730] In our April/June 2015 final and preliminary decisions, we considered that, 'Even if the risk arising from disruptive technologies has increased the systematic risk of the benchmark efficient entity, we consider this will be captured in our empirical equity beta estimates to the extent that investors are aware of the risk' (see, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, p. 406). We do not consider the risk arising from disruptive technologies can be reasonably classified as systematic risk. As Partington and Satchell stated in their October 2015 report, 'Since we do not consider the impact of disruptive technology to be a systematic risk we do not consider that it would be captured by estimates of beta, however recent they are' (see Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 39).

[1731] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 77.

[1732] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 39.

[1733] CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, p. 42.

ENA also agreed with our view in an August 2015 report on future network cost recovery. The ENA considered a set of alternative options that could address the issue of promoting sustainable cost recovery for service providers in an evolving technological environment. It stated:[1734]

> Adjustments to the cost of capital or cash flows to compensate for network stranding risks (option 4) are established theoretical options for addressing similar cost recovery issues. However, there remain a range of outstanding and complex issues regarding how they could be assessed and applied in practice. Compensation for future stranding risk may be impractical, contentious and difficult to calibrate to the conditions of individual networks, and compensation following stranding would also be complex and problematic. These outstanding issues have limited their application in practice. By contrast, providing greater flexibility to bring forward or deferring depreciation (option 5) better recognises the common contribution of all past and present network customers to the existing network.

Some service providers questioned the benefit of utilising such cash flow measures to reduce risk because these measures assume network service providers have a large customer base that can absorb the increased costs. They considered these measures will not be appropriate in a situation where 'an endless spiral of disconnections commences'.[1735] However, increasing the allowed rate of return (through equity beta) also increases costs to consumers, and as such we consider the same assumption applies.[1736]

Frontier also submitted that, 'the AER has neither attempted to estimate the effect of those risks, nor made any allowances for those risks, through the rate of return or through regulated cash flows'.[1737] If such risks were quantifiable at this juncture, a reasonable expectation is for the service providers to quantify these and make decisions to reduce such risk (for example by reducing capex driven by a robust evaluative framework that accounts for such risk).[1738] Generally, we have seen

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1734 ENA, *Future network cost recovery and depreciation: Regulatory and policy options*, August 2015, p. 10.

1735 For example, see: SAPN, *Regulatory proposal*, October 2014, p. 308; SAPN, *Revised regulatory proposal*, July 2015, p. 347.

1736 The Central Irrigation Trust submitted a similar view. It believes SAPN's proposed WACC is too high and that ' Decreasing prices we believe may stimulate demand benefiting both customers and SA Power Networks. In fact reducing prices and increasing demand may halt the disconnection risk outlined in chapter 26 of the proposal'. See: Central Irrigation Trust, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 6. The Energy Consumers Coalition of South Australia (ECCSA) also submitted that SAPN's assertion that its risk profile has changed is ' self serving in the extreme as the Better Regulation program was finalised within the past 2 years and must be considered to be contemporary' (see ECCSA, *The SAPN revised proposal: A response by Energy Consumers Coalition of South Australia*, July 2015, pp. 6–7).

1737 Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, p. 26.

1738 Partington noted "… clearly poses a risk to the regulated business, but it is difficult to be definitive about the materiality of such effects on firm value, but some evidence may be available. For stocks listed on the ASX there is a continuous disclosure requirement. Material impacts on a firm's value are to be communicated to the market as soon the firms becomes aware of them. A natural question therefore is whether listed utilities have made any proposals from service providers where the RAB is continuing to grow, supported by capex that is greater than depreciation. It is the service providers' management role to develop its plans to operate its business and the regulator reviews those in line with the legislative framework. It is not for the regulator to develop management plans and calculate allowances for service providers' management to review according to their internal management incentives.

We consider disruptive technologies and its impact on the energy sector is being widely investigated across those involved in the sector, including policy makers. For example, in May 2014, the Council of Australian Governments (COAG) Energy Council organised a strategic assessment of the network economic regulatory framework under likely future scenarios in the next 20 years. They released a policy advice paper on this issue in June 2015.[1739] Therefore, we consider decisions in this area should be made with wide consultation and awareness of the current policy position.

We disagree with SA Power Networks that the AER has effectively ignored a theme in its original proposal that:[1740]

> Electricity Network businesses face a completely changed risk profile in very recent times due to the rapid advance in disruptive technologies. As a consequence of this, investors require returns that sit several rungs higher on the ladder of efficient risk adjusted returns.

As noted in our April/June 2015 final and preliminary decisions, which applies equally to the current proposals, the service providers have not put forward any robust reason or analysis that demonstrate that these emerging risks relate to systematic risk. It is this risk that is compensated by the return on equity. Also, we provide a return on equity that contributes to the achievement of the allowed rate of return objective and we take account of the prevailing market conditions for equity funds.[1741] It is unclear to us why SA Power Networks considers that we should allow a return 'higher on the ladder of efficient risk adjusted returns'.[1742]

D.2 Australian empirical analysis

Empirical estimates of equity beta are based on regressions that relate the returns on a set of comparator firms to the return on the market. As discussed in step two of section 3.4.1, empirical estimates using a comparator set of listed Australian energy network

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announcements to the market about diminution in firm value arising from disruptive technology? (Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 77)

[1739] COAG Energy Council, *Energy working group: Network strategy working group—Electricity network economic regulation; scenario analysis: Policy advice*, June 2015.

[1740] SAPN, *Revised regulatory proposal*, July 2015, p.336.

[1741] NER, cll. 6.2.5(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

[1742] SAPN, *Revised regulatory proposal*, July 2015, p.336. Also, SA Power Networks extension of this risk profile assertion to justify its use of a multi model approach is not discussed in this appendix. Our evaluation of the multi model approach to estimating the return on equity for a benchmark efficient entity is at appendix A—equity models.

firms are the main determinant of our equity beta estimate for a benchmark efficient entity.

For this analysis we commissioned an expert report from Professor Olan Henry (Henry), which provided an update on his 2009 econometric analysis of equity beta.[1743] Henry's 2014 report is one of a number of Australian empirical studies showing a consistent pattern of equity beta estimates that is robust to the use of different econometric techniques, comparator sets and time periods. From 2002 to 2014, these empirical studies have presented equity beta estimates that converge on the range of 0.4 to 0.7 (see Table 3-59). We consider the evidence presented in Henry's 2014 report in detail because it uses the most recent data and this is relevant in selecting an equity beta (and return on equity) that is reflective of prevailing market conditions.[1744] This report applied a number of regression permutations based on different econometric techniques, comparator sets and time periods. The resulting equity beta estimates consistently fall within the range of 0.4 to 0.7, with most estimates clustered around 0.5. These results are consistent with the pool of other studies considered and are based on a larger, more recent dataset.

We are satisfied our empirical equity beta range is reliable and reflective of the benchmark efficient entity. The remainder of this subsection is set out as follows:

- discussion of our comparator set of Australian energy network firms
- discussion of our methodological choices
- discussion of the empirical evidence from Henry's 2014 report
- discussion of other empirical studies.

D.2.1 Comparator set selection

We define the benchmark efficient entity as 'a pure play, regulated energy network business operating within Australia'.[1745] We would, ideally, use firms that share all or most of the key characteristics of the benchmark efficient entity when conducting our regression analysis to estimate the equity beta. In practice, few firms would fully reflect this benchmark. Therefore we use market data for domestic businesses that are considered to be reasonable comparators to the benchmark efficient entity to inform the equity beta estimate.

In the Guideline we identified nine firms that may be considered as reasonable comparators to the benchmark efficient entity, and these remain relevant. They are ASX listed firms that provide regulated electricity and/or gas network services operating within Australia. Table 3-56 sets out the details of these nine firms. For its

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1743 Henry, *Estimating β*, April 2009; Henry, *Estimating β: An update*, April 2014.

1744 NER, cll. 6A.6.2(g) and 6.5.2(g); NGR, rule 87(7). Note: Grant Samuel and Associates' 2014 independent expert report for Envestra use more recent data than Henry's 2014 report. However, this report is not specific to equity beta estimation, and as such there is no detailed explanation of their methodology or results.

1745 AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 8, 33–36, 44–45.

prevailing specification of the SLCAPM, TransGrid's consultant, NERA Economic Consulting (NERA), based its equity beta estimate on this comparator set of Australian energy network firms.[1746] SFG also used the same Australian energy network firms in its comparator set of Australian (and US energy) firms.[1747]

It is important to note that three of these firms were no longer trading by June 2013. Another firm, AGL Energy Limited, has changed its operations such that it no longer closely represents a benchmark efficient firm.[1748] We account for this by only including data over an applicable time period for these four firms. Whereas, for the other five firms, we consider the most recent data (up to 28 June 2013).[1749] We note that Envestra Ltd was delisted on 17 October 2014.[1750]

Table 3-56 Listed entities providing regulated electricity and gas network services operating in Australia

Firm (symbol)	Time/trading period	Sectors
AGL Energy Limited (AGK)	January 1990 – October 2006	Electricity Gas
Alinta (AAN)	October 2000 – August 2007	Gas
APA Group (APA)	June 2000 – present	Gas Minority interest in energy
DUET Group (DUE)	August 2004 – present	Electricity Gas
Envestra Ltd. (ENV)	August 1997 – October 2014	Gas
GasNet (GAS)	December 2001 – November 2006	Gas
Hastings Diversified Utilities	December 2004– November	Gas

1746 NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 79 (NERA, *Return on capital of a regulated electricity network*, May 2014). We note that NERA did not rely exclusively on this specification of the SLCAPM (and equity beta) as it used a multiple model approach to estimate the return on equity. TransGrid submitted that it maintained its return on equity position from its revenue proposal in its revised revenue proposal (subject to minor additions and changes). As such, the expert reports submitted under TransGrid's proposal (including NERA's 2014 report) are directly relevant to TransGrid's revised proposal.

1747 SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, p. 9.

1748 In October 2006, AGL sold its infrastructure and asset management business to Alinta and acquired a portion of Alinta's retail and co-generation businesses.

1749 Henry, *Estimating β: An update*, April 2014, p. 12.

1750 See: http://www.asx.com.au/asx/statistics/announcements.do?by=asxCode&asxCode=ENV&timeframe=Y&year=2014.

Firm (symbol)	Time/trading period	Sectors
Fund (HDF)	2012	
Spark Infrastructure Group (SKI)	March 2007[1751] – present	Electricity Gas
SP AusNet (SPN)[1752]	December 2005 – present	Electricity Gas

Source: AER analysis; Bloomberg; AER, *Review of the WACC parameters: Final decision*, May 2009, p. 255.

While we consider the firms in Table 3-56 are comparable to the benchmark efficient entity, they also provide some non–regulated electricity and/or gas services. Examples of this include:

- Approximately 21 per cent of APA Group's revenue in the 2015 financial year (excluding pass–through revenue) was subject to prices determined under full regulation. APA generates a large part of the remaining 79 per cent of its revenue from contracts which have set terms, including negotiated pricing for the life of the contract.[1753]
- DUET Group's assets receive limited unregulated revenue—Dampier Bunbury Pipeline (4 per cent unregulated), United Energy (8 per cent unregulated), Multinet Gas (5 per cent unregulated) in the 2015 financial year.[1754]
- Approximately 86 per cent of SP AusNet's (now AusNet Services) revenues are regulated, as at 29 May 2015.[1755]
- Hastings Diversified Utilities Fund (HDF) had investments in three gas pipelines and South East Water, a UK water utility (although it divested its interest in this utility in December 2010). The Pilbara Pipeline System is unregulated. Regulatory coverage of the Moomba to Adelaide pipeline was revoked in September 2007 and ceased to apply for the South West Queensland pipeline in 2008.[1756]

[1751] The SKI data is available from December 2005, but the data prior to March 2007 reflects stapled securities traded as instalment receipts—these instalments requires further leverage adjustment and makes beta estimation difficult.

[1752] Since the publication of the Guideline, SP AusNet changed its company name to AusNet Services. As of 5 August 2014, this change was reflected in the ASX and the company code was changed from SPN to AST. See: http://www.asx.com.au/prices/company-name-and-asx-code-changes-2014.htm.

[1753] APA Group, *Annual report 2015: Connecting markets creating opportunities*, pp. 7, 18.

[1754] DUET Group, *Annual report 2015*, p. 3.

[1755] AusNet Services, *Statutory annual report 2015*, p. 22.

[1756] HDF, *Annual report 2011*, pp. 2, 10; AEMC, *WA: Pilbara Pipeline System*, viewed 7 November 2014, see link <http://www.aemc.gov.au/Energy-Rules/National-gas-rules/Gas-scheme-register/WA-Pilbara-Pipeline-System>; AER, *Moomba to Adelaide pipeline—Access arrangement 2006–10*, viewed 7 November 2014, see link http://www.aer.gov.au/node/5453; AER, *Epic Energy south west Queensland pipeline—Access arrangement 2006–08*, viewed 7 November 2014, see link http://www.aer.gov.au/node/5219.

- While GasNet earned the majority of its revenue from tariffs charged on its regulated assets, a contribution to its earnings for the 2005 financial year was also provided by specialised engineering and project management services.[1757]

Generally, with the exception of APA Group and HDF, these non–regulated activities only constitute a small portion of the revenue earned by the firms in this comparator set. Therefore, when we consider the impact of these unregulated activities, we expect the net impact would be sufficiently minor such that our equity beta estimates for the comparators are reasonable.[1758] If unregulated activities were to have a non–minor impact on the comparator firms' equity beta estimates, we consider it would more likely overstate than understate the 'true' equity beta for a benchmark efficient entity because unregulated activities are likely to face greater systematic risk.[1759]

We received two submissions from the CCP which suggested some firms in our comparator set are not sufficiently comparable to the benchmark efficient entity. One submission recommended we have regard to this when choosing our equity beta point estimate, and the other recommended we remove these firms (HDF, AAN, AGK and APA) from our comparator set.[1760] We recognise these submissions and the desirability of increasing the comparability of our comparator set to the benchmark efficient entity. However, in practice, we consider there is a trade-off between the increased statistical precision from a larger comparator set and the comparability of the firms in the comparator set to the benchmark efficient entity. We are satisfied, at this time, that our comparator set is sufficiently reflective of the benchmark efficient entity, given this trade-off.

International comparators

We have had regard to all available domestic comparators. Ideally, we would have further reasonable domestic comparators to include. However, we consider that the comparators we use are the most relevant and useful for our empirical analysis. We do not include international energy network firms in our comparator set for empirical analysis. We consider international energy firms are not suitable comparators in this case, for the following reasons:

- They deviate from our benchmark efficient entity definition because they do not operate within Australia.

[1757] GasNet, *Infrastructure for generations: GasNet Australia Group annual report 2005*, p. 29.

[1758] We understand that the organisational structure and commercial activities of these comparator firms are subject to change. Consequently, we will continuously review our comparator set in case we need to make adjustments. This may entail adjusting the comparator set by excluding or adding new comparators.

[1759] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, pp. 15, 69, 77, 86.

[1760] CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, pp. 75–77, CCP2 (Bruce Mountain), *Submission on the AER's preliminary decisions for the Qld/SA distribution network service providers (2015-20)*, 29 July 2015, pp. 9–10.

- We discuss equity beta estimates in the context of our foundation model, which is the domestic SLCAPM.[1761] This provides a strong rationale for estimating the equity beta using Australian data. If we included international energy firms in our comparator set, it may be more appropriate to use an international CAPM.
- Differences in regulation of businesses, the domestic economy, geography, business cycles, weather and a number of different factors are likely to result in differences between equity beta estimates for similar businesses between countries. It is difficult to assign quantitative impacts to these qualitative factors.
- Equity beta estimates from international comparators are measured with respect to the market portfolio of their home market.[1762] This means the equity beta estimates from international comparators are not a measurement of the firm's systematic risk relative to the Australian domestic market portfolio.[1763]
- They may not have the same structure as Australian energy network firms. For example, a number of US comparator businesses identified by the Competition Economists Group (CEG) are vertically integrated.[1764] They engage in energy generation, wholesale and retail of energy, as well as other activities distinct from energy distribution and transmission. Some of the firms even engage in telecommunications, real estate development and manufacturing activities.[1765] These activities are very different from the benchmark efficient entity, which is a pure play regulated energy network business (operating within Australia). As noted in the Guideline, we consider vertically integrated firms tend to have higher equity beta estimates than pure play energy network firms.[1766]
- We consider the available Australian data is sufficient for us to form a reasonable equity beta range that is reflective of the equity beta for benchmark efficient entity.

[1761] We implement the SLCAPM under the assumption of a domestic market, but with a presence of foreign investors. This allows us to recognise that foreign investors cannot utilise imputation credits. However, the benchmark efficient entity operates in the Australian market by definition, and we estimate the MRP in the context of the Australian market portfolio.

[1762] This is the case unless the equity betas are estimated using an international CAPM framework.

[1763] This is supported by our consultant John Handley in his 2014 report to the AER. See: Handley, *Advice on the return on equity*, October 2014, pp. 23–24. In his May 2015 report, Handley considered submissions to JGN's access arrangement review, and concluded that he does not consider it necessary to change any of the findings in his earlier report (Handley (2014)). See: Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28. Therefore, references to Handley (2014) (or Handley (April 2015)) also apply to Handley (May 2015).

[1764] CEG describes vertically integrated US energy utility firms as 'common among [its] sample'. See: CEG, *Information on equity beta from US companies*, June 2013, p. 20.

[1765] CEG, *Information on equity beta from US companies*, June 2013, pp. 47–68.

[1766] In the rate of return guideline, we found the average equity beta of 56 US energy utilities (identified by CEG) was greater than the average equity beta of 18 US utilities identified by ACG as 'almost exclusively electricity and/or gas distribution and transmission businesses'. See: AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 62–63. Also see: ACG, *Beta for regulated electricity transmission and distribution: Report to Energy Network Association, Grid Australia and APIA*, September 2008, p. 18; CEG, *Information on equity beta from US companies*, June 2013; SFG, *Regression-based estimates of risk parameters*, June 2013, p. 19.

These factors are discussed in more detail in the Guideline and 2009 WACC review.[1767] Based on the above reasoning, we consider it is a suboptimal outcome to use a foreign proxy (or proxies) to estimate the equity beta for a domestic benchmark. It should only be used where there is evidence that this will produce more reliable estimates of the domestic equity beta than the Australian estimates themselves. We do not consider the proposals submitted by the relevant service providers present us with such evidence. Our reasoning is discussed in detail below.

In its 2014 reports for several service providers, SFG recognised that international energy network firms are less comparable to the benchmark efficient entity than Australian energy network firms. However, it also considered our comparator set of Australian energy network firms was too small and produced unreliable equity beta estimates.[1768]

SFG considered there are two key issues in determining whether international energy firms should be included in the comparator set for our empirical analysis:

1. whether the international energy firms are sufficiently comparable to the benchmark efficient entity to be included in the analysis
2. whether including international energy firms in the domestic comparator set increases the reliability of the equity beta estimates.

In analysing these issues, SFG made the following conclusions:[1769]

1. The 56 US energy firms identified by CEG during the Guideline process are sufficiently comparable to the benchmark efficient entity. Therefore, they should be included in our comparator set for empirical analysis, albeit with less weight than the domestic comparators.
2. Including US energy firms in the comparator set for empirical analysis increases the reliability of the equity beta estimates.

We considered SFG's first point in the Guideline process. At that time we did not consider CEG produced satisfactory evidence that the suggested sample of US energy firms represented sufficiently close comparators to the benchmark efficient entity. Our detailed reasoning for this is in the Guideline material.[1770] In its 2014 reports, SFG has again submitted that we should include the sample of 56 US energy firms in our comparator set of Australian energy network firms.[1771] It considered our reasoning for

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[1767] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 59–64. AER, AER, *Review of WACC parameters: Final decision*, May 2009, pp. 261.

[1768] SFG, *Equity beta*, May 2014, p. 2; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 82.

[1769] SFG, *Equity beta*, May 2014, pp. 31–34, 40; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 71–74, 82.

[1770] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 61–63. AER, *Equity beta issues paper*, October 2013, pp. 33–34.

[1771] SFG, *Equity beta*, May 2014, p. 40; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 82. In its 2014 report, CEG also submitted we should include 56 US energy firms in our domestic why international energy firms are not sufficiently comparable to the benchmark efficient entity is incorrect on several grounds. Hence, we have re-evaluated this material.

SFG has questioned our consideration that vertically integrated energy network firms are not closely comparable to the benchmark efficient entity and are likely to have a higher equity beta than pure energy network firms. SFG submitted that in a 2010 report to the ACCC, Frontier recommended a lower equity beta for more vertically integrated businesses.[1772] However, this report compared Victoria's rural water sector with the energy sector, considering the rural water sector to be more vertically integrated. Accordingly, this report did not provide us with information on the equity beta of pure play energy network firms relative to vertically integrated energy network firms. Therefore, we maintain our view that vertically integrated energy network firms are likely to overestimate the equity beta for the benchmark efficient entity. Our reasons for this are discussed in detail in the Guideline material.[1773]

SFG has also questioned our consideration that geography and weather may influence the equity beta of a similar business operating in different countries.[1774] It submitted that the climate and geography also differ within Australia, and by this logic we would have to separate the firms in our Australian comparator set. We recognise that climate and geography do differ within Australia. However, we consider SFG's selection of one of our examples of potential differences between domestic and international comparators misses the broader issue we are considering. That issue is that international energy network firms operate in different operating environments to Australian energy network firms. The identification of one difference between Australian energy network firms does not address this.

We are not suggesting our comparator firms face identical levels of systematic risk and are perfect comparators to the benchmark efficient entity. We consider they are reasonable comparators to the benchmark efficient entity, given the set of listed firms available to choose from. However, we also consider that they are more reasonable comparators than international energy network firms. International energy network firms are less reflective of the benchmark efficient entity for a number of reasons, including different operating environments. International operating environments can differ from domestic operating environments in a number of respects, from the regulatory framework the energy network firm is operating under, to the climate and

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comparator set (see: CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, pp. 7–10 (CEG, *WACC estimates*, May 2014)). It submitted very similar views to SFG and used SFG's preferred equity beta estimate. Therefore, the discussion in this section also applies to the service providers who submitted CEG's 2014 report.

[1772] SFG, *Equity beta*, May 2014, p. 34; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 74.

[1773] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 62–64. AER, *Equity beta issues paper*, October 2013, pp. 33–34.

[1774] SFG, *Equity beta*, May 2014, p. 33; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 73.

geography they are exposed to. These differences can affect equity betas though the covariance of an energy firm's returns with the return of the applicable market portfolio.

This point leads to our consideration that under the domestic SLCAPM, equity beta estimates of international energy firms are measured with respect to the market portfolio of their home market. We consider this market portfolio will be different to the Australian market portfolio, and may be exposed to different systematic risks. As discussed in the Guideline, we consider this could be important in practice as well as theory. For example, the Australian market portfolio may exhibit a high systematic risk relative to other countries such as the US (due to a potentially larger proportion of mining stocks). If this is the case, international comparators are likely to produce upwardly biased equity beta estimates when used in an Australian context.[1775] In response to this view, SFG submitted the market portfolio always has an equity beta of 1.0 by definition, regardless of which country is being considered.[1776] It also considered that markets are not segmented by country, and domestic investors can buy stocks from other countries (including mining stocks). We do not agree with SFG's submission for the following reasons:

- While investors can buy stocks from different countries, we estimate equity beta in the context of the Australian domestic SLCAPM. We define the market for the SLCAPM as the domestic market, with a presence of foreign investors. Under this domestic SLCAPM, we consider Australian and international equity betas should be estimated separately using an appropriate proxy for the market portfolio of each country. SFG does this itself; it chooses the All Ordinaries accumulation index for the Australian market and the S&P 1500 for the US market.[1777] These stock market indices contain different portfolios of stocks, which indicate the market portfolios of different countries can differ in composition and systematic risk.
- The different compositions of market portfolios in different countries has a direct effect on the measurement of beta. This is because the equity beta measures the sensitivity of an asset or business's returns to movements in the applicable market portfolio's returns.[1778] It is the covariance of an asset's returns with the market portfolio returns ($cov(r_i, r_m)$), relative to the variance of the market portfolio returns ($var(r_m)$), and its formula is set out below:[1779]

[1775] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 60.

[1776] SFG, *Equity beta*, May 2014, pp. 33–34; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 73–74.

[1777] SFG, *Regression-based estimates of risk parameters*, June 2013, pp. 9–10. This is the original report that sets out the data, methodology and results for SFG's preferred regression based estimate of equity beta (0.82). It is referred to in: SFG, *Equity beta*, May 2014, pp. 40–41; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 82; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 29.

[1778] Our foundation model is the domestic SLCAPM, and as such the appropriate market portfolio is based on the Australian market. McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 21.

[1779] The SLCAPM is an expected returns model. Therefore, the equity beta is, in theory, based on expected returns. However, when estimating equity beta, historical returns are used. See: Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill Australia: Tenth edition, 2009, pp. 186, 195.

$\beta_i = \frac{cov(r_i, r_m)}{var(r_m)}$

where

- r_i is the return on asset or business *i*
- r_m is the return on the market portfolio.

Any given market portfolio has an equity beta of 1.0.[1780] This is a statement of relative risk—the contribution of the market portfolio to the market portfolio risk is 1.0. However different market portfolios can have different levels of systematic risk. In particular different market portfolios based on equity market indexes from different countries can have different levels of systematic risk, as measured by the variance of that market portfolio's returns.

Equity beta is a relative measure and is tied to the market portfolio that is used. This means that the equity beta of a given asset (or industry) will be expected to be affected by the market portfolio used. Different market portfolios for different countries can be expected to differ in both:

- the variance of the market portfolio return
- the covariance of any given asset's returns with the market portfolio return.

We consider this makes a direct comparison of equity betas from different countries estimated against different domestic market proxies of reduced value.

- Handley added to these views in his 2014 report. He considered comparing domestic equity betas with international equity betas is like comparing 'apples and oranges' because they are measured relative to different domestic markets.[1781] He stated:[1782]

> In general, domestic betas and international betas measure different things and are not comparable due to potential differences in the covariance structure and level of systematic risk in the respective markets. This is purely a definitional difference.

Handley considered it is not valid to directly compare the magnitudes of Australian and international equity betas in the absence of a model that allows for such a comparison.[1783] He considered that any comparison of Australian and international equity betas would also need to account for currency risk, as the returns in different markets are expressed in different currencies.

[1780] This is because the covariance of the market portfolio's returns with itself is in fact equal to the variance of the market portfolio's return. So both the numerator and denominator in the beta equation become equal, giving a beta of 1.0.

[1781] Handley, *Advice on the return on equity*, October 2014, p. 23.

[1782] Handley, *Advice on the return on equity*, October 2014, p. 23.

[1783] That is, unless an international asset pricing model is used. International asset pricing models can measure equity betas relative to the same international benchmark market. See: Handley, *Advice on the return on equity*, October 2014, p. 24.

- We also note that the use of equity betas estimated relative to the Australian market is consistent with our estimate of the Australian market risk premium (MRP) and risk free rate, which we use to implement the domestic SLCAPM in the Australian context.

Based on the available evidence, and after considering SFG's submissions, we maintain our view from the Guideline. We do not consider SFG has provided satisfactory evidence that the suggested sample of 56 US energy firms are sufficiently comparable to the benchmark efficient entity. Handley supports this view.[1784]

We now turn to SFG's second point that a larger comparator set of US and Australian energy network firms increases the reliability of the equity beta estimates.[1785] SFG submitted that equity beta estimates based only on a small sample of Australian comparators are inherently unreliable. It considers having a larger comparator set in itself increases the statistical reliability of equity beta estimates.

We do not consider our Australian empirical equity beta estimates are unreliable. SFG appears to have taken a narrow definition of what is reliable in this context. SFG measures reliability by considering the dispersion of equity beta estimates across samples of comparator firms and over time.[1786] It finds that the individual equity beta estimates from our Australian comparator set are widely dispersed and this dispersion decreases as the comparator set increases.[1787] However, a larger dataset is not an end in itself. Decreasing the dispersion of estimates by increasing the size of the comparator set may not be helpful if that comparator set is less representative of what we are trying to estimate. In those cases, the mean the estimates will be clustered around will be less representative of the 'true' equity beta of a benchmark efficient entity. We do not consider this constitutes reliability. Therefore, we do not consider a larger comparator set of less relevant firms necessarily results in more reliable equity beta estimates, as the estimates may be biased.

It is also useful to note that Henry performed a separate time series regression for each comparator firm and various portfolios of comparator firms.[1788] The weekly returns for each firm are regressed against the weekly returns on the market over a period of time (the estimation period).[1789] This means that the number of observations, or sample size, relevant to the statistical analysis of the individual equity beta estimates is the number of weekly return intervals in the estimation period. In Henry's 2014 report this sample size ranges from 229 (last five years, HDF) to 826 (longest

1784 Handley, *Advice on the return on equity*, October 2014, pp. 23–24.

1785 SFG, *Equity beta*, May 2014, pp. 13, 28–33; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 68–73.

1786 SFG measures dispersion as the standard deviation of individual firm equity beta estimates, relative to the mean of the sample (of equity beta estimates). See: Brooks, Diamond, Gray and Hall, *Assessing the reliability of regression-based estimates of risk*, June 2013, p. 5.

1787 SFG, *Equity beta*, May 2014, p. 13.

1788 Henry, *Estimating β: An update*, April 2014.

1789 We also measure returns over monthly intervals. The sample size for monthly return intervals ranges from 51 to 190 observations. See: Henry, *Estimating β: An update*, April 2014, pp. 23–26.

period available, ENV) observations.[1790] In addition, we place most reliance on averages of individual firm estimates and fixed weight portfolio estimates, which cluster around 0.5 (see section D.2.3). The focus on average and portfolio equity beta estimates further reduces any residual uncertainty associated with individual firm estimates.

We consider the available Australian data is sufficient for us to form an equity beta estimate that will contribute to the achievement of the allowed rate of return objective.[1791] The set of nine Australian comparators is reflective of the benchmark efficient entity and generates a consistent pattern of empirical equity beta estimates that is robust across econometric techniques and time periods. This is demonstrated in our analysis of Henry's 2014 report and other empirical studies based on Australian energy network firms (see Table 3-59 and section D.2.3).

In its 2015 reports for several service providers, SFG again submitted that we should include the sample of 56 US energy firms in our comparator set of Australian energy network firms.[1792] It did not directly respond to any of the concerns we raised above.[1793] Instead, SFG maintained its view that including the 56 US energy firms in our comparator set would increase the reliability of our empirical equity beta estimates. We agree with SFG's view that it would be unreasonable to conclude that international comparators can never be used. However, for this decision, we do not include international comparators in our Australian comparator set, for the reasons set out above.[1794]

In its 2015 report for several service providers, CEG also submitted that we should include the sample of 56 US energy firms in our comparator set of Australian energy network firms. It noted the objective is to estimate an equity beta that will give rise to a reasonable return on equity estimate over the subsequent regulatory period, which is a future period.[1795] CEG suggested that equity beta estimates based on our Australian comparator set does not best meet this objective because:

[1790] Henry, *Estimating β: An update*, April 2014, pp. 17, 21.

[1791] NER, cll. 6.5.2(c) and 6A.6.2(c); NGR, rule 87(3).

[1792] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 10–12; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, p. 20.

[1793] SFG only noted that our November 2014 draft decisions appear to focus on differences between the US and Australian market portfolios because we placed less reliance on factors such as geography/weather and vertical integration (see: SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 11). We do not agree with this view. The reasoning in this section shows clearly that we do not place less reliance on those factors.

[1794] SFG also submitted that our Australian comparator is 'far from perfect' because the firms have both regulated and unregulated assets, and some of the firms have not been listed since 2006 or 2007 (see: SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 10–11). We never claimed to have a 'perfect' comparator set, and recognise the imperfections noted by SFG. However, we consider our comparator set of Australian energy network firms is still more reflective of the benchmark efficient entity than international energy firms. This is because there are many differences in factors that may affect the equity beta, such as the form of regulation, domestic economy, geography, business cycles, weather, market portfolio and structure of the firms (for example, vertical integration).

[1795] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–34.

- many other regulators use international comparator firms
- the equity betas for Australian energy network firms have been affected by the mining boom (we address this issue in section D.2.2)
- it does not produce a reliable equity beta estimate.

We maintain our view that the available Australian data is sufficient for us to form a reliable equity beta estimate that contributes to the achievement of the allowed rate of return objective, for the reasons set out above. It is unclear how including US energy firms in our comparator set would better meets CEG's stated objective, because all regression based estimates rely on historical data. We consider we have sound reasons for our decision to use an Australian comparator set. We are not satisfied that other regulators' decisions provide sufficient evidence to change our decision.

We received submissions in 2015 from the CCP and other stakeholders that do not support the inclusion of international energy firms in our domestic comparator set. For example, Origin supported our decision to use a comparator set of Australian energy network firms.[1796] It considered international comparators should not be used as primary determinants of risk to the extent that the risks faced by these firms are not directly comparable to Australian conditions. The CCP also disagreed with the inclusion of 56 US energy firms in our Australian comparator set.[1797] The CCP considered that SFG has not provided any statistical evidence that the Australian and US equity beta estimates come from the same statistical population. Moreover, it considered SFG's weighting approach (that is, to give twice as much weight to the Australian energy firms) to be arbitrary.

Based on the available evidence and after consideration of SFG and CEG's submissions, we maintain our view from the Guideline and April/June 2015 final and preliminary decisions.[1798] While increased statistical precision is desirable, it is not preferable if the resulting estimates are substantially less reflective of the 'true' equity beta for the benchmark efficient entity. We do not include the suggested sample of 56 US energy firms in our comparator set of nine Australian energy network firms. This is

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[1796] Origin Energy*, Submission to AER preliminary decision Qld electricity distributors*, 3 July 2015, pp. 11–12; Origin Energy*, Submission to AER preliminary decision SAPN*, 3 July 2015, p. 9; Origin Energy*, Submission to Victorian electricity distributors regulatory proposals*, 3 July 2015, pp. 10–11. Also see QCOSS, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 78.

[1797] CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, pp. 70–71.

[1798] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 49. SFG also submitted there are strong similarities between our current approach to beta estimate and the previous Tribunal's comments in relation to the debt risk premium (DRP). We do not consider the previous Tribunal's comments made in relation to the DRP are relevant to our equity beta estimation, and we provide reasoning for this in the Guideline material. See: SFG, *Equity beta*, May 2014, pp. 13–14; AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 64. SFG also submitted that we consider the use of international comparators as a binary choice—that we will rely on the domestic comparator set or the US comparator set. We do not agree with this view. As we state in this decision, we do not *include* SFG's suggested sample of 56 US energy firms in our domestic comparator set. See: SFG, *Equity beta*, May 2014, pp. 35–36; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 74–75.

because we consider it will produce equity beta estimates that are substantially less reflective of the 'true' beta for the benchmark efficient entity. We consider including international energy network firms in our comparator set is not necessary in this case because our Australian comparator set is sufficient to produce a reliable equity beta range for the benchmark efficient entity (see Table 3-59 and section D.2.3).

This does not imply that the empirical evidence based on international energy network firms should be discarded completely. Rather, we consider that such evidence may have some use in informing the equity beta point estimate from within the range derived using Australian empirical estimates—provided the choice of overseas comparators is based on solid reasoning. Further, we consider it useful to examine evidence on many available international energy network firms, rather than only those based in the US.

D.2.2 Methodological choices

In this section, we discuss the methodological choices we consider in our empirical analysis. These include estimation methods, time period selection, gearing, individual firm and portfolio estimates, and post estimation adjustments.

Estimation method

We consider equity beta estimates from both Ordinary Least Squares (OLS) and Least Absolute Deviation (LAD) estimators. We rely more on OLS estimates because OLS appears to be the most commonly used estimation method for estimating beta.[1799]

However, the OLS estimation method is sensitive to outliers in the underlying data. In the 2009 WACC review, we identified events that could create outlier observations in the market data used to estimate the equity beta. These could include business–specific events (for example, merger announcements) and events that are 'unrepresentative' of the market (for example, the 'technology bubble').[1800]

1799 Greene notes, 'Chapter 2 defined the linear regression model…There are a number of different approaches to estimation of the parameters of the model. For a variety of practical and theoretical reasons that we will explore as we progress though the next several chapters, the method of least squares has long been the most popular'. See: Greene, *Econometric analysis*, Pearson Education (Prentice Hall): Fifth edition, 2003, p. 19. Additionally, OLS is the method used for beta estimation in: Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill Australia: Tenth edition, 2009, p. 195. Also, Bloomberg, the Australian Graduate School of Management (AGSM), Morningstar and ValueLine estimate equity beta using regression analysis of stock and market index returns. Also, Grant Samuel and Associates (Grant Samuel) relied on equity beta estimates from Bloomberg and AGSM in its 2014 independent valuation report for Envestra. The Economic Regulation Authority (ERA) also estimates the equity beta using regression analysis of stock and market index returns. See: Grant Samuel and Associates, Envestra financial services guide and independent expert's report (appendix 3), March 2014, p. 6 (this shows Bloomberg and AGSM estimates); ValueLine, *Using Beta*, 2 October 2012, viewed on 16 April 2015, link: http://www.valueline.com/Tools/Educational_Articles/Stocks/Using_Beta.aspx#.VS96wNR--Uk; Morningstar, *Investing glossary: Beta*, viewed on 16 April 2015, link: http://www.morningstar.com/InvGlossary/beta.aspx; ERA, *Rate of return guideline explanatory statement*, December 2013, p. 165.

1800 AER, *Review of the WACC parameters: Final decision*, May 2009, pp. 267–271.

The LAD estimation method reduces the influence of extreme observations (or potential data outliers) on its estimates.[1801] It belongs to a class of estimators known as 'robust' estimators. Such estimators are not heavily affected by extreme observations in the data. Therefore, we consider LAD regression results as a robustness check on potential outliers in the underlying data. In its 2013 study, the Economic Regulation Authority (ERA) used two additional robust estimators, the MM and the Theil–Sen, because it considered different robust estimators can produce different results.[1802]

In its 2014 report, SFG submitted that the LAD estimation method produces systematically downward biased equity beta estimates and should not be used.[1803] It also submitted LAD estimation is not used to estimate equity beta in academic research or in commercial practice. We are not satisfied that SFG has produced compelling evidence to infer the LAD estimator produces systematically downward biased estimates of equity beta. In a report submitted by the Energy Networks Association (ENA) during the Guideline process, Brooks, Diamond, Gray and Hall considered the value–weighted average of equity beta estimates from their in–sample market index should equal 1.0.[1804] For the in–sample market index used by the authors, the value–weighted averages of OLS beta estimates presented do equal 1.0, while the value–weighted averages of LAD beta estimates are below 1.0. The authors consider this evidence that the LAD technique itself leads to a systematic downward bias in equity beta estimates. We have the following concerns with SFG's view that LAD equity beta estimates are systematically downward biased:

- SFG has not provided us with any basis to expect LAD estimates of equity beta to be systematically downward biased. We consider that discovering LAD estimates are lower than OLS estimates ex post, on a particular subset of the market, does not necessarily indicate systematic bias.
- The value–weighted average of LAD equity beta estimates across all firms in the authors' particular market index are 0.98, 0.96 and 0.99.[1805] The authors do not justify a link between the particular market index they have used and more commonly used market indexes. We also note that in his 2014 report, Henry stated that the difference between his OLS and LAD estimates of equity beta 'is almost universally statistically insignificant'.[1806]

In any case, we rely more on OLS estimates and consider that removing LAD estimates from our empirical analysis would not substantially change our empirical results. For example, in Henry's 2014 report, the minimum re-levered OLS estimate is 0.39 and the minimum re-levered LAD estimate is 0.38 (see section D.2.3).

[1801] Greene, *Econometric analysis*, Pearson Education (Prentice Hall): Fifth edition, 2003, p. 448.
[1802] ERA, *Rate of return guideline explanatory statement*, December 2013, p. 179.
[1803] SFG, *Equity beta*, May 2014, p. 12.
[1804] Brooks, Diamond, Gray, Hall, *Comparison of OLS and LAD regression techniques for estimating beta*, June 2013, pp. 9–10.
[1805] Brooks, Diamond, Gray, Hall, *Comparison of OLS and LAD regression techniques for estimating beta*, June 2013, p. 10.
[1806] Henry, *Estimating β: an update*, April 2014, p. 62.

Time period selection

There is generally a trade–off in determining the length of the estimation period. Older data might be considered less reflective of current systematic risk assessments (which would suggest a shorter, more recent period). On the other hand, a longer time period provides more observations, which improves the accuracy of estimates, all else equal. Therefore, we consider equity beta estimates measured over a number of estimation periods, including:[1807]

- the longest period available (which Henry recommends in his 2014 report)
- the period after the 'technology bubble' and before the global financial crisis (GFC)[1808]
- the last five years of available data.

In its 2015 report, CEG submitted that there is evidence that equity beta estimates for Australian energy network firms have been affected by the mining boom.[1809] It submitted this period is distinguished by high market capitalisation on high beta mining stocks. Therefore, the betas of all other stocks were depressed relative to those measured against other market portfolios. CEG submitted that this can be accounted for by:

- excluding the mining boom period from the estimation periods used
- adjusting the equity beta estimates from that period upward
- giving more weight to equity beta estimates measured in markets that were less affected by the mining boom (such as the US and European markets).

We do not agree with CEG's view. We consider that, at any given time, there are sectors of the economy that are experiencing relative booms and busts. In his 2015 report, Partington stated that 'mining booms are a regular feature of Australian equity markets rather than abnormal one-off events'.[1810] He considered mining booms are a part of what is normal in Australian equity markets. Therefore, we do not consider the mining boom period CEG refer to is an abnormal market event. As such, we do not consider this period should be removed from the estimation periods we use to estimate the equity beta. We also do not consider it is reasonable to adjust our equity beta estimates upward over the mining boom period or include international energy firms in our domestic comparator set (see section D.2.1). In our view, CEG's proposed upward

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1807 Henry, *Estimating β: An update*, April 2014, pp. 11–12, 63. Henry uses data up to 28 June 2013.

1808 For individual firms, Henry used an estimation period from 2002 to present (excluding the GFC) and for the fixed weight portfolios Henry used the longest period available (excluding the technology bubble and GFC). Henry defined the first week in the tech boom as the week ending on Friday 3 July 1998, and defined the last week as that ending on Friday 28 December 2001. Henry defined the first week during the GFC as the week ending on Friday 5 September 2008, and the end of the GFC as the week ending on Friday 30 October 2009. Henry, *Estimating β: An update*, April 2014, pp. 11–12.

1809 CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–34, 46–58.

1810 Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 76–77.

adjustment to Australian equity beta estimates of between 0.1 to 0.3 is arbitrary and not based upon sufficiently robust analysis.[1811] This is because it appears to be based on visual inspection of two graphs.[1812] The first compares beta estimates for 'material and financial' sub-indices with beta estimates for all other sub-indices. The other compares one year daily beta estimates for Australian utilities stocks with one year daily beta estimates US and European utilities.

There is also a trade–off in determining the length of the return interval (or estimation interval). A short return interval increases the frequency of the data used and generates more observations. However, short return intervals can cause distorted results because of the effects of thin trading.[1813] We rely more on equity beta estimates based on weekly return intervals, but monthly return intervals are considered as a robustness check.

Henry collected weekly data from Datastream. Datastream provides these weekly price observations using the close on the last trading day within each week, defining the end of the week as Friday. Monthly returns were calculated each month using the last closing price of the month.[1814]

In its 2014 reports, SFG, submitted that equity beta estimates can vary materially depending on how the return interval is defined (in particular, what reference day is chosen to calculate weekly or monthly returns).[1815] SFG referenced a report by CEG which was submitted to the ERA in 2013.[1816] This report presented a diagram showing variation in equity beta estimates depending on which day of the week or month is used as the reference day of the return interval.[1817] SFG subsequently proposed a regression based equity beta estimate that used four–weekly return intervals, but with the analysis repeated twenty times so that it does not 'ignore any stock and market returns information'.[1818]

[1811] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 57–58.

[1812] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 57–58.

[1813] Early papers on thin trading effects include Scholes and Williams (1977) and Dimson (1979). Thin trading biases beta estimates downwards. More infrequent trading implies larger gaps in time between when the share price was last updated and when the market index was last updated. This reduced synchronicity with the market can result in reduced covariance between share (or asset) returns and market returns. This tendency towards bias increases as the return interval decreases, as the proportion of the interval’s return covered by the time gap increases as the return interval decreases. See: Dimson, *Risk measurement when shares are subject to infrequent trading*, Journal of financial economics, 7(2), 1979, pp. 197–226; Scholes and Williams, *Estimating betas from non-synchronous data*, Journal of financial economics, 5(3), 1977, pp. 308–328.

[1814] Henry, *Estimating β: An update*, April 2014, pp. 9–10.

[1815] SFG, *Equity beta*, May 2014, pp. 29–31; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 69–71.

[1816] CEG, *Regression estimates of equity beta*, September 2013, pp. 25–27.

[1817] CEG, *Regression estimates of equity beta*, September 2013, pp. 26, figure 3. The same diagram is presented in: SFG, *Equity beta*, May 2014, p. 30, figure 3 and SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 70, figure 8.

[1818] SFG, *Regression based estimates of risk parameters for the benchmark firm*, June 2013, p. 5.

We do not consider that SFG has provided any basis to expect that returns based on a particular day of the week will underestimate or overestimate equity beta for the benchmark efficient entity.[1819] SFG and CEG have looked at the data ex post and discovered variation in equity beta estimates. Variation is inherent in statistical estimation, and we can expect estimates to differ when the underlying inputs are changed. Indeed, sampling distributions are formed on the basis that estimates will differ under different samples of the same population. We consider variation in equity beta estimates, in itself, does not indicate whether particular return intervals underestimate or overestimate the 'true' equity beta of the benchmark efficient entity.

SFG considered our equity beta estimates are unreliable because we do not account for this variation in equity beta estimates. However, we note that SFG has not determined whether the differences in estimates based on different reference days for weekly (or monthly) return intervals are statistically significant. As it stands, the diagram presented in SFG's (and CEG's) report shows the equity beta estimates based on different days of the week fall within the range of 0.5 to 0.65.[1820] This is well within our empirical range of 0.4 to 0.7. SFG also produces an average equity beta estimate of 0.60 by repeating its analysis 20 times using different start points within the four–weekly period.[1821] This estimate is again within our empirical range.

Further, if we continue with SFG's logic that no stock and market returns information should be ignored, we come to the problem that there is an infinite choice of reference times which one can use to define a return interval. SFG based its equity beta estimates on four–weekly returns using all daily closing prices.[1822] If SFG consider the reference day of the return interval is an arbitrary choice, then the same logic would apply to the reference time of the return interval. If equity beta estimates vary according to return intervals based on different days, then they may also vary according to return intervals based on different times. When we analyse the logic of SFG's submission we realise there is, in theory, an infinite choice of return intervals to choose from, and one cannot account for all these possibilities.[1823]

We base our return intervals on closing prices. That is, we use the closing price of the last trading day within each week (and month). We consider this a reasonable choice,

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1819 We discuss this issue in relation to weekly returns because we rely more on these estimates. However, the same reasoning applies to monthly return intervals.

1820 See: SFG, *Equity beta*, May 2014, p. 30, figure 3; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 70, figure 8. SFG's figure 3 (and figure 8) shows the average equity beta estimates (over six Australian energy network firms) based on difference reference days for weekly and monthly return intervals. Column two (Monday) to column six (Friday) show the average estimates for weekly return intervals. Visual inspection of these five columns show the highest average estimate is for a weekly return interval ending Tuesday (below 0.65), and the lowest is for a weekly return interval ending Thursday (above 0.5).

1821 Based on SFG's estimate for Australian energy network firms. See: SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 5, 13.

1822 SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, p. 15, footnote 28.

1823 We consider that, in theory, there is an infinite choice of return intervals to choose from. However, in practice, this would not be the case. The choice would be limited by how often trades are reported and what the smallest return interval would be.

and are not aware of any reason to expect basing our return interval on a particular day of the week (or month) will underestimate or overestimate equity beta. Additionally, basing return intervals on the close of the week (Friday) or month appears to be common practice. For example:[1824]

- For its equity beta estimation, Bloomberg calculates weekly returns using Friday to Friday data.
- Datastream provides weekly price observations using the close of the last trading day within each week (Friday), as noted in Henry's 2014 report.
- In two 2013 reports for the ENA, Brooks, Diamond, Gray and Hall estimated beta based on four–week return intervals computed using Friday closing prices.
- The ERA's empirical analysis of equity beta for Australian energy network firms uses return intervals based on Friday closing prices
- The Centre for Research in Security Prices and Compustat merged database calculates monthly holding period returns from month end to month end.

In its 2015 report, SFG reiterated its view on this issue.[1825] It submitted that even if there is no reason to expect that returns based on a particular day of the week will underestimate or overestimate equity beta for the benchmark efficient entity, it remains that the equity beta estimates do vary. SFG again submitted that averaging across equity beta estimates from different return intervals (by varying the reference day) produces a more precise and reliable estimate. We maintain our view on this issue for the reasons set out above. We reiterate that variation is inherent in statistical estimation and basing return intervals on the close of the week or month appears to be common practice. We consider performing more computations does not necessarily result in a better estimate, and it is impossible to average over every choice in the estimation process (for example, there are choices outside of defining the return interval).

Based on the available evidence and submissions, we are satisfied that return intervals based on the closing price of the last trading day within each week (and month) is reasonable.[1826]

1824 Bloomberg help desk, *Inquiry reference number H#516253958*, 22 August 2014; Henry, *Estimating β: An update*, April 2014, p. 9; Brooks, Gray, Diamond and Hall, *Comparison of OLS and LAD regression techniques for estimating beta*, June 2013, p. 6; Brooks, Gray, Diamond and Hall, *Vasicek adjustment to beta estimates in the capital asset pricing model*, June 2013, p. 9; ERA, *Rate of return guideline explanatory statement*, December 2013, p. 168; Center for Research in Security Prices, *Data definitions—R*, viewed 5 November 2014, last updated July 2014, see link: http://www.crsp.com/products/documentation/data-definitions-r.

1825 SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 29–30.

1826 Figure 4 of SFG's 2014 report is titled 'Domestic beta estimates by day of week'. However, the estimates presented are from US energy firms. SFG also referenced another CEG report that suggested Henry had arbitrarily changed the return interval used to estimate equity beta for US energy firms from his 2008 to his 2009 report. Henry did not define the return interval used to estimate these US equity betas. However, we consider this to be irrelevant as we do not place any consideration on the US estimates from those reports in this empirical analysis. See: SFG, *Equity beta*, May 2014, pp. 30–31, figure 4; SFG, *Estimating the required return on equity: Report for*

Gearing

The raw equity beta estimates of comparator businesses will reflect varying levels of actual financial leverage. These raw estimates can be de-levered to obtain the asset beta of the business. The result of de-levering reflects the beta of the asset if the asset was financed 100 per cent by equity, with zero debt. These asset betas can then be re-levered to match the level of gearing associated with the benchmark efficient entity (as adopted by the regulator).

We have adopted a gearing ratio of 60 per cent for the benchmark efficient entity, and we use the Brealey–Myers formula (assuming a debt beta of zero) to de-lever and re-lever the comparable businesses' equity beta estimates. That is:

$$\beta_e = \beta_a \left(1 + \frac{D}{E}\right)$$

where:

- β_e is the equity beta
- β_a is the un-levered asset beta, and
- $\frac{D}{E}$ is the debt to equity ratio.

We note there are views both for and against de-levering and re-levering equity beta estimates. On one hand, the resulting estimates will be more aligned with our benchmark. On the other hand however, the relationship between equity beta, financial leverage and financial risk is complex and uncertain. Making a specific adjustment for leverage imposes a certain assumed relationship that may not necessarily be correct in all circumstances. Therefore, we consider both raw and re-levered equity beta estimates where possible.

We also note the choice of whether or not to de-lever and re-lever is unlikely to be material on the average of individual firm estimates. This is because the industry average gearing and the benchmark gearing are very similar. However, the difference between raw and re-levered equity beta estimates for individual firms may be greater because some firms have higher or lower gearing than the benchmark efficient entity.

Individual firm and portfolio estimates

Because no one comparator firm is perfectly reflective of the benchmark efficient entity, we rely on averages of individual firm estimates to determine the equity beta range. We consider taking an average over the individual equity beta estimates is likely to produce an equity beta estimate that is more reflective of the benchmark efficient entity than considering individual firm estimates in isolation. In this respect, we also consider equity beta estimates from various portfolios of comparator firms. Averages of

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Energex, 28 August 2014, pp. 70–71, figure 9; CEG, *AER equity beta issues paper: International comparators*, appendix A, October 2013, pp. 41–45.

individual firm estimates and portfolio estimates combine information from multiple comparator firms, instead of considering single firms in isolation.

We consider the average of individual firm estimates, not the median. We received submissions in 2015 which considered Henry's 2014 report indicates we should choose an equity beta estimate closer to the median of the individual firm estimates.[1827] We do not consider there is evidence in Henry's 2014 report that indicates a preference for median equity beta estimates over average equity beta estimates. We prefer average estimates because they contain information from all individual firm estimates in our comparator set. Median values may be preferable to mean (average) values when significant outliers exist in the sample. However, we consider our comparator set (or sample) is reasonably comparable to the benchmark efficient entity. Therefore, we consider taking the average of individual firm estimates is reasonable.

Portfolio estimates combine the returns of various comparator firms by taking an average or median of these returns over a specific time period. Equity beta estimates can be derived from various types of portfolios, including:[1828]

- equal weight portfolios—which consist of *n* businesses and each business has a weighting of 1/*n*
- value weight portfolios—where the weighting on each business is proportional to the market capitalisation of the business relative to the market capitalisation of that entire portfolio
- time varying portfolios—where the weights in the portfolios vary over time due to businesses being introduced into the portfolio as they become listed on the market and being removed when they are no longer listed.

Henry recommends that we exercise great caution when interpreting equity beta estimates from the time varying portfolios.[1829] This is because he considers they are not grounded in financial theory, prone to measurement error and unlikely to yield reliable evidence. Therefore, we do not place any material reliance on the equity beta estimates from time varying portfolios.

In its 2015 report, SFG submitted that Henry's concerns on the reliability of equity beta estimates from time varying portfolios only holds if the firms in the portfolio have different levels of systematic risk.[1830] SFG considered that this means Henry's

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[1827] See: UnitingCare, *Submission to SA Power Networks' regulatory proposal for 2015–20*, February 2015, p. 32; ECCSA, *Submission to SA Power Networks' regulatory proposal for 2015–20*, December 2014, p. 74; Origin, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 79; QCOSS, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, pp. 77–78; CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, p. 67.

[1828] Henry, *Estimating β: An update*, April 2014, pp. 34–36.

[1829] Henry, *Estimating β: An update*, April 2014, p. 52.

[1830] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 30–31.

concerns mirror SFG's concerns over the reliability of empirical equity beta estimates, particularly for our small Australian comparator set.

We disagree with SFG's view. We are not satisfied that Henry's concerns regarding time varying portfolios imply that regressions of stock returns on market returns in general may not provide reliable equity beta estimates.[1831] Further, we are aware that the true systematic risks of our nine Australian comparator firms are not identical. We consider they are reasonable, not perfect, comparators to the benchmark efficient entity, with reasonably similar levels of systematic risk. If we included SFG's suggested sample of 56 US energy firms in our comparator set, this problem would likely be amplified. This is because the systematic risks of international energy firms are likely to be even more divergent from the systematic risk of the (Australian) benchmark efficient entity.

Blume and Vasicek adjustments

We do not apply Blume or Vasicek adjustments to our equity beta estimates. We took the same view in the Guideline and the 2009 WACC review, and this material remains relevant.[1832] In the 2009 WACC review we stated:[1833]

> Neither the Blume nor Vasicek adjustments (assuming a 'prior belief' of one) should be applied in a regulatory context as either adjustment is likely to introduce an upwards bias in the beta estimates.

In its 2014 report, SFG again proposed we apply a Vasicek adjustment to our equity beta estimates.[1834] It submitted that the Vasicek adjustment is necessary to correct for statistical estimation error and is commonly employed in practice. It also submitted that Vasicek–adjusted OLS estimates provide a better fit to the data and referenced a 2013 report for the ENA by Brooks, Diamond, Gray and Hall.[1835]

We recognise the potential merits of Vasicek's adjustment of equity beta estimates based on prior information and the use of this approach by some market practitioners. However, we have conceptual concerns with SFG's prior information assumptions when applying this approach.

The original Vasicek paper applies a Bayesian estimation of equity beta for a single firm.[1836] A key part of Bayesian estimation is the formulation of an appropriate prior distribution (mean and variance), which is based on the analyst's beliefs about the

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1831 SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 31.

1832 AER, *Review of WACC parameters: Final decision*, May 2009, p. 243; AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 58.

1833 AER, *Review of WACC parameters: Final decision*, May 2009, p. 243.

1834 SFG, *Equity beta*, May 2014, p. 11.

1835 This report was submitted during the Guideline development process. Brooks, Diamond, Gray and Hall, *Vasicek adjustment to beta estimates in the capital asset pricing model*, June 2013.

1836 Vasicek, *A note on using cross-sectional information in bayesian estimation of security betas*, Journal of Finance 28(5), December 1973, p. 1233.

parameter of interest before seeing the data.[1837] This prior information is used to inform the distribution implied by a sample of data, and the resulting distribution is known as the posterior distribution. Therefore, estimates calculated using a Bayesian approach will combine information from a sample of data with subjective prior information.

Vasicek's paper estimates equity beta for a single firm, and formulates a prior distribution based on a cross–sectional distribution of beta estimates across all firms in the US market, which has a mean of 1.0.[1838] Therefore, Vasicek sets a prior belief that the equity beta for a single firm is 1.0 on average, which is consistent with the idea of a firm being drawn randomly from the market as a whole.

This brings us to the question, what is the appropriate prior information for our purposes? SFG has proposed a similar prior distribution to Vasicek.[1839] This suggests a prior belief that the equity beta of the benchmark efficient entity is equal to the average across all firms in the market. However, our situation is different to Vasicek's. We are not randomly drawing firms from the market as a whole. Instead, we have a set of firms that have been carefully selected to represent the benchmark efficient entity. Therefore, we do not consider establishing a prior belief based on the equity beta of all firms in the market is appropriate for our purposes. As Vasicek himself stated:[1840]

> If nothing is known about a stock prior to sampling except that it comes from a certain population of stocks (for instance, from the population of all stocks traded on the New York Stock Exchange), an appropriate choice of the prior density is the cross–sectional distribution of betas observed for that population.

The population in our case is not the entire market. We have a set of Australian energy network firms that have been carefully selected to be comparable to a theoretical benchmark efficient entity. Based on conceptual analysis, we expect the benchmark efficient entity to have an equity beta less than 1.0 (see section D.1). However, our conceptual analysis is qualitative in nature and as such we do not have a prior expectation of the magnitude of the equity beta for the benchmark efficient entity.

Notwithstanding our conceptual concerns, we do not consider SFG has provided us with sufficient evidence to conclude that Vasicek–adjusted equity beta estimates are more reliable than unadjusted estimates. The 2013 report from Brooks, Diamond, Gray and Hall asserted that return on equity estimates (from the SLCAPM) provide a better fit to the data when Vasicek–adjusted OLS equity beta estimates are used than when unadjusted OLS estimates are used.[1841] This leads the authors to their conclusion that

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[1837] Kennedy, *A guide to econometrics, Wiley–Blackwell*: Sixth edition, 2008, p. 216. Also see: Greene, *Econometric analysis*, Pearson Education (Prentice Hall): Fifth edition, 2003, p. 430.

[1838] Vasicek uses the New York Stock Exchange as a market proxy. See: Vasicek, *A note on using cross-sectional information in bayesian estimation of security betas*, Journal of Finance 28(5), December 1973, p. 1234.

[1839] SFG, *Equity beta*, May 2014, p. 10.

[1840] Vasicek, *A note on using cross-sectional information in bayesian estimation of security betas*, Journal of Finance 28(5), December 1973, p. 1237.

[1841] The authors measure goodness of fit using the R–squared statistic. See: Brooks, Diamond, Gray and Hall, *Vasicek adjustment to beta estimates in the capital asset pricing model*, June 2013, p. 3.

Vasicek–adjusted OLS estimates of equity beta are more reliable than unadjusted OLS estimates. We make the following points in response to their analysis:

- The analysis is based on the entire market. We are not estimating the return on equity for all firms in the market, or on firms drawn at random from the market. We are estimating a return on equity that is representative of the benchmark efficient entity.
- The SLCAPM is an expected returns model. As such, we do not consider an analysis using realised returns provides clear evidence that Vasicek–adjusted estimates of equity beta are preferable to unadjusted estimates.

Lastly, the practical outcome is that applying the Vasicek adjustment in the manner recommended by SFG made little to no difference on the equity beta estimates. SFG itself noted that the average difference between the OLS estimate and Vasicek–adjusted OLS estimate is just 0.03 for the nine Australian energy network firms.[1842]

In its 2015 report, SFG has again proposed we apply a Vasicek adjustment to our equity beta estimates.[1843] It again submitted that the Vasicek adjustment is a correction for statistical bias in regression based estimates of equity beta, and it produces a more reliable equity beta estimate. SFG did not provide new analysis to support its view. We continue to disagree with SFG's view, for the reasons set out above. We also note the following statement from Partington:[1844]

> we note the work of Henry (2008), who finds no evidence that would support the use of the Vasicek model for Australian data. The results of the Henry (2008) study: "… suggest that there is little convincing evidence of regression to unity in this data. Therefore, it is difficult to justify the application of the Blume or Vasicek adjustments." (p. 12)

We now turn to the empirical evidence presented in Henry's 2014 report to the AER. The following subsection analyses the results.

D.2.3 Empirical evidence from Henry's 2014 report

Henry's 2014 report presented empirical evidence on equity beta for our comparator set of nine Australian energy network firms, using available data from 29 May 1992 to 28 June 2013.[1845] This report presented estimates for individual firms as well as various portfolio specifications, and used a range of different estimation methods and time periods. Based on our discussion of methodological choices (section D.2.2), we consider the most useful empirical estimates:

- use the OLS estimator (with the LAD estimator used as a robustness check for outliers in the underlying data)

[1842] SFG, *Regression-based estimates of risk parameters*, June 2013, p. 6.

[1843] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 31.

[1844] Partington, *Report to the AER: Return on equity (updated),* April 2015, pp. 33–34.

[1845] Henry, *Estimating β: An update*, April 2014, p. 9.

- are measured over multiple estimation periods
- use weekly return intervals (with monthly returns used as a robustness check)
- are based on averages of individual firm estimates and fixed weight portfolios (equal weighting and value weighting)
- do not apply a Blume or Vasicek adjustment.[1846]

We consider the equity beta estimates presented in Henry's empirical analysis support a range of 0.4 to 0.7. Table 3-57 and Table 3-58 set out Henry's re-levered OLS equity beta estimates for the individual comparator firms (averaged across firms) and fixed weight portfolios respectively. The results show that:

- The re-levered individual firm estimates (averaged across firms) range from 0.46 to 0.56. The corresponding raw (that is, observed market gearing level) estimates range from 0.48 to 0.50.[1847]
- The re-levered fixed weight portfolio estimates range from 0.39 to 0.70. The corresponding raw estimates range from 0.42 to 0.58.[1848]

Table 3-57 Average of re-levered equity beta estimates (individual firm) from Henry's 2014 analysis (OLS, weekly)

	Longest available period	2002 to 2013 (excl. GFC)	Last five years[(a)]
Re-levered OLS estimates	0.52	0.56	0.46

Source: AER analysis; Henry, *Estimating β: An update*, April 2014.

(a) AAN, AGL and GAS were not used for this estimation period because Henry only uses data up to 2006 or 2007 for these firms. See: Henry, *Estimating β: An update*, April 2014, p. 17.

Table 3-58 Re-levered fixed weight portfolio equity beta estimates from Henry's 2014 analysis (OLS, weekly)

	P1	P2	P3	P4	P5
Firms	APA, ENV	AAN, AGL, APA, ENV, GAS	APA,DUE, ENV,HDF,SPN	APA,DUE, ENV, HDF, SKI, SPN	APA, DUE, ENV, SKI, SPN

1846 Henry does not apply a Blume or Vasicek adjustment of any of his estimates, as specified in our terms of reference.

1847 The raw equity beta estimates are those that are observed from the initial regression. They have not been de-levered and re-levered to a benchmark gearing of 60 per cent. These estimates are not presented but can be found at: Henry, *Estimating β: An update*, April 2014, pp. 87–89.

1848 These estimates are not presented but can be found at: Henry, *Estimating β: An update*, April 2014, pp. 90–93.

	P1	P2	P3	P4	P5
Equal weighted					
Longest available period[(a)]	0.46	0.52	0.50	0.48	0.39
longest available period (excl. tech boom and GFC)	0.49	0.52	0.55	0.53	0.45
Value weighted					
Longest available period[(a)]	0.50	0.70	0.44	0.42	0.39
longest available period (excl. tech boom and GFC)	0.54	0.70	0.52	0.50	0.48

Source: AER analysis; Henry, *Estimating β: An update*, April 2014.

(a) The longest available period is June 2000–June 2013 for P1; December 2001–October 2006 for P2; December 2005–November 2012 for P3; March 2007–November 2012 for P4; March 2007–June 2013 for P5.

Note: Henry's 2014 report also presented time varying portfolio estimates of equity beta. We do not place any material reliance on these estimates for reasons discussed under the 'Individual firm and portfolio estimates' subsection of section D.2.2. However, these OLS estimates range from 0.39 to 0.53. See: Henry, *Estimating β: An update*, April 2014, p. 56.

Additionally, Henry's 2014 report presented LAD (weekly) estimates as a robustness check for outliers in the underlying data. He also presented OLS estimates using monthly return intervals as a robustness check of the estimates using weekly return intervals. Henry stated the difference between the re-levered OLS and LAD equity beta estimates are 'almost universally statistically insignificant'.[1849] The results are as follows:[1850]

- the re-levered LAD estimates range from 0.38 to 0.58 and the raw LAD estimates range from 0.31 to 0.60.[1851]
- the OLS estimates using monthly return intervals range from 0.37 to 0.58.[1852]

[1849] Henry, *Estimating β: An update*, April 2014, p. 62.

[1850] These equity beta estimates are not presented but can be found at: Henry, *Estimating β: An update*, April 2014, pp. 17–43. The estimates considered are fixed weight portfolio estimates (equal weighting and value weighting) and averages of individual firm estimates.

[1851] The raw LAD estimates can be found at: Henry, *Estimating β: An update*, April 2014, pp. 87–89 (for averages of individual firm estimates) and Henry, *Estimating β: An update*, April 2014, pp. 90–93 (for fixed weight portfolio estimates). Henry also presented LAD equity beta estimates for time varying portfolios, and these estimates range from 0.39 to 0.53. See: *Henry, Estimating β: An update*, April 2014, p. 56.

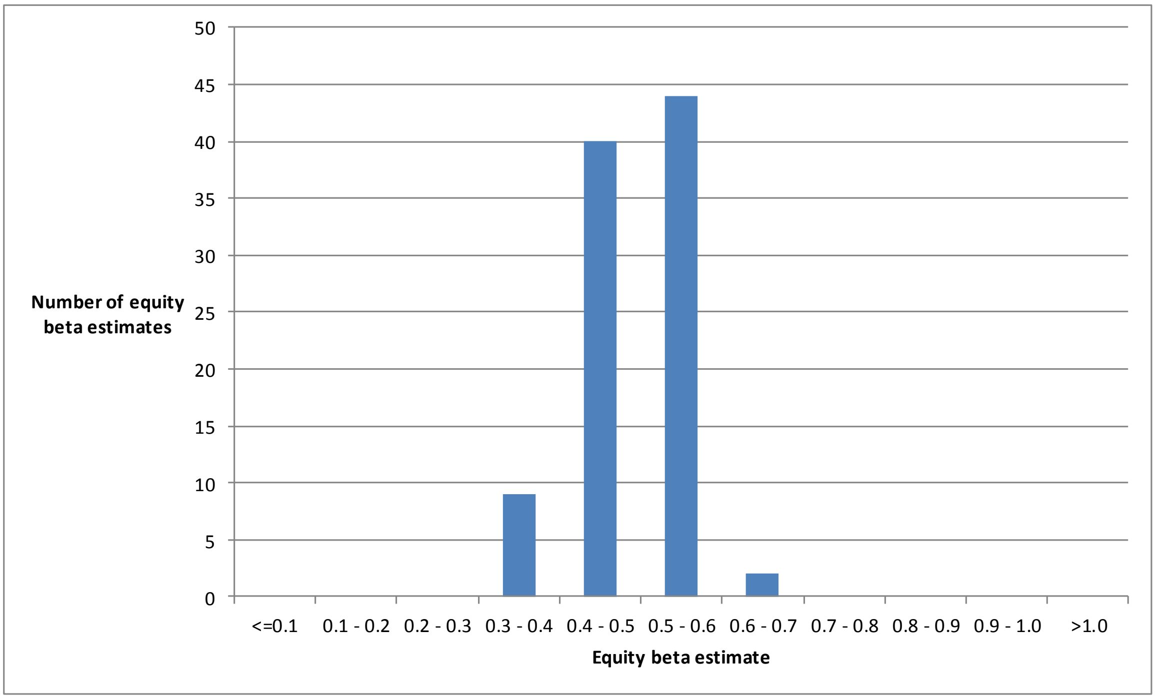
Henry also performed various robustness and sensitivity tests on the equity beta estimates. These included the Dimson adjustment for thin trading, as well as recursive estimates and the Hansen test for parameter stability and sensitivity. Henry concluded that there is little to no evidence of thin trading across all regression permutations and 'no overwhelming issue with instability'.[1853] Therefore, we are satisfied the estimates presented in Henry's 2014 report are reasonably stable and not significantly affected by thin trading.

We consider the equity beta estimates presented in Henry's 2014 report are consistent across a range of different regression permutations, as outlined above. Henry used credible econometric techniques and incorporated robustness checks for data outliers, thin trading and parameter instability in his analysis. Therefore, we have confidence that the equity beta estimate for a benchmark efficient entity falls within the range of 0.4 to 0.7. We also consider Henry's 2014 results indicate a best empirical estimate of approximately 0.5 for the benchmark efficient entity. This is because most of the estimates are clustered around 0.5, as shown in Figure 3-27.

[1852] Henry did not present raw estimates for monthly return intervals. Henry also did not present LAD estimates using monthly return intervals. Henry did present time varying portfolio OLS estimates using monthly return intervals, and these estimates range from 0.39 to 0.47. See: *Henry, Estimating β: An update*, April 2014, p. 58. Henry also suggested that the individual firm estimates based on monthly returns be treated with a degree of caution because some estimates are statistically insignificant. See: *Henry, Estimating β: An update*, April 2014, p. 27.

[1853] Henry, *Estimating β: An update*, April 2014, p. 62. Henry explains that where the Hansen test does show evidence of instability, it is almost uniformly due to a change in the error variance in the regression model. He states that 'there is no evidence of parameter instability associated with the coefficients of the regression models themselves'. However, the Hansen test for equal and value weighted portfolio estimates for P2 (over the longest available period) shows some evidence of parameter instability for beta and should be treated with a degree of caution. See: Henry, *Estimating β: An update*, April 2014, pp. 50–51, 62.

Figure 3-27 Equity beta estimates from Henry's 2014 report (average of individual firm estimates and fixed weight portfolio estimates)



Source: AER analysis; Henry, *Estimating β: An update*, April 2014.

Note: This figure contains all averages of individual firm estimates and fixed weight portfolio estimates presented in Henry's 2014 report (95 estimates in total). This includes OLS and LAD estimates, raw and re-levered estimates, weekly and monthly return intervals and all estimation periods.

In its 2014 reports, SFG expressed concerns regarding the reliability of equity beta estimates based on a small comparator set of Australian energy network firms.[1854] We discuss these concerns below. However, we note that the service providers and their consultants have raised concerns about the reliability of our empirical estimates in the past. We provided detailed material addressing this issue in the Guideline process and Roma to Brisbane pipeline regulatory determination, and this material remains relevant.[1855]

SFG submitted that the equity beta estimates presented in Henry's report do not indicate a range of 0.4 to 0.7. In its report, SFG presented a diagram which shows that the individual firm estimates in Henry's report range from below 0.2 to just above

1854 SFG, *Equity beta*, May 2014, pp. 2–3; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 68–71.

1855 AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 48–49; AER, *Draft decision: APT Petroleum Pipeline Pty Ltd, Access arrangement draft decision, Roma to Brisbane pipeline, 2012–13 to 2016–17*, April 2012, pp. 323–326. There is also relevant material in AER, *Final decision: APT Petroleum Pipeline Pty Ltd, Access arrangement final decision, Roma to Brisbane Pipeline, 2012–13 to 2016–17*, August 2012, pp. 230–235.

1.0.[1856] SFG submitted that this wide range of individual firm estimates indicates our equity beta estimates are unreliable. It also stated that these estimates 'vary wildly':[1857]

- across firms
- over time
- depending on which estimation method is used (OLS or LAD)
- depending on which return interval is used and the reference day chosen.

We also received submissions from the CCP in 2014, which submitted that most of the equity beta estimates presented in Henry's 2014 report are clustered around a range of 0.3 to 0.5.[1858]

SFG and the CCP used individual firm estimates to support their views.[1859] We consider the most useful empirical estimates are averages of individual firm estimates and fixed weight portfolio estimates, and these estimates range from 0.4 to 0.7 under almost every regression permutation considered, including:[1860]

- various portfolios containing different combinations of comparator firms
- different estimation periods and return intervals
- different estimation methods.

We also note that SFG's proposed 'best empirical estimate of beta' is based on averages of individual estimates for Australian energy network firms and US energy firms.[1861]

In regards to the consistency of our equity beta estimates over time, the re-levered OLS estimates presented in Henry's 2009 report range from 0.44 to 0.71.[1862] This is consistent with the range of OLS estimates presented five years later in Henry's 2014 report. The ERA drew a similar conclusion in its 2013 Rate of return guideline based on its own studies.[1863] Table 3-59 sets out empirical studies from 2002 that show equity

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1856 SFG, *Equity beta*, May 2014, p. 27, figure 2; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 68, figure 7.

1857 SFG, *Equity beta*, May 2014, p. 3; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 68–71.

1858 CCP, *Jam tomorrow? Submission to the NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014, p. 16; CCP, *Jam tomorrow? – ACT version: Submission to ActewAGL's regulatory proposal for 2014–19*, August 2014, p. 12; CCP, *Submission to TasNetworks' revenue proposal for 2014–19*, September 2014, p. 8.

1859 SFG used individual firm estimates to support its first, second and third points, but used an average estimate (of six comparator firms) to support its fourth point (variation based on which return interval used and the reference day chosen). See: Henry, *Estimating β: An update*, April 2014, pp. 28–31.

1860 Except for the raw LAD estimates, which range from 0.3 to 0.6. However, the re-levered LAD estimates range from 0.4 to 0.6. We do not consider this is sufficient to justify adjusting our range.

1861 SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 2, 13.

1862 This range includes averages of individual firm estimates and fixed weight portfolio estimates. See: Henry, *Estimating β*, April 2009.

1863 ERA, *Rate of return guideline explanatory statement*, December 2013, p. 171.

beta estimates generally in line with the empirical range derived from Henry's 2014 estimates. If only OLS estimates are considered, then the equity beta estimates presented in these studies fall within the 0.4 to 0.7 range.[1864] These results demonstrate the consistency of our empirical equity beta estimates over time, as well as across various regression permutations.

We note that SFG's solution to this alleged unreliability of our estimates is to include a set of 56 US energy firms in our comparator set of Australian energy network firms.[1865] We discuss the role of international comparators in detail in section D.2.1. However, we note the individual equity beta estimates for these US firms display significant variability. They range from 0.49 to 1.51, according to SFG's analysis.[1866] If we accepted SFG's proposal and included the US energy firms in our comparator set, the range of our individual firm equity beta estimates would widen substantially as the highest number in the range would increase from 1.03 to 1.51.[1867]

In its 2015 report, SFG reiterated its concerns regarding the reliability of equity beta estimates based on a comparator set of Australian energy network firms.[1868] Similarly, the CCP again noted that most of the equity beta estimates presented in Henry's 2014 report are clustered around a range of 0.3 to 0.5.[1869] We have had regard to these submissions and maintain our view for the reasons set out above. We also note Partington's statement that:[1870]

> A final comment may be made with reference to a number of the reports that allege instability in the estimates of β. Henry (2008, 2009, 2014) provides a range of evidence demonstrating the stability of the estimates.

[1864] This is excluding time varying portfolios and Vasicek/Blume adjustments. See Table 3-59. The minimum OLS estimate is 0.37 (Henry's 2014 report, average of individual firm OLS estimates using monthly returns over the last five years) and the maximum OLS estimate is 0.71 (Henry's 2009 report, average of individual firm estimates using weekly returns over 2003–08).

[1865] SFG, *Equity beta*, May 2014, p. 40; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 82.

[1866] SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, p. 19.

[1867] This includes all individual firm estimates (OLS, LAD, weekly returns, monthly returns, all estimation periods). Henry, *Estimating β: An update*, April 2014, p. 27.

[1868] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 10–11. SFG also submitted that our estimates are imprecise with wide standard errors. However, SFG has not provided analysis to support this submission. As discussed in section D.2.1, we do not consider increased statistical precision (or reduced dispersion) necessarily results in more reliable equity beta estimates. We also note that Henry performed tests for thin trading and parameter instability in his analysis and concluded that there was no significant issue with thin trading or stability in his equity beta estimates.

[1869] CCP, *Submission: AER draft TransGrid determination TransGrid revised revenue proposal*, 6 February 2015, p. 12. The EUAA and UnitingCare made similar submissions (see: EUAA, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 16; UnitingCare, *Submission to SA Power Networks' regulatory proposal for 2015–20*, February 2015, p. 32). The Tasmanian Small Business Council (TSBC) also submitted that the equity beta estimates in Henry's 2014 report are heavily concentrated around the range 0.4 to 0.6 (see: TSBC, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, February 2015, p. 28).

[1870] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 22.

We also received a submission from the South Australian Council of Social Service (SACOSS) and South Australian Centre for Economic Studies (SACES) in 2015. This submission stated that the degree of agreement is striking between the Australian equity beta estimates from different regression permutations and studies.[1871]

Based on the available evidence and submissions, we do not consider our Australian empirical equity beta estimates are unreliable. In our discussion of the comparator set selection for the empirical analysis, we considered that SFG appears to have taken a narrow definition of what is reliable in this context. We are satisfied the set of nine Australian comparators are reflective of the benchmark efficient entity and generate a consistent pattern of empirical estimates that is robust across a range of different regression permutations.

D.2.4 Empirical evidence from other studies

We consider the equity beta estimates presented in Henry's 2014 report are generally consistent with other empirical studies based on Australian energy network firms, as set out in Table 3-59. These other empirical studies use different econometric techniques and/or comparator sets to our empirical analysis, some of which are not necessarily consistent with our methodological choices. For example, we do not use Vasicek or Blume adjusted estimates to inform our equity beta range and do not place any material reliance on time varying portfolio estimates. Nonetheless, the empirical estimates presented give us confidence that there is an extensive pattern of support for an empirical equity beta within a range of 0.4 to 0.7.

Table 3-59 Equity beta estimates for Australian energy network firms

Source	Time period	Individual firm averages	Fixed portfolios	Varying portfolios[a]	Summary of regression permutations
Henry 2014	1992–2013	0.37–0.56	0.31–0.70[b]	0.39–0.53	weekly/monthly return intervals, multiple estimation periods, OLS/LAD regressions, value/equal weight fixed portfolios, average/median varying portfolios, raw/re-levered estimates, 9 comparators
Grant Samuel 2014	2009–2014[c]	0.42–0.64			weekly/monthly return intervals, multiple estimation periods, OLS regressions, Bloomberg adjusted betas, raw estimates, 5 comparators

[1871] SACOSS, *Submission to SA Power Networks' regulatory proposal for 2015–20*, January 2015, p. 7; SACES, Independent estimate of the WACC for SA Power Networks 2015 to 2020: Final report, January 2015, p. 12.

Source	Time period	Individual firm averages	Fixed portfolios	Varying portfolios[a]	Summary of regression permutations
ERA 2013	2002–2013	0.48–0.52	0.39–0.59		weekly return intervals, OLS/LAD/MM/TS regressions, value/equal weight fixed portfolios, multiple estimation periods, re-levered estimates, 6 comparators
SFG 2013	2002–2013	0.60		0.55	OLS regressions, four weekly repeat sampling, Vasicek adjustment, re-levered estimates, 9 comparators
ERA 2012	2002–2011	0.44–0.60			weekly/monthly return intervals, OLS/LAD regressions, re-levered estimates, 9 comparators
Henry 2009	2002–2008	0.45–0.71	0.35–0.94[d]	0.41–0.78	weekly/monthly return intervals, various estimation periods, OLS/LAD regressions, value/equal weight fixed portfolios, average/median varying portfolios, re-levered estimates, 9 comparators
ACG 2009	1990–2008	0.50–0.58		0.69–0.91	monthly return intervals, OLS/LAD regressions, multiple estimation periods, raw/re-levered estimates, average/median varying portfolios, 9 comparators
Henry 2008	2002–2008	0.35–0.67	0.31–0.77[e]		daily/weekly/monthly return intervals, discrete/continuous returns, various estimation periods, OLS/LAD regressions, value/equal weight portfolios, raw/re-levered estimates, no adjustment/Vasicek/Blume, 10 comparators
ACG 2002	2000–2002[f]	0.61–0.69			monthly return intervals, OLS regressions, raw/re-levered estimates (with varying debt betas), 4 comparators

Source: AER analysis.[1872]

(a) We place no material reliance on the estimates from time varying portfolios as they are not grounded in financial theory and are prone to measurement error. See: Henry, *Estimating β: An update*, April 2014, p. 52.

(b) 0.31 is a raw LAD estimate, which we place less reliance on. The minimum re-levered LAD estimate is 0.38 and the minimum OLS estimate is 0.39.

(c) Grant Samuel uses equity beta estimates from the Australian Graduate School of Management (AGSM) and Bloomberg. This time period reflects AGSM's estimation, which uses a four year estimation period as at September 2013, and Bloomberg, which uses a four year estimation period as at February 2014.

(d) 0.94 is an LAD estimate based on a portfolio with only 18 monthly observations. If this portfolio is excluded the maximum estimate is 0.75, which is again an LAD estimate (which we place less reliance on). The maximum OLS estimate is 0.62.

(e) 0.31 is an LAD estimate, which we place less reliance on. The minimum OLS estimate is 0.42. 0.77 is a Blume–adjusted estimate, which we do not rely on. The maximum unadjusted estimate is 0.68, and the maximum OLS estimate is 0.66.

(f) ACG did not make it clear what time period its data covered. However, it noted that equity beta estimates were only used where there were more than 20 observations.

In its 2015 letter for TransGrid, Grant Samuel and Associates (Grant Samuel) noted that it utilised a number of different sources to estimate the equity beta for each of the energy network firms in its peer group.[1873] Grant Samuel submitted that we have averaged the different sources for each energy network firm to derive the equity beta range of 0.42 to 0.62 for the sector, which it considered is inappropriate.

We do not average across the different sources for each energy network firm in Grant Samuel's peer group. We average over the four Australian energy network firms in the peer group for each source (excluding the Bloomberg estimates using the Morgan Stanley capital international developed world index (MSCI)). Averaging across the four Australian equity beta estimates for each source gives the following results:

- 0.42—from the Australian Graduate School of Management (AGSM)
- 0.64—from Bloomberg, using a local index and four years of monthly observations
- 0.62—from Bloomberg, using a local index and two years of weekly observations.

Grant Samuel also submitted that averaging over individual equity beta estimates disguises the unreliability of the data.[1874] We set out our reasons for averaging over

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[1872] Based on the following reports: ACG, *Empirical evidence on proxy beta values for regulated gas transmission activities: final report*, July 2002, pp. 35, 39–40; Henry, *Econometric advice and beta estimation*, November 2008; ACG, *Australian Energy Regulator's draft conclusions on the weighted average cost of capital parameters: commentary on the AER's analysis of the equity beta*, January 2009, pp. 22, 25; Henry, *Estimating β*, April 2009; ERA, D*raft decision on proposed revisions to the access arrangement for the Western Power network*, March 2012, pp. 202, 204; SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 12–15; ERA, *Explanatory statement for the rate of return guidelines*, December 2013, pp. 171, 173; Grant Samuel and Associates, *Envestra financial services guide and independent expert's report (appendix 3)*, March 2014, p. 6; Henry, *Estimating β: an update*, April 2014.

[1873] Grant Samuel and Associates, *Letter—Grant Samuel response to AER draft decision*, 12 January 2015, p. 8.

[1874] Grant Samuel and Associates, *Letter—Grant Samuel response to AER draft decision*, 12 January 2015, p. 8. Grant Samuel also submitted that we do not discuss issues regarding the reliability of equity beta estimates, such individual firm estimates in section D.2.2. We also note that SFG, CEG and NERA use equity beta estimates based on averages of individual firm estimates.[1875]

D.3 International empirical estimates

In step two of section 3.4.1, we consider equity beta estimates derived from international comparators, and conclude this evidence should not be used as the primary determinant of the equity beta range or point estimate. This is because these estimates are less representative of the benchmark efficient entity (see section D.2.1). We use empirical estimates of international energy networks to inform the equity beta point estimate from within the range. We consider this evidence provides some limited support for an equity beta point estimate towards the upper end of our empirical range.

In the Guideline, we set out a number of international empirical equity beta estimates that ranged from 0.5 to 1.3.[1876] The studies we consider in this decision present equity beta estimates that range from 0.3 to 1.0.[1877] These studies are discussed below:

- The CEG report prepared as a part of the ENA submission to the Guideline process suggested a sample of 56 US–listed energy network companies to be included in our comparator set of Australian–listed energy network firms.[1878] Based on the comparator sample provided by CEG, SFG computed equity beta estimates over an 11 year period from 2 January 2002 to 19 November 2012.[1879] The resulting OLS equity beta estimates are as follows:[1880]
    - raw:
        - 0.68 for the average equity beta of individual firms
    - re-levered to 60 per cent gearing:
        - 0.88 for the average equity beta of individual firms

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as standard errors or stability over time. We discuss these issues (which we consider are similar to those raised by SFG) in section D.2.3.

1875 SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 2, 13. CEG and NERA base their equity beta estimates on SFG's analysis. See: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 58; NERA, *Return on capital of a regulated electricity network*, May 2014, pp. 79–81.

1876 AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 64–67.

1877 This range includes raw and re-levered equity beta estimates. The re-levered estimates presented have been calculated using the Brealey-Myers formula set out in our empirical analysis section (see section D.2.2). We note that this de-levering and re-levering process may have more of an impact on international empirical estimates because the average industry gearing may not be similar to our benchmark gearing level of 60 per cent. If the Brealey–Myers formula is not an accurate representation of reality, then the re-levered international equity beta estimates may contain material error. Also, the studies we consider in this section are the same as those considered for our November 2014 draft decisions and April/June 2015 final and preliminary decisions for several service providers.

1878 CEG, *Information on equity beta from US companies*, June 2013, p. 7.

1879 SFG, *Regression-based estimates of risk parameters*, June 2013, p. 6.

1880 SFG, *Regression-based estimates of risk parameters*, June 2013, pp. 15, 19. SFG's results incorporate a Vasicek adjustment to its OLS equity beta estimates. We do not apply a Vasicek adjustment in our decision. The raw average equity beta estimate without a Vasicek adjustment is 0.67.

        - 0.91 for the average equity beta of an equal–weighted index.[1881]

- The Damodaran equity beta estimates for US industry groups have been updated for 2014 market data. However, Damodaran has changed his industry classifications since 2013.[1882] The only industry that reports energy network firms is 'Utility (general)'. It contains electricity and gas network businesses, as well as vertically integrated businesses. Damodaran uses weekly return intervals and a five year estimation period (up to 2014 year–end). The resulting OLS equity beta estimates for the utilities (general) industry are as follows:[1883]
    - raw:
        - 0.59 as at January 2015
    - re-levered to 60 per cent gearing:[1884]
        - 0.92 as at January 2015.
- FTI Consulting's 2012 report for Ofgem provided equity beta estimates for three UK–listed energy network firms. FTI Consulting used daily return intervals and calculated the average daily returns for the sector as the market–capitalisation weighted average of the returns for National Grid, Scottish and Southern Energy and Scottish Power. The resulting raw OLS equity beta estimates are as follows:[1885]
    - 0.45 using one year of daily data (10 May 2011 to 9 May 2012)
    - 0.48 using two years of daily data (10 May 2010 to 9 May 2012).
- The Alberta Utilities Commission (AUC) published a 2013 report setting out an interim approved generic return on equity for all relevant utilities for 2014, until the full decision is published.[1886] For this decision, several experts contributed advice on the equity beta based on estimates of Canadian utilities. The resulting equity beta estimates recommended by these experts range from 0.45 to 0.70.[1887] We

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[1881] SFG defines its equal weighted index as an index of firm returns, which allows it to 'construct one time series in each market that is available over the entire 11 year period'. See: SFG, *Regression-based estimates of risk parameters*, June 2013, p. 2.

[1882] 'Utilities' have been separated into water and 'general' (which consists of energy utilities). 'Power' contains mainly energy generation and retail services and 'Oil/Gas distribution' contains oil and gas pipelines. See: Damodaran, *Updated data: The Data page*, *Levered and Unlevered Betas by Industry: Download detail*, Stern school of Business New York University, last updated 5 January 2015, viewed 30 March 2015, see link: http://people.stern.nyu.edu/adamodar/.

[1883] Damodaran, *Updated data: The Data page*, *Levered and Unlevered Betas by Industry*, Stern school of Business New York University, last updated 5 January 2015, viewed 30 March 2015, see link: http://people.stern.nyu.edu/adamodar/.

[1884] We have de-levered and re-levered the raw equity beta estimates from Damodaran's data.

[1885] FTI Consulting, *Cost of capital study for the RIIO-T1 and GD1 price controls*, July 2012, p. 42. We are not able to provide re-levered equity beta estimates because the report does not provide the appropriate gearing data.

[1886] The interim decision applied the 2011 generic cost of capital decision as a placeholder for 2014. See: AUC, *2013 Generic Cost of Capital*, December 2011, pp. 1–2.

[1887] Alberta Utilities Commission, *2011 Generic Cost of Capital*, December 2011, pp. 8, 19–20. The relevant experts were Dr. Laurence Booth at the University of Toronto, Dr. Lawrence Kryzanowski at Concordia University, Dr.

note the full decision has now been published and the equity beta estimates recommended by the experts range from approximately 0.3 to 0.7.[1888]

- PricewaterhouseCoopers (PwC) publish an annual report for New Zealand which outlines the cost of capital (and equity beta) for a number of companies classified by industry. The equity beta estimates are based on an average of monthly returns over (up to) five years.[1889] PwC's June 2014 report presents the following raw equity beta estimates for two New Zealand energy network firms as at 31 December 2013:[1890]
    - raw:
        - 0.6 for the average of individual firm estimates
    - re-levered to 60 per cent gearing:[1891]
        - 0.87 for the average of individual firm estimates.
- The Brattle Group's 2013 report for the Netherlands Competition Authority estimated equity beta for a set of seven European and three US energy network firms. It used a three year estimation period and daily return intervals. In response to CEG's concerns, we have used the Dimson beta where the adjustment is significant.[1892] The resulting average equity beta estimates are:[1893]
    - raw:
        - 0.58 for the average of European individual firm estimates
        - 0.60 for the average of US individual firm estimates
        - 0.58 for the average of European and US individual firm estimates
    - re-levered to 60 per cent gearing:[1894]

Gordon Roberts at York University and Ms. Kathleen McShane, president and senior consultant with Foster Associates Inc. of Bethesda, Maryland. This report did not specify whether the equity betas were raw or re-levered to a benchmark gearing.

1888 The relevant experts were Dr. Laurence Booth at the University of Toronto, Dr. Sean Cleary at Queen's University and Ms. Kathleen McShane, president and senior consultant with Foster Associates Inc. of Bethesda, Maryland. Dr Cleary recommended an equity beta range of 0.3 to 0.6. He calculated an average beta of 0.29 using monthly returns over the 1988–2012 period. He also calculated an average beta of 0.25 using 60 months of returns up to 20 December 2013. Dr Booth recommended an equity beta range of 0.45 to 0.55 for Canadian stand-alone utilities based on long run beta estimates. Ms McShane was critical of historical equity betas, but used beta estimates from Bloomberg and Value Line. These betas range from 0.65 to 0.7. These betas also incorporate an adjustment towards 1.0 (Blume or Vasicek), which we do not agree with. See: AUC, *2013 Generic Cost of Capital*, 23 March 2015, pp. 24–26. This report did not specify whether the equity betas were raw or re-levered to a benchmark gearing.

1889 See: http://www.pwc.co.nz/appreciating-value/pwc-wacc-formula/

1890 PwC, *Appreciating Value New Zealand, Edition five - IPO survey*, June 2014, p. 21. This report presented equity beta estimates of 0.5 for Horizon Energy Distribution Limited and 0.7 for Vector Limited.

1891 We have de-levered and re-levered the raw equity beta estimates from the data in PwC's report.

1892 See: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 37.

1893 The Brattle Group, *The WACC for the Dutch TSOs, DSOs, water companies and the Dutch pilotage organisation*, March 2013, pp. 16–18.

1894 We have de-levered and re-levered the raw equity beta estimates from the data in Brattle Group's report.

- 0.71 for the average of European individual firm estimates
- 1.01 for the average of US individual firm estimates
- 0.80 for the average of European and US individual firm estimates.

In its 2014 reports for several service providers, SFG submitted that more weight should be placed on the empirical estimates of overseas (particularly US) energy networks, which it considers supports an equity beta point estimate above the 0.4 to 0.7 range.[1895] We do not agree with SFG's view for the following reasons:

- As discussed in section D.2.1, we do not consider empirical estimates of international energy networks are sufficiently representative of the benchmark efficient entity to warrant SFG's submission. In determining the role we place on international empirical estimates (see steps one and two of section 3.4.1), we considered the strengths and limitations of this form of evidence. We subsequently concluded that international empirical estimates would not be used to inform the equity beta range, only the point estimate.
- We consider SFG has placed a disproportionate amount of weight on equity beta estimates of US energy network firms, with little to no consideration of empirical estimates from other countries. This view has also been expressed in submissions from the EMRF and PIAC.[1896] We consider empirical equity beta estimates from a range of different countries. These estimates (presented above) show it is not clear that the international evidence supports an equity beta estimate above the top of our range. The range of the international empirical estimates is wide, with a number of estimates both above and below the top of our empirical range.

In its 2015 reports for several service providers, SFG again submitted that more weight should be placed on international empirical estimates (particularly from the US). SFG submitted that:[1897]

- international equity beta estimates should be used to produce equity beta estimates, and should be used in determining the equity beta range
- we do not set out a preferred point estimate of equity beta based on the international empirical estimates

1895 SFG, *Equity beta*, May 2014, p. 32; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 72. SFG also consider we should include US energy firms in the comparator set for our empirical analysis.

1896 EMRF, *Submission to Jemena Gas Network's access arrangement proposal for 2015–20*, August 2014, p. 87; PIAC, *Submission to the NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014, p. 78.

1897 SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 8, 12–18; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 19; SFG, *The required return on equity: Initial review of the AER draft decisions: Note for ActewAGL, Ausgrid, Essential Energy and Endeavour Energy*, 19 January 2015, pp. 33–39 (SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015); SFG, *The required return on equity: Initial review of the AER draft decisions: Report for Energex*, 30 January 2015, pp. 33–39 (this report is very similar to SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015 and therefore, any references we make to the 19 January 2015 in this appendix applies to this 30 January 2015 report).

- our analysis of international empirical estimates is incorrect because we consider both raw and re-levered estimates
- our analysis of international empirical estimates is incorrect because we do not consider the relative reliability of different studies
- the correct analysis of the international empirical evidence set out above is consistent with an equity beta estimate materially above 0.7.

We do not agree with SFG's submission for the following reasons:

- While we do use international equity beta estimates in producing the equity beta point estimate, we do not use it to determine the range. We explain our reasoning for this decision above and in steps one and two of section 3.4.1.
- We do not consider it is necessary to determine a specific equity beta point estimate for each source of evidence we consider. However, we note that the midpoint of the range of international empirical estimates presented above is 0.7.
- We consider raw and re-levered equity beta estimates in our analyses of Australian and international empirical estimates. We set out our reasons for this consideration in section D.2.2. We note that international energy firms are unlikely to have gearing levels close to our benchmark level of 60 per cent, and leverage adjustment formulae are likely to be simplifications of reality. If our chosen formula (Brealey–Myers) is not an accurate representation of reality, then the re-levered international equity beta estimates may contain material error. We note that, in his 2015 report, Partington cautioned against re-levering equity beta estimates in general. However, he considered the problems associated with re-levering are compounded when re-levering international equity beta estimates to an Australian benchmark gearing level because of institutional differences across countries. Partington considered attempts to re-lever international equity beta estimates to some assumed level of leverage in Australia are likely to be unreliable.[1898] We consider this issue highlights the limitations of using international empirical estimates to estimate the equity beta for an Australian benchmark efficient entity.[1899]
- We consider the international empirical estimates in a holistic manner, while also considering that there are inherent uncertainties when relating foreign estimates to

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[1898] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 74–75.

[1899] In their 2015 report, Partington and Satchell reiterated the views in Partington (2015). They summarised their view in three points (referring the reader to Partington (2015) for more detail). First, they consider if world-wide utility betas are considered, many are found to be lower than USA utility betas. Second, they consider the relevering process is problematic and also unnecessary. Third, they show how the betas from USA utilities can be used to estimate the cost of capital for Australian utilities without any need to relever those betas. They also show that when this is done, the resulting estimates of the cost of capital are below the rate allowed by the AER. See Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, pp. 6–7.

Australian conditions. The reports we review above are from reputable sources.[1900] Different reports use different estimation techniques because experts have different views on how best to estimate equity beta. We note that it would be difficult to find reports that are fully consistent with our preferred estimation approach. In relation to SFG's specific concerns:

- We consider international empirical estimates of equity beta in this section, not other regulators' equity beta decisions. Therefore, Ofgem's decisions on equity beta are not relevant for this analysis. Similarly, the AUC's approach to determining the return on equity is not relevant for this analysis because the range of equity beta estimates presented above are based on regression analysis.[1901]
- As discussed in section D.2.1, increasing the number of firms in the comparator set may increase the statistical precision of the resulting equity beta estimate. However, increased statistical precision is not preferable if the resulting estimates are substantially less reflective of the 'true' equity beta that is being estimated. Therefore, we are not satisfied that SFG has provided sufficient evidence to suggest a comparator set of three energy network firms necessarily produces unreliable equity beta estimates.[1902]
- As discussed in section D.2.2, there is generally a trade–off in determining the length of the estimation period and the return interval. Therefore, we are not satisfied that SFG has provided sufficient evidence to suggest estimation periods of 1–3 years or daily return intervals necessarily produce unreliable equity beta estimates.[1903] We also note that using daily return intervals increases the number of observations in the time series dataset. Therefore, even though FTI Consulting and the Brattle Group use relatively short estimation periods, they may not have less observations in their dataset because they use daily return intervals.
- The AUC's 2013 Generic Cost of Capital is not a report that documents submissions to the regulator. It is a decision that sets out the approved return on equity for all affected utilities for the years 2013, 2014, and 2015.[1904] Evidence (including equity beta estimates) was provided by a number of experts that were sponsored by utilities and other stakeholders.

[1900] For example, we use estimates derived by well-respected advisory firms (PwC); expert consultants commissioned by regulators, energy network firms and other stakeholders (SFG, FTI Consulting, Brattle Group, experts used in AUC report); and academics (Damodaran).

[1901] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 15; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 36.

[1902] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 14–17; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, pp. 35–38.

[1903] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 14–17; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, pp. 35–38.

[1904] It also sets out individual deemed equity ratios (also referred to as capital structure) for each affected utility. See: AUC, *2013 Generic Cost of Capital*, 23 March 2015, p. 1.

- SFG also presented re-levered equity beta estimates from Damodaran's analysis of European and global industry groups. These are 1.3 (European) and 0.9 (global).[1905] These equity beta estimates may increase the upper bound of the range of international empirical estimates but do not change our view on the evidence provided from international empirical estimates.

- We do not agree with SFG's interpretation of the international evidence we have presented above. We maintain our view that international empirical estimates support an equity beta range from 0.3 to 1.0 (or 0.3 to 1.3 if SFG's re-levered European and global estimates are included). These estimates span across a wide range. We do not consider this evidence implies an equity beta estimate materially above 0.7 for the benchmark efficient entity.[1906]

In its 2015 report for several service providers, CEG made similar submissions to SFG.[1907] The above considerations also apply to CEG, and we note the following:

- We agree with CEG that the equity beta estimates in the Brattle Group's report should apply the Dimson adjustment where the adjustment is significant and we have adjusted our estimates accordingly.[1908] However, we do not use the equity beta estimates presented in Table 10 of the report because they incorporate a Vasicek adjustment, which we do not agree with (see section D.2.2).
- We agree with CEG that the equity beta estimates from PwC's report should include the re-levered estimates, and we have adjusted our estimates accordingly.[1909] However, we consider both the raw and re-levered estimates.

In its June 2015 report, Frontier also submitted that we should only consider re-levered estimates to allow international equity beta estimates to be compared on a like-with-like basis.[1910] We maintain our view for the reasons stated above, and add the following considerations:

- There are many uncertainties involved with de-levering and re-levering international empirical estimates to a domestic benchmark gearing level. We consider this highlights the limitations of using international empirical estimates to estimate the equity beta for an Australian benchmark efficient entity. There are many differences between international and Australian energy network firms that affect their equity betas. We consider de- and re-levering international equity beta estimates does not resolve the difficulties associated with comparing these estimates, and certainly

[1905] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 14.
[1906] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 17; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 38; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 19.
[1907] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 34–38
[1908] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 37.
[1909] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 37–38.
[1910] Frontier, *Review of the AER's conceptual analysis for equity beta*, June 2015, pp. 14–19.

does not allow for a 'like-for-like' comparison. As Partington and Satchell stated in their October 2015 report:[1911]

> However we do not agree that it is a useful exercise to take the equity betas of overseas utilities and relever them. Not only is this process subject to uncertainty and debate about the appropriate formula to use, particularly where tax systems differ, more importantly as we show below, it is unnecessary. There is also the fundamental question of how close the underlying business risks are and, how similar is the impact of leverage, between the domestic and overseas utilities. For example, if they really are similar why do American utilities have lower leverage ratios than Australian utilities, when it is generally considered that the American tax system is more favourable to leverage?

- Partington and Satchell also considered it is unnecessary to de-lever and re-lever international equity beta estimates, stating:[1912]

> In Partington (2015) we urge care in making such international comparisons and we also show that when such comparisons are made it is unnecessary to go through the unlevering/relevering process. Since that material is instructive we reproduce it in full below…

We note the pattern of international results is not consistent and there are inherent uncertainties when relating foreign estimates to Australian conditions. We also note Partington's consideration that 'too much weight should not be given to inter-country comparisons and overseas betas'.[1913] However, based on the available evidence, we are satisfied the international empirical estimates provide some limited support for an equity beta estimate towards the upper end of our empirical range.[1914]

FTI Consulting report for Ofgem

In 2012, FTI Consulting was commissioned by Ofgem to prepare a report on the cost of capital for energy network forms under the upcoming RIIO-T1 and RIIO-GD1 price controls.[1915]

Gray and Hall (previously SFG, now Frontier) have focussed on this report and submitted that FTI Consulting itself recommended Ofgem should not rely on their

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[1911] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 39–40.

[1912] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 40–42.

[1913] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 76. The CCP agrees with Partington's view (see CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, p. 72).

[1914] QCOSS considered international empirical estimates should not be used to inform our equity bets point estimate from within the range because they are not comparable to the Australian benchmark efficient entity (see QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, pp. 22–24). We consider we give international empirical estimates a reasonable role, based on our assessment of this information against the criteria set out in the Guideline (see steps one and two in section 3.4.1).

[1915] FTI Consulting, *Cost of capital study for the RIIO-T1 and GD1 price controls*, July 2012, p. 8.

estimates.[1916] This contributed to Gray and Hall's submission that we do not have appropriate regard to the reliability of the international empirical estimates we consider.

The FTI report was commissioned to recommend whether Ofgem's previous analysis and conclusions in its RIIO Strategy Decision needed to be updated to reflect new issues or developments.[1917] In regards to equity beta, FTI Consulting considered recent regulatory precedent and updated previous empirical analysis by Europe Economics in March 2011. Its updated calculation of Europe Economics' beta estimates suggested betas had not changed materially since March 2011. Therefore, FTI Consulting concluded that they had not identified evidence to suggest Ofgem should update its range for beta, given the limited weight Ofgem placed on empirical beta estimates in its Strategy Decision.[1918] In this context, we do not agree with Gray and Hall that FTI Consulting itself recommended Ofgem should not rely on their estimates. FTI Consulting stated:[1919]

> In the RIIO Strategy Decision, Ofgem noted that Europe Economics had identified a sharp fall in beta for SSE and National Grid PLC. However, they did not reflect this fall in the decision:
>
> > "With this being a sharp and drastic change, we do not think it would be appropriate for us to rely on the latest data [on equity betas for National Grid and SSE] in determining the equity beta for RIIO-T1 and GD1. However, we will monitor the situation in the lead-up to final proposals".
>
> We have reviewed recent regulatory precedent on beta since the RIIO Strategy Decision and updated the beta estimates performed by Europe Economics, although we place limited weight on those updates given the scope of this report and the emphasis placed by Ofgem on other factors in the Strategy Decision Paper.

D.4 The theory of the Black CAPM

In step two of section 3.4.1, we consider the Black CAPM and conclude it should not be used as the primary determinant of the equity beta range or point estimate for the benchmark efficient entity. We also conclude that, because of the model's empirical instability, we only have regard to the theory underlying the Black CAPM. Therefore, we use the theoretical principles underpinning the Black CAPM to inform the equity beta point estimate from within our empirical range. We consider this evidence is consistent with an equity beta point estimate above the best empirical estimate implied

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[1916] See, for example, Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 53–54.

[1917] FTI Consulting, *Cost of capital study for the RIIO-T1 and GD1 price controls*, July 2012, p. 9. FTI Consulting stated: In particular, we have been asked to assess whether, and if so to what extent, Ofgem's analysis and conclusions in the RIIO Strategy Decision need to be updated to reflect new issues or developments. We have not been asked to comment on the approach taken by Ofgem in the RIIO Strategy Decision. **We have not been asked to comment on the approach taken by Ofgem in the RIIO Strategy Decision**. [emphasis added]

[1918] FTI Consulting, *Cost of capital study for the RIIO-T1 and GD1 price controls*, July 2012, pp. 39–43.

[1919] FTI Consulting, *Cost of capital study for the RIIO-T1 and GD1 price controls*, July 2012, p. 40.

from Henry's 2014 report, which is approximately 0.5 (see section D.2.3). In the Guideline we considered the theoretical underpinnings of the Black CAPM in detail and this material remains relevant.[1920]

The Black CAPM is an alternative model to the SLCAPM. As a result of slightly different starting assumptions, the Black CAPM predicts a slope of estimated returns that can be flatter than for the SLCAPM.[1921] This means that for firms with an equity beta below 1.0, the Black CAPM may predict a higher return on equity than the SLCAPM.

The key theoretical difference between the Black CAPM and the SLCAPM relates to borrowing and lending. The SLCAPM assumes that investors can access unlimited borrowing and lending at the risk free rate. The Black CAPM relaxes this assumption, and instead assumes that investors can access unlimited short selling of stocks, with the proceeds immediately available for investment. Either of these assumptions might correctly be criticised as being unrealistic, and it is not clear which assumption is preferable. More information on the Black CAPM can be found in section A.3.3.

We consider the theoretical principles underpinning the Black CAPM demonstrate that market imperfections could cause the true (unobservable) expected return on equity to vary from the SLCAPM estimate. For firms with an equity beta below 1.0, the Black CAPM may predict a higher expected return on equity than the SLCAPM. We use this theory to inform our equity beta point estimate, and consider it supports an equity beta above the best empirical estimate implied from Henry's 2014 report. However, while the direction of this effect may be known, the magnitude is much more difficult to ascertain. We do not consider this theory can be used to calculate a specific uplift to the equity beta estimate to be used in the SLCAPM. This would require an empirical implementation of the Black CAPM, and we do not give empirical evidence from the Black CAPM a role in determining the equity beta for a benchmark efficient entity (as discussed under step two of our foundation model approach in section 3.4.1).

Our use of the Black CAPM in informing the equity beta point estimate is supported by recent advice from our expert consultants, McKenzie and Partington. In their 2014 (and 2015) report, McKenzie and Partington considered that while the empirical implementation of the Black CAPM is problematic, the theory underlying the Black CAPM may have a role in informing the equity beta estimate.[1922] McKenzie and Partington noted there is considerable uncertainty in how the Black CAPM theory should be applied to a SLCAPM equity beta estimate. However, they considered the

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[1920] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 68–73.

[1921] Fischer Black's 1972 paper on the Black CAPM develops two model specifications. The base specification assumes no risk free asset exists (no risk free borrowing or lending). The second specification assumes that the representative investor can lend but not borrow at the risk free rate. In the base specification, the return on the zero beta portfolio can be above the risk free rate. In the second specification, the return on the zero beta portfolio must be above the risk free rate. See: Black, *Capital market equilibrium with restricted borrowing*, Journal of Business 45(3), July 1972, pp. 452–454.

[1922] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 24–25; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 44–45.

theory underlying the Black CAPM does not necessarily support an uplift to the equity beta estimate used in the SLCAPM.[1923]

On the basis of the available information, we consider that the theoretical principles underpinning the Black CAPM cannot indicate a specific value for the equity beta. However we consider this information supports an equity beta point estimate above the best empirical estimate implied from Henry's 2014 report, and is not inconsistent with an equity beta estimate towards the upper end of our empirical range.[1924]

In their 2014 reports for several service providers, SFG and NERA submitted that in the Guideline we used the Black CAPM to apply a specific uplift to equity beta to correct for 'low beta bias', and that the uplift applied was insufficient.[1925] This is a mischaracterisation. We do not use the theory underlying the Black CAPM to apply a specific uplift to the equity beta and we did not do so in the Guideline. Further, we do not accept that our use of the theory underlying the Black CAPM implies that we consider the SLCAPM produces biased return on equity estimates.[1926] This is discussed further in section D.5.3.

In its 2015 reports for several service providers, SFG submitted that we have had regard to the Black CAPM in a convoluted manner. It submitted that we should have regard to the Black CAPM by either:[1927]

- empirically estimating the Black CAPM in a multiple model approach to estimating the return on equity
- empirically estimating the Black CAPM return on equity and then inserting this into the SLCAPM to reverse engineer an equity beta estimate (SFG recommends an equity beta of 0.91 under this approach).

1923 McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, p. 24; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 44.

1924 In the Guideline we performed a rough assessment of the reasonableness of the option to select a point estimate towards the upper end of the equity beta range (to reflect the differing predictions of the Black CAPM relative to the SLCAPM). We noted for clarity that we do not consider the possible zero beta premiums presented in table C.11 of the explanatory statement to the Guideline are accurate or reliable as empirical estimates because we do not consider that there is any reliable empirical estimate for this parameter. However, in light of the available evidence, if the Black CAPM captured the 'true' state of the world better than any other asset pricing model (although we are not implying that it does), selecting a point estimate towards the upper end of the equity beta range appears open to us. See: AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 70–71.

1925 NERA, *Return on capital of a regulated electricity network*, May 2014, pp. 44, 68, 89–91; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 92–95; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 76–79, 83. SFG and NERA consider the SLCAPM produces downward biased return on equity estimates for low beta stocks (stocks with an equity beta less than 1.0). This is what they refer to as 'low beta bias'.

1926 Our consideration is supported by McKenzie and Partington and Handley in their 2014 and 2015 reports. See: McKenzie and Partington, *Report to the AER: Part A return on equity*, October 2014, p. 23; Handley, *Advice on the return on equity*, October 2014, pp. 10–12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 41–44; Handley, *Further advice in the return on equity*, April 2015, pp. 5–6.

1927 SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 23–24, 35; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, pp. 16–17; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, p. 19.

SFG also submitted that transparency requires us to empirically estimate the Black CAPM, and that we have essentially computed an unspecified estimate of the zero-beta premium.[1928]

We disagree with SFG's views. Our view is that it is open to us to consider the theory underlying the Black CAPM in informing our equity beta estimate. We set our reasons for not empirically estimating the Black CAPM in step two of section 3.4.1 and appendix A. We also set out our reasons for using the theory underlying the Black CAPM to inform the equity beta point estimate in steps one and two of section 3.4.1. Our assessment of the merits and limitations of the Black CAPM leads us to give it an informative, not determinative, role in estimating the equity beta for the benchmark efficient entity.

We consider our approach is simple to understand:

- The theory underlying the Black CAPM implies that the Black CAPM may predict a higher return on equity than the SLCAPM for firms with a beta less than 1.0.
- We have regard to this theoretical information by selecting an equity beta above the best empirical estimate implied from Henry's 2014 report.
- The theory underlying the Black CAPM cannot indicate a quantitative adjustment to the equity beta. However, we use judgement to consider the evidence is not inconsistent with an equity beta towards the upper end of the range.

We also consider we are transparent about how we apply our approach above. We do not agree with SFG that transparency requires us to empirically estimate the Black CAPM and derive a quantitative adjustment to equity beta. We do not consider this approach appropriately reflects the merits and limitations of the Black CAPM. In his 2015 report, Partington supported our view, stating that:[1929]

> we do not consider that the consultants' estimates of the Black model provide a basis for assessment of the magnitude of the beta adjustment.

In its June 2015 report, Gray and Hall (as Frontier) maintained its disagreement with our use of the theory underlying the Black CAPM to inform the equity beta point estimate.[1930] We do not consider Gray and Hall have raised any substantive new evidence to support their views. Therefore, we maintain the position and reasoning set out above.

[1928] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 23–24; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 17.

[1929] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 71.

[1930] Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 48–50, 61.

In 2015 submissions, the CCP agreed with our view on empirically implementing the Black CAPM. However, it disagreed with our use of the theory underlying the Black CAPM to inform the equity beta point estimate.[1931] The CCP stated:[1932]

> We have discussed our concerns with the Black CAPM above and do not consider it is an appropriate basis for the AER to select an equity beta that is higher than the median of the empirical observations.

We consider there are merits to the theoretical principles underpinning the Black CAPM, and we have assessed this information against the criteria set out in the Guideline in step one of section 3.4.1. What remains (in relation to both the service providers' and CCP's submissions) is a difference in opinion on the usefulness of qualitative evidence from one model to inform a parameter estimate in another model.[1933]

D.5 Selection of range and point estimate

In this section we discuss the selection of our equity beta range and point estimate. We adopt an equity beta point estimate of 0.7 from a range of 0.4 to 0.7. We are satisfied that an equity beta of 0.7 is reflective of the systematic risk a benchmark efficient entity is exposed to in providing regulated services.

Our decision on equity beta, after analysing all the relevant information before us, is consistent with the Guideline. This has the benefit of providing certainty and predictability for investors and other stakeholders. We also note that we have received extensive support for the Guideline approach and application in stakeholder submissions.[1934]

1931 CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, pp. 64–67, CCP2 (Bruce Mountain), *Submission on the AER's preliminary decisions for the Qld/SA distribution network service providers (2015-20)*, 29 July 2015, p. 10. QCOSS similarly disagreed with our use of the theory underlying the Black CAPM to inform the equity beta point estimate (see QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, pp. 22–24).

1932 CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, p. 67.

1933 In the Guideline we clearly explained why we use the theory underlying the Black CAPM to inform the equity beta point estimate. See AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 71–72.

1934 See, for example, AGL, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16; Australian PV Institute, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 6; Origin, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 17; AGL, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 14; Australian PV Institute, *Submission to SA Power Networks' regulatory proposal for 2015–20*, December 2014, p. 5; Business SA, *Submission to SA Power Networks' regulatory proposal for 2015–20*, January 2015, p. 30; Origin, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 13; ERAA, *Preliminary Decisions for Ergon Energy and Energex determinations 2015-16 to 2019-20*, 3 July 2015, p. 1; ERAA, *Preliminary Decisions for SAPN determination 2015-16 to 2019-20*, 3 July 2015, p. 1; ERAA, *Submission to the AER issues paper: Victorian electricity distribution pricing review 2016-2020*, 13 July 2015, pp. 1–2; Origin Energy, *Submission to AER preliminary decision Qld*

D.5.1 Selection of range

Our equity beta range is based on the empirical evidence in Henry's 2014 report, as well as a number of other empirical studies based on Australian energy network firms (see section D.2). More specifically, our range is based on the average of individual firm estimates and fixed weight portfolio estimates from a range of different regression permutations.

We are satisfied the empirical studies considered show an extensive pattern of support for an empirical equity beta within a range of 0.4 to 0.7. However, in his 2014 report, Henry reported a range of 0.3 to 0.8. This range was based on:[1935]

> the majority of evidence presented in this report, across all estimators, firms and portfolios, and all sample periods considered,

However, while Henry appears to base his range on all his estimates (including individual firm estimates), we consider the most useful empirical estimates in our regulatory context are averages of individual firm estimates and fixed weight portfolio estimates. As discussed in section D.2.2, we do not consider individual firm estimates in isolation as it is difficult to select an equity beta estimate from a particular comparator firm over a different estimate from another. Therefore, taking an average over all comparator firms is more likely to be reflective of the benchmark efficient entity. Considering equity beta estimates from various portfolios of comparator firms is also more likely to be reflective of the benchmark efficient entity because it combines the returns of various comparator firms.

Therefore, we base our equity beta range for the benchmark efficient entity on averages of individual firm estimates and fixed weight portfolio estimates. This is also consistent with regulatory precedent. It was the approach applied in the Guideline and in the 2009 WACC review.[1936] As demonstrated in sections D.2.3 and D.2.4, these estimates show a consistent pattern of support for an empirical equity beta range of 0.4 to 0.7 over:

- multiple estimation periods
- weekly and monthly return intervals (as well as four–weekly repeat sampling used by SFG)

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electricity distributors, 3 July 2015, pp. 11–12; Origin Energy*, Submission to AER preliminary decision SAPN*, 3 July 2015, p. 9; Origin Energy*, Submission to Victorian electricity distributors regulatory proposals*, 3 July 2015, pp. 10–11; Origin Energy, *Submission on AGN 2016-21 Access Arrangement Proposal for its SA Gas Distribution Network*, 10 August 2015, p.5; ECCSA, *The SAPN revised proposal: A response by Energy Consumers Coalition of South Australia*, July 2015, pp. 6–7; Business SA, *Submission to the AER's preliminary decision for SAPN*, 3 July 2015. p. 2.

1935 Henry, *Estimating β: An update*, April 2014, p. 63.

1936 AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 53; AER, *Review of the WACC parameters: Final decision*, May 2009, p. 342.

- OLS and LAD estimation methods (as well as MM and Theil–Sen methods used by the ERA)
- different combinations of comparator firms.

This empirical range of 0.4 to 0.7 is also consistent with our conceptual analysis, which we use to cross check our empirical results (see section D.1). This is because our conceptual analysis suggests the systematic risks of a benchmark efficient entity would be less than the risks of a market average entity (that is, less than 1.0).

D.5.2 Selection of point estimate

We consider the evidence in Henry's 2014 report suggests a best empirical equity beta estimate of approximately 0.5 (see section D.2.3). However, there are additional considerations that inform our determination of the equity beta point estimate from within the range. In particular, we consider the following sources of additional information:

- Empirical estimates of international energy networks—the recent international empirical estimates we consider range from 0.3 to 1.0.[1937] The pattern of international results is not consistent and there are inherent uncertainties when relating foreign estimates to Australian conditions. However, generally, we consider the international empirical estimates provide some limited support for an equity beta point estimate towards the upper end of our range (see section D.3).
- The theoretical principles underpinning the Black CAPM—for firms with an equity beta below 1.0, the Black CAPM may predict a higher return on equity than the SLCAPM. We consider this information points to the selection of an equity beta point estimate above the best empirical estimate implied from Henry's 2014 report. However, we do not consider the theory underlying the Black CAPM warrants a specific uplift or adjustment to the equity beta point estimate.[1938] The theory underlying the Black CAPM is qualitative in nature, and we are satisfied that this information is reasonably consistent with an equity beta point estimate towards the upper end of our range (see section D.4).

Further, we recognise the importance of providing stakeholders with certainty and predictability in our rate of return decisions, which we consider is consistent with the achievement of the allowed rate of return objective. The Guideline was developed, in part, to provide regulatory certainty for stakeholders under the new rules framework, and allow for our decisions to be reasonably predictable. It was also developed

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[1937] The upper bound of this range increases to 1.3 if we consider the additional Damodaran estimates SFG submitted in its 2015 report (see section D.3).

[1938] We also do not consider our use of this information implies there is bias in the return on equity estimates derived from the SLCAPM. Our considerations are supported by McKenzie and Partington and Handley in their 2014 and 2015 reports. See: McKenzie and Partington, *Report to the AER: Part A return on equity*, October 2014, p. 23; Handley, *Advice on the return on equity*, October 2014, pp. 10–12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 41–44; Handley, *Further advice in the return on equity*, April 2015, pp. 5–6.

following consultation and analysis. The AEMC and stakeholder submissions to the 2012 rule change process accepted these views.[1939] The final Guideline expanded on the draft Guideline to include input parameter estimates for our foundation model as of December 2013. We did this in response to submissions from stakeholders, particularly service providers, seeking greater certainty of process.[1940]

After taking these considerations into account, we adopt an equity beta point estimate of 0.7 for this decision, consistent with the Guideline. We consider this approach is reflective of the available evidence, and has the advantage of providing a certain and predictable outcome for investors and other stakeholders. We recognise the other information we consider does not specifically indicate an equity beta at the top of our range. However, a point estimate of 0.7 is consistent with these sources of information and is a modest step down from previous regulatory determinations.[1941] It also recognises the uncertainty inherent in estimating unobservable parameters, such as the equity beta for a benchmark efficient entity.

Moreover, we consider an equity beta point estimate of 0.7 provides a balance between the views of service providers and other stakeholders. While many stakeholder submissions supported the application of the approach set out in the Guideline, the CCP and a number of other stakeholders consider that our equity beta point estimate was set too high.[1942] For example, the Queensland Council of Social Service (QCOSS) submitted that:[1943]

[1939] AEMC, *Final rule determination*, November 2012, pp. 42–43, 45, 50. Additional support for these views were provided in stakeholder submissions on the Guideline material. See: RARE Infrastructure Limited, *Submission to AER's rate of return guidelines consultation paper*, June 2013; The Financial Investor Group, *Response to the AER's rate of return guidelines consultation paper*, June 2013, p. 1; ENA, *Submission to AER's rate of return guidelines issues paper*, February 2013, p. 4; PIAC, *Submission to AER's rate of return guidelines issues paper*, February 2013, p. 17.

[1940] AER, *Explanatory statement: Rate of return guideline*, December 2013, p. 51.

[1941] From 2010 to early 2014, all our regulatory determinations have applied an equity beta of 0.8. See: AER, *Review of the WACC parameters: final decision*, May 2009, p. v.

[1942] See, for example, Alliance of Electricity Consumers, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 6; TEC, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, February 2015, p. 20; SACOSS, *Submission to SA Power Networks' regulatory proposal for 2015–20*, January 2015, p. 19; SAFCA, *Submission to SA Power Networks' regulatory proposal for 2015–20*, January 2015, p. 10; CCIQ, *Submission to the Australian Energy Regulator on the preliminary determinations for Ergon Energy and Energex revenue determination*, 3 July 2015, pp. 3–4; QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, pp. 22–24; EUAA, *Submission to AER draft determination and Energex's revised revenue proposal for the 2015 to 2020 regulatory period*, 24 July 2015, p. 11; EUAA, *Submission to AER draft determination and SA Power Networks' revised revenue proposal for the 2015 to 2020 regulatory period*, 24 July 2015, pp. 11–12; UnitingCare, *Submission to the Australian Energy Regulator*, July 2015, p. 28; VECUA, *Submission to the AER: Victorian distribution networks' 2016–20 revenue proposals*, July 2015, p. 11; CCP2 (Bruce Mountain), *Advice on AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015, p.10; CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, p. 77; CCP2 (Hugh Grant), *Submission: AER preliminary 2015–20 revenue determinations Energex and Ergon Energy revised revenue proposals*, 3 September 2015, pp. 14–15.

[1943] QCOSS, *Response to Australian Energy Regulator Preliminary Decision for Queensland distributors 2015-2020*, 3 July 2015, p.24.

> QCOSS argues that the best available evidence should be the basis for selection of the equity beta. Using the best available evidence would suggest an equity beta around 0.5.

Conversely, many service providers have submitted that our equity beta point estimate has been set too low. They consider our approach dilutes or eliminates the impact of relevant information, and does not sufficiently correct for various possible biases in the SLCAPM (see section D.5.3).[1944]

We consider an equity beta of 0.7 for the benchmark efficient entity is reflective of the systematic risk of a benchmark efficient entity is exposed to in providing regulated services.[1945] In determining this point estimate, we applied our regulatory judgement while having regard to all sources of relevant material. We do not rely solely on empirical evidence and we do not make a specific adjustment to equity beta to correct for any perceived biases in the SLCAPM. We also do not rely on empirical evidence from the Black CAPM, Fama French three factor model (FFM) or SFG's construction of the dividend growth model (DGM) (see appendix A–equity models and appendix B–DGM). We do not consider our use of the SLCAPM as the foundation model will result in a downward biased estimate of the return on equity for a benchmark efficient entity (see section A.3.1 of appendix A–equity models).

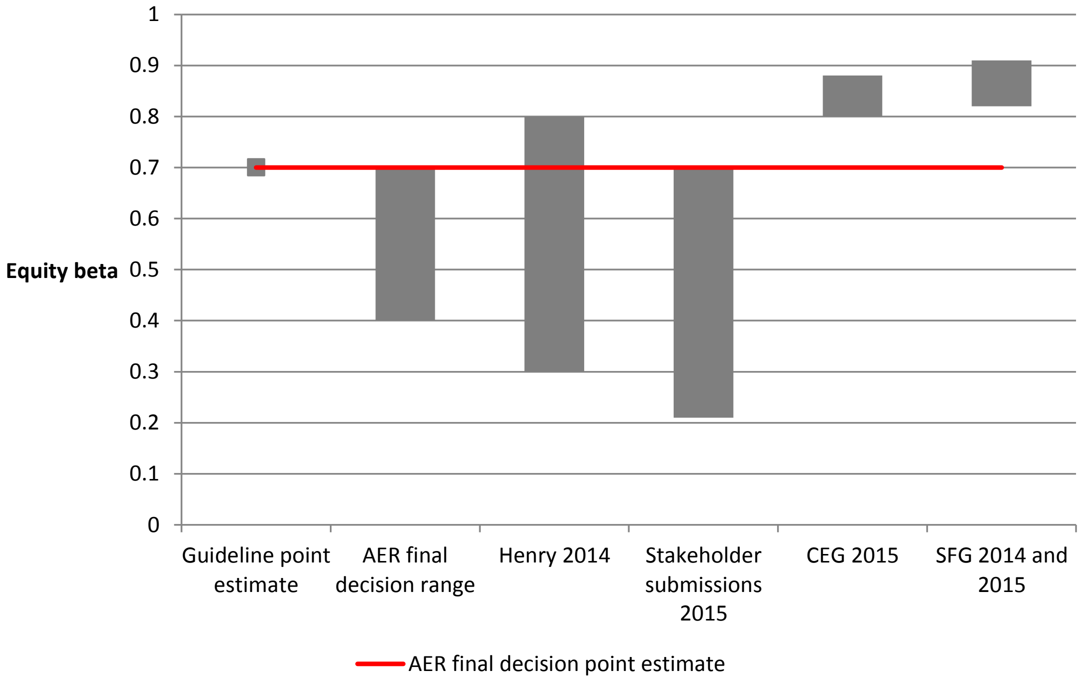
Our equity beta point estimate provides a balanced outcome, given the submissions by stakeholders and services providers. Figure 3-28 shows our point estimate and range in comparison with other reports and submissions. We are satisfied this outcome is likely to contribute to a rate of return estimate that achieves the allowed rate of return objective, and is consistent with the NEO/NGO and revenue and pricing principles (RPP).[1946]

1944 For example, the service providers' consultants submitted that the SLCAPM underestimates the return on equity for stocks with an equity beta below 1.0 (low beta bias) and stocks with a high book-to-market ratio (or value stocks). They also submitted we should give a determinative role to international empirical estimates. See, for example, SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 84–85, 94–95; SFG, *Equity beta*, May 2014, pp. 1–4; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 1–4; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, pp. 18–21; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–34; Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 18–25, 47–54.

1945 This benchmark efficient entity operates in Australia, by our definition. For this reason (and other reasons discussed in section D.2.1 and step two of section 3.4.1), we do not give a determinative role to international empirical estimates of equity beta.

1946 NER, cll. 6A.6.2(c) and 6.5.2(c); NGR, rule 87(2)(3); NEL, sections 7 and 7A; NGL, sections 23 and 24.

Figure 3-28 Submissions on the value of equity beta



Source: AER analysis[1947]

Note: Henry 2014 presents the range specified in Henry's 2014 report (0.3 to 0.8). The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network (or pipeline), and as such it does not include submissions from network (or pipeline) service providers. The lower bound of this range is based on the CCP's submission and the upper bound is based on Origin's submission. The CEG 2015 range is based on adjustments to SFG's regression based estimates for the mining boom. The SFG 2014 and 2015 range lower bound is based on SFG's regression analysis of Australian and US firms (submitted under a multiple model approach for the return on equity) and the upper bound is based on SFG's multiple model based equity beta estimates (under its alternative 'foundation model' approaches for the return on equity).

[1947] Based on our decision and the following reports: AER, *Rate of return guideline*, 17 December 2013, p. 15; Henry, *Estimating β: An update*, April 2014, p. 63; CCP2 (Bruce Mountain), *Submission on the AER's preliminary decisions for the Qld/SA distribution network service providers (2015-20),* 29 July 2015, pp. 10-11; Origin, *Submission to the AER's preliminary decision for the Qld distribution network service providers (2015-20)*, 3 July 2015, p. 12; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 57–58. SFG submitted 0.82 (under multiple model approach for return on equity) in SFG, *Equity beta*, May 2014, p. 41; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 28; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, p. 85; SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 20; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 4. SFG submitted 0.91 (under alternative 'foundation model' approaches for return on equity) in SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, p. 96; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 88; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35.

In its 2015 reports, SFG submitted that our approach is inconsistent with the approach we used to estimate equity beta in the 2009 WACC review. SFG submitted that we selected a point estimate of 0.8 from a range of 0.4 to 0.7 in the 2009 WACC review because of the NEO/NGO and RPP. It considered these reasons apply equally today but are not mentioned in our November 2014 draft decisions, where we selected an equity beta point estimate of 0.7 from the same range.[1948]

We do not agree with SFG's view. During the Guideline process we stated:[1949]

> During both the 2009 WACC review and now we considered the empirical estimates support a range of 0.4 to 0.7. In the 2009 WACC review, we adopted a point estimate of 0.8 (slightly above the range of empirical estimates). In this issues paper, we propose to lower our point estimate from 0.8 to 0.7 because we now have greater confidence in the reliability of the empirical estimates—In 2009, there were fewer empirical estimates available. The data spanned a shorter time period and we were facing uncertainty due to the global financial crisis. Four years on, we now have more studies, spanning a longer time period and a diversity of market conditions. The results from these studies demonstrate a consistent pattern over time.

These reasons applied for the November 2014 draft decisions and continue to apply for this decision. We also note that we did mention the NEO/NGO and RPP in our November draft decisions and April/June 2015 final and preliminary decisions.[1950]

D.5.3 Overall approach to estimating equity beta

We are satisfied that our approach to estimating the equity beta has regard to all sources of relevant material and determines a role for each source based on an assessment of its merits. We are also satisfied that an equity beta of 0.7 for the benchmark efficient entity is reflective of the systematic risk of a benchmark efficient entity is exposed to in providing regulated services.

However, we have received a number of reports from Gray and Hall (previously SFG, now Frontier), CEG and NERA (the consultants) that disagreed with our approach to estimating the equity beta.[1951] We consider the consultants key views on our approach to selecting the equity beta range and point estimate can be summarised as follows:

1948 SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 24–25; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, pp. 19–20.

1949 AER, *Equity beta issues paper*, October 2013, p. 7. We provided similar reasoning in the final Guideline. See: AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 84–85.

1950 See, for example: AER, *Draft decision: ActewAGL distribution determination 2015–16 to 2018–19—Attachment 3: Rate of return*, November 2014, p. 271. The other draft decisions contain similar references to the NEO/NGR and RPP. Also see, for example, AER, *Final decision Jemena Gas Networks (NSW) Ltd access arrangement 2015–20: Attachment 3—Rate of return*, June 2015, p. 457. The other final and preliminary decisions contain similar references to the NEO/NGR and RPP.

1951 SFG, *Equity beta*, May 2014, pp. 25–27; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 92–95; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 66–67, 72, 79, 83–89; CEG, *WACC estimates*, May 2014, pp. 7–20; NERA, *Return on capital of*

- a multi–stage approach pre-emptively dilutes or eliminates the impact of other relevant evidence by:[1952]
    - imposing a binding constraint through our use of Australian empirical estimates to determine the equity beta range
    - inappropriately widening the range implied from international empirical estimates.
- our estimate of equity beta does not sufficiently account for possible biases in the SLCAPM. The service providers' consultants consider there is evidence to suggest the SLCAPM underestimates the return on equity for firms with an equity beta below 1.0 and firms with high book-to-market ratios.

The consultants submitted that their approaches to estimating the return on equity and equity beta address both these considerations. We do not agree with the consultants' submissions. We discussed these submissions in detail in our April/June 2015 final and preliminary decisions, and this material remains relevant.[1953] However, given recent submissions received, we have reviewed the information before us.

On the consultants' first view, we note that our approach to determining the equity beta range and point estimate is designed such that we rely mostly on the evidence from our robust Australian empirical analysis and rely less on evidence we consider to be less useful for our regulatory task (international empirical estimates and theory underlying the Black CAPM). We implement this approach by using our Australian empirical evidence to determine the equity beta range, and restricting the other information to informing the point estimate within the empirical range. By contrast, we consider the approaches applied by the consultants do not give appropriate consideration to the merits of the available information. We also disagree with Gray and Hall's submission that we have inappropriately widened the range implied from international empirical estimates.[1954] We consider raw and re-levered international empirical estimates from reputable sources (see section D.3 for more detail).[1955] We have not artificially widened this range.

a regulated electricity network, May 2014, pp. v–vi, 44, 64, 68–69; CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–34; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 6–9, 25–28, 35; SFG, *The required return on equity for the benchmark efficient entity*, February 2015, p. 19; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 27; SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, 27 March 2015, pp. 8, 13–15, 23; Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 20–25, 47–54; NERA, *The Cost of Equity: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks*, June 2015, pp. 20–22.

[1952] This view has been expressed by Gray and Hall (as SFG and Frontier) in particular.

[1953] See, for example, AER, *Jemena Gas Networks final decision 2015-20: Attachment 3—Rate of return*, June 2015, pp. 459–467.

[1954] Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 53–54.

[1955] For example, we use estimates derived by well-respected advisory firms (PwC); expert consultants commissioned by regulators, energy network firms and other stakeholders (SFG, FTI Consulting, Brattle Group, experts used in AUC report); and academics (Damodaran).

On the consultants' second view, we do not make a specific adjustment to our equity beta point estimate to correct for perceived biases in the SLCAPM. We do not consider our use of the SLCAPM as the foundation model will result in a downward biased estimate of the return on equity for a benchmark efficient entity (see section A.3.1 of appendix A–equity models).[1956] We do consider there are market imperfections that affect the practical application of any model including the SLCAPM. These could lead to a SLCAPM estimate of the required return that differs from the (unobservable) 'true' required return on equity, and this is a relevant factor we have considered. It is important to note that all models with simplifying assumptions will be affected by market imperfections when they are applied in a practical setting. These include the Black CAPM, FFM and SFG's construction of the DGM. We note the following statement from Partington and Satchell:[1957]

> We sympathise with Frontier's (2015, Key) argument that the AER should present some measure of the quality of its cost of equity estimate and provide a quantitative analysis of the adjustments it makes to the CAPM returns. This might be done relatively easily if the estimate involved was just the OLS estimator for a given set of data. However, when a value is chosen from a range of values and the overall process involves both judgement and estimation the exercise becomes very difficult to carry out. With well-defined priors on the part of the AER, perhaps a Bayesian approach could be adopted, but we expect this would just shift the debate to arguments about the priors. There is no straightforward solution to the demands by Frontier (2015, Key). However, the role of judgement by the AER in such exercises seems to us entirely warranted and indeed inescapable.

Under its alternative 'foundation model' approach, Gray and Hall (as SFG) used empirical evidence from the SLCAPM, Black CAPM, Fama French three factor model (FFM) and its own construction of the DGM to estimate the equity beta.[1958] They submitted that in the Guideline we used evidence from the Black CAPM to reverse engineer an equity beta estimate that accounts for 'low beta bias'. Therefore, they suggested we should do the same in accounting for evidence of a value premium (FFM) and contemporaneous evidence from DGMs (SFG's DGM construction).[1959] We consider the equity beta for the benchmark efficient entity in the context of our foundation model, that is the domestic SLCAPM. Therefore, we do not use beta estimates that are implied from the empirical results of other models. We assess other models against the rate of return criteria in step two of our foundation model approach (see section 3.4.1). We consider the theoretical principles underpinning the Black

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[1956] We also do not consider the evidence from the Black CAPM implies that the estimates produces from the SLCAPM are downward biased for low beta stocks (see section). Additionally, we do not consider the service providers have provided us with commonly accepted evidence that a value factor is priced in the return on equity (see section).

[1957] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 22.

[1958] SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 94–96; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 76–78, 83–89.

[1959] CEG also used SFG's DGM construction to form the upper bound of its equity beta range. See: CEG, *WACC estimates*, May 2014, pp. 7, 19–20.

CAPM when estimating equity beta but do not consider its empirical implementation. We only use DGM evidence to inform the range and point estimate of the MRP and do not use the FFM.

SFG's DGM based estimates of equity beta are derived by estimating the relative risk ratio of Australian energy network firms to the market.[1960] It calculates the equity risk premium for all Australian-listed firms using its own DGM construction to generate estimates of the implied MRP. SFG then compares this to equity risk premium estimates for Australian-listed energy network firms and generates a risk premium ratio of 0.94, which it uses as an implied equity beta estimate. We consider there are a number of problems with this approach to estimating beta, and these are discussed in section B.3 of appendix B–DGM.

Additional issues—Use of expert consultants

Several service providers have suggested that we constrained the terms of reference for Henry's 2014 expert advice on equity beta.[1961] We disagree with these submissions.[1962]

Henry has provided us with three reports since 2008. The 2008 report sought his advice in relation to equity beta estimation techniques, as well as estimates of beta for Australian and international energy network firms.[1963]

In 2009, Henry prepared another report that built upon the 2008 advice and presented equity beta estimates for a comparator set of Australian energy network firms. Henry stated, 'This report builds upon the material discussed in the preliminary report on β estimation provided to the ACCC by the Consultant in 2008'.[1964]

The 2014 Henry report was intended to be an update of the 2009 Henry report, which is noted clearly in the title. Henry stated, 'This report builds upon the methods for estimating equity β presented in two previous reports for the Australian Energy Regulator (AER), in 2008 and 2009'.[1965]

This shows that our 2014 advice from Henry is a continuation of a series of advice we have received since 2008. Therefore, it is entirely reasonable for us to specify the terms of reference for the 2014 report to maintain general consistency between the 2009 and 2014 estimates. We based the terms of reference on the results of a process

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[1960] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, pp. 56–57.

[1961] See, for example, AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, pp. 317–318; United Energy, *2016 to 2020 regulatory proposal: Attachment—Return on equity*, April 2015, pp. 68–69; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 214 (Powercor's regulatory proposal on the return on equity appears to be identical in substance to CitiPower's); Jemena Electricity Networks, *2016-20 electricity distribution price review regulatory proposal: Attachment 9-2—Rate of return proposal,* April 2015, p. 60.

[1962] The CCP also disagreed with this view. See CCP3, *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, August 2015, pp. 73–74.

[1963] Henry, *Econometric advice and beta estimation*, November 2008, section 8.

[1964] Henry, *Estimating β*, April 2009, p. 2.

[1965] Henry, *Estimating β: An update*, April 2014, p. 3.

and series of advice that began in 2008, as well as our own expertise in energy network regulation.

E Other information – return on equity

In section 3.4.1 of Attachment 3 to our final decision we noted the other information included in the Guideline or submitted by stakeholders as relevant material. This appendix sets out the other information we considered to inform overall return on equity. This appendix also responds to issues raised by stakeholders about the way to consider other information.

E.1 The Wright approach

We estimate the return on equity under the Wright approach using a range for the long term historical average return on the market. We use a range because the estimated return on the market will vary depending on the time period used.[1966]

Using the full beta range and data up to the 2014 calendar year end, return on equity estimates fall within a range of 5.8 to 9.8 per cent. Using only the beta point estimate from the top of the range, return on equity estimates fall within a range of 7.9 to 9.8 per cent.

We estimate this range using the following parameter estimates:

- a return on the market range of 10.0 to 12.7 per cent, based on historical returns on the market portfolio
- an equity beta range of 0.4 to 0.7, with a point estimate from the top of the range
- a prevailing risk free rate of 2.96 per cent, based on a 20 day averaging period commencing 1 July 2015 (see discussion on the risk free rate under step three).

Table 3-60 sets out our estimates of historical returns on the market portfolio. These historical estimates are calculated on the basis that dividends are valued at 60 per cent of their face value. That is, these use a theta of 0.6 ($\theta = 0.6$).

Table 3-60 Historical returns on the market portfolio when theta equals 0.6 (per cent)

Sampling period	Arithmetic mean (real)	Arithmetic mean (nominal)[(a)]
1883–2014	8.6	11. 3
1937–2014	7.3	10.0
1958–2014	8.9	11.6
1980–2014	9.9	12.7

[1966] AER, *Explanatory statement: Rate of return guideline (appendices)*, December 2013, pp. 26–27.

Sampling period	Arithmetic mean (real)	Arithmetic mean (nominal)[(a)]
1988–2014	9.3	12.0

Source: Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012, p. 6. AER update for 2012–2014 market data.

(a) Assuming an inflation rate of 2.5 per cent. Nominal figures calculated by the AER using the Fisher equation: 1+i=(1+r)×(1+π) where r denotes the real return, i denotes the nominal return and π denotes the inflation rate

SA Power Networks proposed an expected return on the market informed by SFG's estimate of the Wright approach.[1967] We agree with the following aspects of SFG's estimate under the Wright approach:

- Using a prevailing risk free rate averaged, consistent with the risk free rate used in the SLCAPM. However, we have used the averaging period that was agreed upon in advance (see discussion on the risk free rate under step three above).
- Normalising estimates using the Fisher equation and a historical inflation rate of 2.5 per cent.

However, we apply the Wright approach differently to SFG's approach because:

- SFG applied the Wright approach to estimate the return on the market.[1968] Table 3-6 and Table 3-13 set out why we use the Wright approach at the return on equity level. As explained at step four we compare our foundation model equity risk premium to the Wright approach equity risk premium. This provides for consideration of both MRP and equity beta estimates, as the equity risk premium is the product of both estimates.
- To estimate the return on equity under the Wright approach, we apply an equity beta range of 0.4 to 0.7. SFG submitted that we should apply our equity beta point estimate of 0.7 instead of the range of 0.4 to 0.7.[1969] Our equity beta point estimate of 0.7 is the estimate of equity beta that we consider is appropriate to use in our foundation model. The Wright specification of the CAPM is not our foundation model. As stated in step three, Australian empirical studies present equity beta estimates that converge on the range of 0.4 to 0.7, while we consider Henry's 2014 report suggests a best empirical equity beta estimate of approximately 0.5. We selected a point estimate of 0.7 from the range of 0.4 to 0.7 partly on considerations of the theoretical underpinnings of the Black CAPM, which is unrelated to the estimation of the Wright specification of the CAPM. To consider the

[1967] SFG, *The required return on equity for a benchmark efficient entity*, 25 February 2015, pp. 32-33.

[1968] See also: AGN, *2016/17 to 2020/21 Access Arrangement Information: Attachment 10.1 - Rate of Return*, July 2015, pp. 26–27; ActewAGL Gas Distribution, *Appendix 8.02: Return on Equity - detailed proposal*, June 2015, pp. 38–39; Energex, *Revised Regulatory Proposal*, 3 July 2015, pp. 94–95.

[1969] SFG, *The required return on equity for a benchmark efficient entity*, 25 February 2015, pp. 32-33. See also: ActewAGL Gas Distribution, *Appendix 8.02: Return on Equity - detailed proposal*, June 2015, pp. 45–47; Energex, *Revised Regulatory Proposal*, 3 July 2015, pp. 99–100.

evidence from the Wright approach independently from our foundation model, we consider it is important to use the equity beta range of 0.4 to 0.7. To do otherwise would reduce the efficacy of using the Wright approach as a check against the foundation model for the reasons set out above.

- We do not apply NERA's (2013) adjustment to historical returns data.[1970] As a result, SFG proposes a different estimate of historical market returns to us.[1971] We do not consider NERA's (2013) adjustment to early historical data to be robust and sufficiently justified (see appendix B–MRP).
- We use a range under the Wright approach, whereas SFG estimates the return on the market under the Wright approach as a point estimate using the longest time period available.[1972] We estimate a range under the Wright approach from the different averaging periods in Table 3-60. This recognises the estimated return on the market will vary depending on the time period used.[1973] This also recognises that each of these periods has its own merits and limitations (see appendix B–MRP). This is consistent with the Guideline. We do not consider SA Power Networks has explained why it departed from the Guideline by adopting a point estimate.

Applying our estimates, the return on equity falls within a range of 5.8 to 9.8 per cent using the full beta range. Using only the beta point estimate, the return on equity estimates fall within a range of 7.9 to 9.8 per cent.

E.2 Return on debt relative to the return on equity

In step two we considered the comparison between the return on equity and return on debt is relevant material that may inform our estimate of the expected return on equity. We consider that prevailing debt market conditions provide support for the view that:

- our estimated return on equity is not below efficient financing costs[1974]
- SA Power Networks' proposed return on equity is likely to exceed efficient financing costs.

The current debt market is indicating a premium over the risk free rate of about 2.4 per cent.[1975] This compares to our foundation model equity premium over the risk free rate

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[1970] NERA, *The market, size and value premiums*, June 2013.

[1971] SFG, *The required return on equity for a benchmark efficient entity*, 25 February 2015, p. 33.

[1972] SFG, *The required return on equity for a benchmark efficient entity*, 25 February 2015, p. 33.

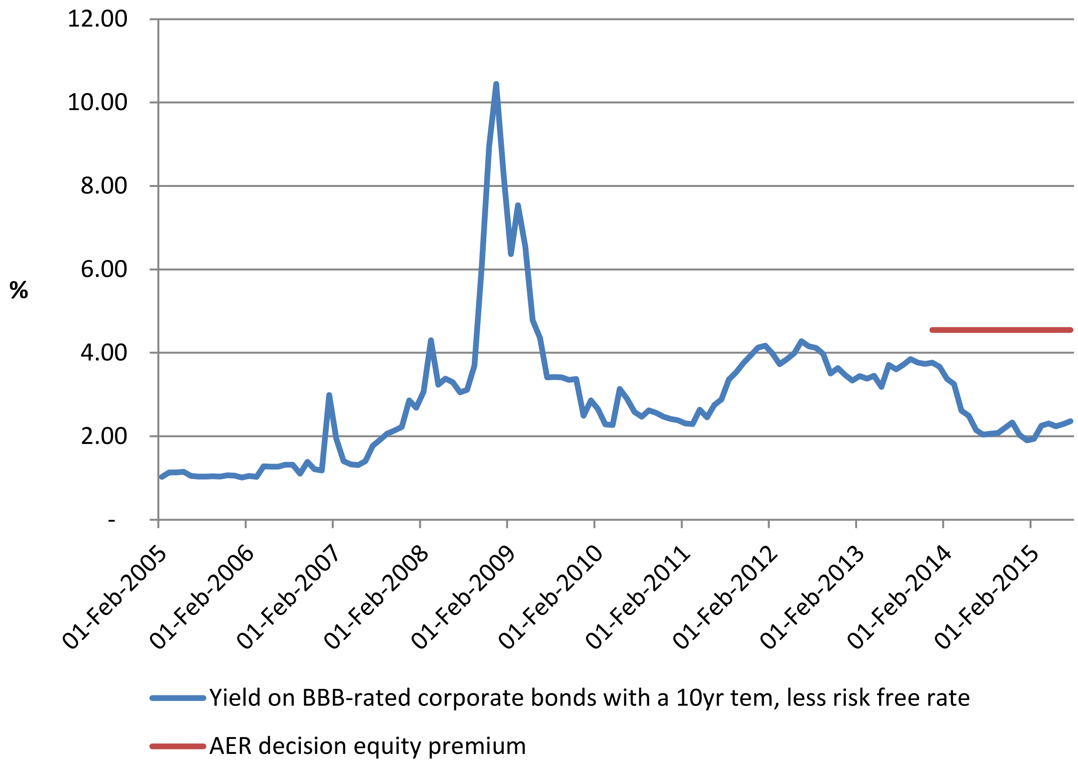
[1973] AER, *Explanatory statement: Rate of return guideline (appendices)*, December 2013, pp. 26–27.

[1974] Efficient financing costs for a benchmark efficient entity with a similar degree of risk as that which applies to the distribution network service provider in respect of the provision of standard control services. See: NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR, r.87(3).

[1975] Based on the RBA's monthly data (statistical table F3) for 31 July 2015 on yield to maturity on BBB-rated corporate bonds with a ten year term, specifically, the spread to CGS. RBA corporate bond data used for comparative purpose only. This is not reflective of our final decision return on debt estimate which is calculated as an average of the RBA and Bloomberg (BVAL) data series and estimated by reference to BBB+ rated corporate bonds. In our final decision we also make an extrapolation adjustment to the RBA data series.

of 4.55 per cent (given a market risk premium of 6.5 per cent and a beta of 0.7). Figure 3-29 shows the current and historical debt risk premium and our foundation model equity risk premium. SA Power Networks proposed an equity risk premium of 7.28 per cent.[1976]

Figure 3-29 Comparison of equity and debt premiums



Source: AER analysis, RBA F3 and F16 interest rates statistics

We do not consider that the current 219 basis points difference between the equity risk premium allowed in our final decision and debt risk premiums[1977] to be too low, on the basis of:

- the low risk nature of a benchmark efficient entity as outlined above
- the current stabilising of debt risk premiums after a recent downward trend
- the gap between the equity risk premium and debt risk premium is likely to be wider than stated above, since it compares a promised, pre-tax return on debt to an expected, post-tax return on equity.[1978]

[1976] Based on a proposed return on equity of 9.83 per cent and a proposed risk free rate of 2.55 per cent (see: SAPN: 9.83, 2.55, SA Power Networks, *Revised Regulatory Proposal 2015-20*, 3 July 2015, p. 331).

[1977] The debt risk premiums to CGS are calculated as the extrapolated effective annual yield to maturity on BBB rated debt with 10 years to maturity less the effective annual yield to maturity on CGS with 10 years to maturity). BBB bond yields have been used instead of BBB+ because the RBA quotes BBB yields to maturity.

In a concurrent determination process, in relation to our review of debt risk premiums relative to equity premiums in our April 2015 decisions, ActewAGL submitted:[1979]

> In relation to more stable market conditions, ActewAGL Distribution does not consider that the AER provides any supporting evidence that 260 basis points is a sufficient margin. Noting that the debt risk premium for a long time has been between 2 and 4 per cent indicates that the ERP of 4.55 per cent is low when compared with the last 8 years. ActewAGL Distribution also considers that the 'flight to safety' in relation to the decreasing CGS values are very likely to have influenced the return on debt

We agree that it is difficult to derive definitive conclusions about equity premiums from data debt premiums, which is one of the reasons why we give this material a directional role (see step 2). It is therefore unclear how ActewAGL reconciles this difficulty in extracting precision from this material with its statement that an equity risk premium of 4.55 per cent is too low. We consider that it is far from clear that a 'flight to safety' has impacted recent risk premiums. As noted by Partington, an alternative and equally plausible view is that low CGS yields may have driven investors to 'search for yield' with the result of decreasing risk premiums.[1980]

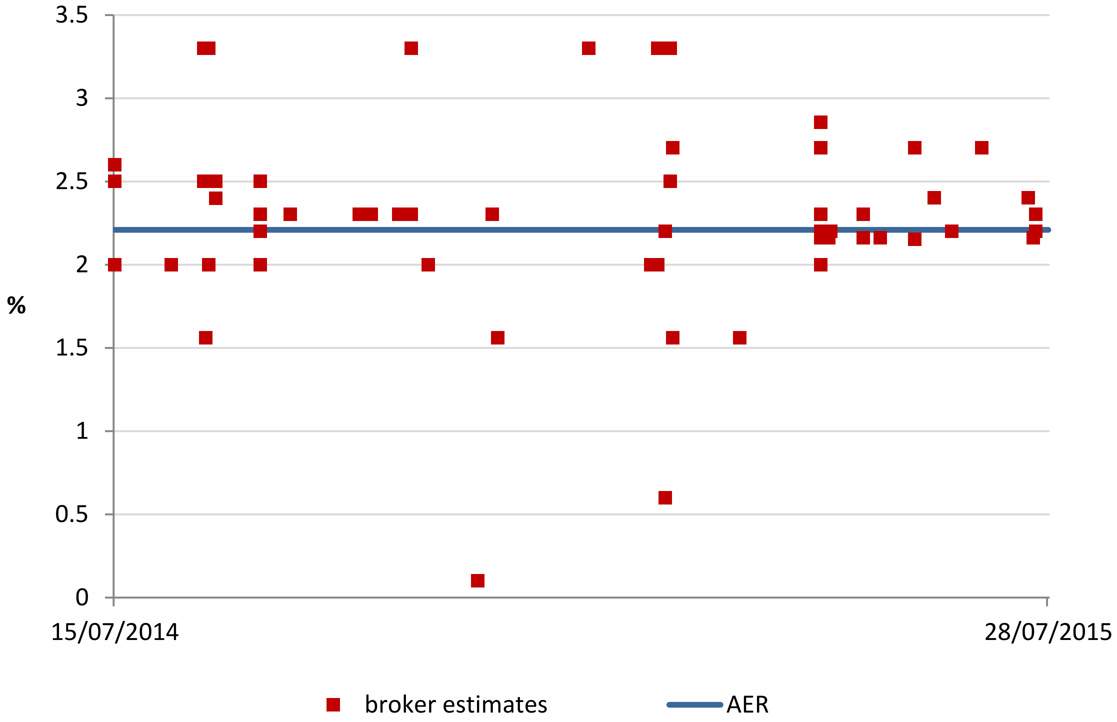
We note that the directional evidence shows that since our Rate of Return Guideline was published (in December 2013) debt risk premiums have declined. We also note that broker estimates of debt and equity risk premiums for comparable listed Australian companies supports our view that the current 219 basis points difference between the equity risk premium allowed in our decision and debt risk premiums is not an insufficient margin.

[1978] We consider that promised returns will always exceed expected returns and pre-tax returns will always exceed corresponding post-tax returns. For further explanation, see McKenzie and Partington, *Report to the AER: The relationship between the cost of debt and the cost of equity*, March 2013, pp. 7, 21; AER, *Final decision: Access arrangement final decision—Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd 2013-17*, March 2013, Part 3, p. 48.

[1979] ActewAGL Gas Distribution, *Appendix 8.02: Return on Equity - detailed proposal*, June 2015, p. 48.

[1980] Partington, Report to the AER: Return on Equity (updated), April 2015, p. 72.

Figure 3-30 Difference between equity and debt premiums in broker reports



E.3 Independent valuation reports

We have focused on independent valuation reports that include a return on equity for companies that provide the closest comparison to a benchmark efficient entity. Table 3-61 outlines the range of return on equity and equity risk premium estimates from relevant independent valuation reports. However, we note that Table 3-61 includes a number of companies that are not substantially comparable to a benchmark entity as they are not similarly subject to our regulatory regime. We have also focused on the equity risk premium rather than the overall return on equity to isolate the business-specific risk premium from movements in the risk free rate.[1981]

The directional evidence from these reports tends to suggest:

- Equity risk premium ranges from 3.3 per cent to 5.4 per cent (without uplifts or adjustment for dividend imputation, 3.7 per cent to 11.7 per cent with uplifts and imputation adjustment).

[1981] Note that the valuation reports show there is a general consensus among valuers on the estimation methods for the risk free rate. Valuers typically estimate the risk free rate as the current yield to maturity on long term (10 year) Australian government securities. Therefore, we do not consider that removing the risk free rate and examining the equity risk premium will bias the results.

- The AER's foundation model equity risk premium of 4.55 per cent (which includes the effect of dividend imputation) is within the range of estimates from valuation reports.
- The three most recent return on equity estimates from valuation reports (Hastings Diversified, DUET Group, and Envestra) explicitly include discretionary uplifts applied by the valuer. As discussed in section E.6 of appendix E–other information, we consider these discretionary uplifts applied by the valuer are likely for a purpose inconsistent with the allowed rate of return objective. We consider these return on equity estimates likely overstate the return on equity that would be comparable to our objective.
- The AER's foundation model equity risk premium sits lower in the imputation adjusted range from valuation reports. However, we note we have concerns that the adjustment for dividend imputation may not be appropriate (as outlined in section E.6 of appendix E–other information). The risk premium appropriately reflecting dividend imputation is likely somewhere between the adjusted and unadjusted premiums, but we are unable to distil a precise estimate due to a lack of transparency in valuation reports.
- The total risk premium above the risk free rate provided by the WACC estimates from the valuation reports ranges from 2.1 per cent to 4.8 per cent. Mid-points of the valuers' estimated total risk premium ranges are shown in Figure 3-31.[1982] Our rate of return for SA Power Networks of 6.17 per cent[1983] provides a total risk premium of about 3.21 per cent.
- The total risk premium from expert reports appears to have increased following the GFC, but also appears to be recently declining towards a level more in line with the total risk premium for this final decision. However, caution should be exercised in drawing inferences from a small number of valuation reports.

We also consider that the number of reports is too low and the concentration of reports among only a few valuers is too high to be able to place significant reliance on the directional evidence from valuation reports.

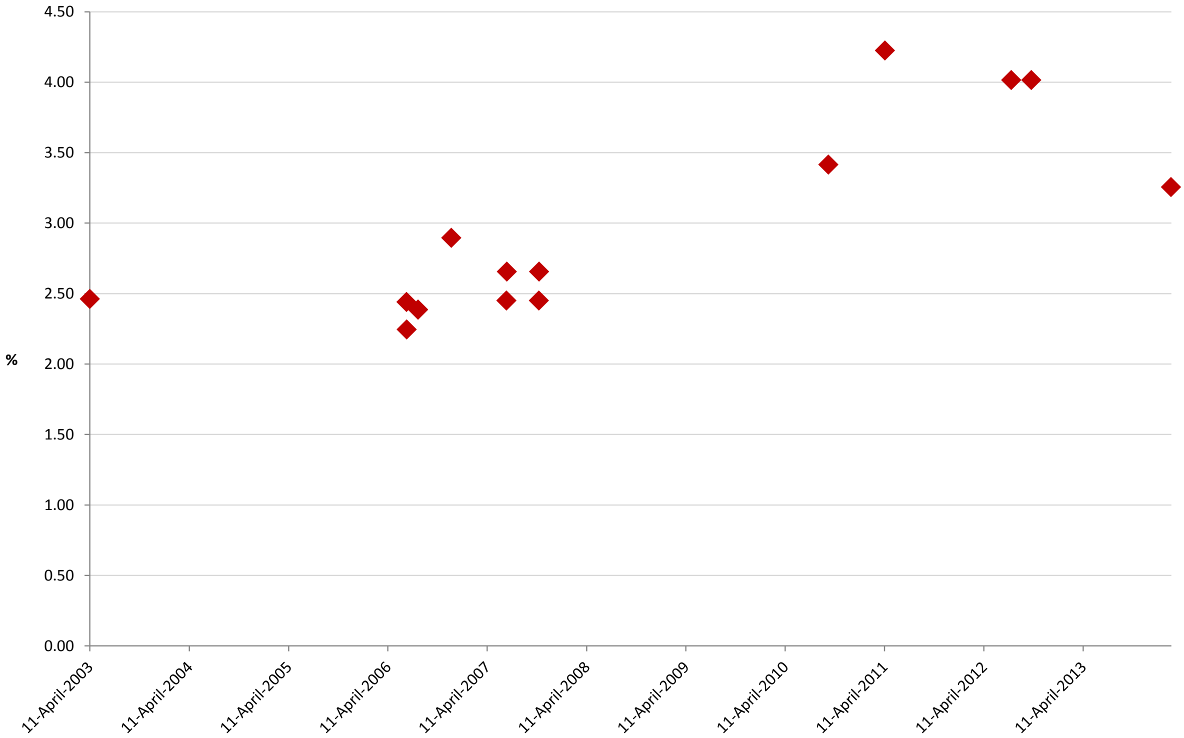
Table 3-61 is based on only 18 independent valuation reports spanning a period going back to 1991.[1984] Only 12 reports included a discounted cash flow analysis with information on a return on equity estimate. These 12 reports were provided by only three independent valuation firms, with 9 of the 12 reports being provided by Grant Samuel & Associates.

[1982] The range of 2.1 to 4.8 extends from the minimum lower bound to the maximum upper bound of the valuers' ranges.

[1983] Based on the return on debt for 2015–16.

[1984] The independent valuation reports were sourced from Thomson Reuters' Connect 4 database. This database contains reports going back to 1991, but contains no reports between 1991 and 1998 for comparable electricity or gas network businesses. A list of the reports included in Table 3-61 of this report can be found in Table 3-20 of AER, *Draft Decision: TransGrid transmission determination*, 2015–16 to 2017–18, Attachment 3–Rate of return, November 2014.

Figure 3-31 Total risk premium from relevant expert reports over time



Source: AER analysis of reports from the Thomson Reuters Connect4 database

Notes: Total risk premium is the WACC less the risk free rate. We have shown the total risk premium based on a nominal vanilla WACC, expert reports using a different WACC form have been adjusted accordingly. We have also shown the vanilla WACC excluding any discretionary uplifts applied by the independent valuer. Grant Samuel's final WACC values for HDF, DUE, and ENV included discretionary uplifts.

Table 3-61 Range of estimates from relevant independent valuation (expert) reports

	Minimum	Maximum
Return on equity (without uplifts, without dividend imputation adjustment)	7.50	11.50
Return on equity (with uplifts, with dividend imputation adjustment)	8.98	14.67
Equity risk premium (without uplifts, without dividend imputation adjustment)	3.30	5.40
Equity risk premium (with uplifts, with dividend imputation adjustment)	3.72	11.67

Source: AER analysis of reports from the Thomson Reuters Connect4 database that are dated between 27 April 2013 and 28 February 2015.

The most (and only) recent report for a regulated energy network business is Grant Samuel's report for Envestra on 4 March 2014 (Grant Samuel). We find that this evidence does not support a move away from our foundation model estimate. We note that:

- Grant Samuel’s initial SLCAPM-based return on equity estimate provides an equity risk premium range of 3.6 to 4.2 per cent (without adjustment for dividend imputation, 4.1 to 4.8 per cent including our estimated adjustment for dividend imputation). Our foundation model estimate of equity risk premium of 4.55 per cent.
- Grant Samuel outlined four separate uplift scenarios that supported its discretionary uplift to its rate of return above the initial SLCAPM-based estimate.[1985] Although we have concerns with the applicability of these uplifts to the allowed rate of return objective, our foundation model premium of 4.55 per cent is above or within the equity risk premium range in three of the four scenarios.[1986]

Grant Samuel's submission in response to our November 2014 draft decisions makes a number of comments, of which two stand out. First, whether we should have used its pre-uplift SLCAPM-based return on equity along with its estimate including discretionary uplifts to set up the ERP range. As explained above and in Appendix A.6, we consider it reasonable to do so and it is not a case of 'cherry picking' by us as alleged by Grant Samuel. Second, whether all of the uplift should be allocated to the return on equity. In the draft decision we noted that Grant Samuel examined four scenarios before applying an uplift, but that the relative weight given by Grant Samuel to each scenario was unclear. One of the scenarios involved an uplifted risk free rate that would affect both return on equity and return on debt. Grant Samuel's valuation report for Envestra Ltd stated: [1987]

> Effective real interest rates are now low. We do not believe this position is sustainable and, in our view, the risk is clearly towards a rise in bond yields…On this basis, an increase in the risk free rate to (say) 5% would increase the calculated WACC range to 6.6-7.2%

When considering the return on equity ranges from Grant Samuel's Envestra report, we considered the range of possibilities from Grant Samuel's uplift scenarios. In its submission, Grant Samuel states "at no stage did we state that we assumed an uplift in risk free rates over time".[1988] We acknowledge that Grant Samuel did not assume that risk free rates would definitely increase, but note that Grant Samuel did consider the risk of this occurring.[1989] Grant Samuel's submission states "to the extent the risk free rate played a role, it was relatively minor".[1990] We note that the precise weight applied to the risk free rate scenario remains unclear. We consider that the approach applied in our November 2014 draft decisions remains open to us on the available evidence.

1985 These being (1) increased risk free rate, (2) increased market risk premium, (3) broker estimates of return on equity, and (4) DGM estimates of return on equity.

1986 Without any adjustment for dividend imputation.

1987 Grant Samuel & Associates Pty Ltd, *Financial Services Guide and Independent Expert's Report to the Independent Board Sub-Committee in relation to the Proposal By APA Group*, 3 March 2014, p. 89.

1988 Grant Samuel & Associates Pty Ltd, *Australian Energy Regulator - Draft Decision*, 12 January 2015, p. 8.

1989 Grant Samuel & Associates Pty Ltd, *Australian Energy Regulator - Draft Decision*, 12 January 2015, p. 6.

1990 Grant Samuel & Associates Pty Ltd, *Australian Energy Regulator - Draft Decision*, 12 January 2015, p. 8.

Even including discretionary uplifts, Grant Samuel's final estimate of Envestra's equity risk premium ranges from 4.3 per cent to 6.2 per cent.[1991] Our foundation model estimate of 4.55 per cent lies within this range. We note that the upper end of the range is likely over-stated, due to our concerns over adjusting for dividend imputation and uncertainty about the extent to which Grant Samuel's uplift to its rate of return should apply to the return on debt or the return on equity.[1992]

Incenta Economic Consulting, in a report recently prepared for TransGrid, reviewed independent valuation reports recently released and submitted that:[1993]

- many independent valuation reports include an uplift to the return on equity above the valuer's initial SLCAPM-based estimate
- uplifts above initial SLCAPM-based estimates are on average higher for low beta businesses.

We note that the ranges for return on equity and equity risk premium estimates contained in Table 3-61 include the final values used in the independent valuation reports and reflect any uplifts applied. However, as noted in the return on equity appendix we have concerns about the applicability of these uplifts to the allowed rate of return objective.[1994] We also have concerns about the small sample size of relevant reports, as stated above. We note that the correction of a small number of errors in Incenta Economic Consulting's initial analysis resulted in material reductions in the average uplift from the sample.[1995] Further, we consider that there is greater benefit in observing comparable businesses than all businesses with low betas.

We consider that material uncertainty persists around the appropriate values. Therefore, it remains appropriate to report both adjusted and unadjusted values. Appendix E discusses further these issues.

Incenta Economic Consulting also submitted that independent valuers tend to estimate a more stable return on the market than the AER (over the sample period), and that this directional evidence should be considered.[1996] Section E.7 of Appendix E

[1991] Where the lower bound does not include any adjustment for dividend imputation and maximises the allocation of uplift to the return on debt, while the upper bound does include an adjustment for dividend imputation and allocates the entire uplift to the return on equity. For clarification, maximising the allocation of uplift to the return on debt assumes that the uplift is entirely in relation to the risk free rate scenario outlined by Grant Samuel. In this case, we have allocated the uplift to the risk free rate, which then increases both the return on equity and the return on debt, but does not allocate the entire uplift on the return on debt.

[1992] Grant Samuel submits that its DGM and risk premium scenarios are the 'primary' reasons for its uplift, indicating that the uplift is primarily to the return on equity [Grant Samuel & Associates, Grant Samuel Response to AER Draft Decision, January 2015, p. 6]. However, we note that the role and materiality of any secondary reasons for an uplift are unclear, and we consider there remains uncertainty about allocating uplift between debt and equity.

[1993] Incenta, *Update of evidence on the required return on equity from independent expert reports*, May 2014, p. 4.

[1994] See Appendix A.6. 'Return on equity estimates from other practitioners' for more detail.

[1995] Incenta Economic Consulting, *Addendum to report titled 'Update on evidence on the required return on equity from independent expert reports'*, 20 August 2014, p. 1.

[1996] Incenta Economic Consulting, *Further update on the required return on equity from independent expert reports*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian discusses this issue further. We examined independent valuation reports dated between 10 April 2013 and 28 February 2015. Overall, the market return estimated as the sum of the risk free rate and the AER's point estimate of the market risk premium is not inconsistent with the market returns estimated in valuation reports.[1997]

E.4 Broker reports

Table 3-62 shows the estimates of return on equity and premium above the risk free rate from recent broker reports.[1998] As explained in step two, we have focused on those reports that include a return on equity for companies with non-diversifiable risks closest to those of a benchmark efficient entity. This sample includes a number of companies that are not substantially comparable to our benchmark entity as they are not similarly subject to our regulatory regime. We have also focused on the equity risk premium rather than the overall return on equity to isolate the business-specific risk premium from movements in the risk free rate.

Table 3-62 Recent broker reports

		Return on equity	Equity risk premium
Broker estimate—no imputation adjustment	Minimum	6.8	3.5
Broker estimate—no imputation adjustment	Maximum	8.7	4.6
Broker estimate—adjusted for imputation	Minimum	7.3	4.1
Broker estimate—adjusted for imputation	Maximum	9.3	5.2

Source: AER analysis of broker reports by Credit Suisse, JP Morgan, Morgan Stanley, and Macquarie Bank that include a valuation for AusNet Services, Spark Infrastructure, APTNT, and/or DUET Group.

The equity risk premium from the AER's foundation model of 4.55 per cent is within the range of premiums recently estimated by brokers. The proposed equity risk premium of SA Power Networks is above the range of premiums recently estimated by brokers.

As explained in step two, we use directional evidence from broker reports to inform our overall return on equity estimate. To observe directional changes in brokers' return on

Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 35.

1997 In particular in comparison to the market return estimates from valuation reports excluding any adjustment for dividend imputation, which we consider to be the more appropriate series for our purposes (see section E.1.).

1998 Table 3-63 shows the most recent report from each broker on each listed company, subject to the report being no older than one year prior to the end of the risk free rate averaging period used in this decision.

equity estimates, we have compared recent broker estimates to those we observed in our April and June 2015 decisions. Our analysis in our April and June 2015 decisions examined broker reports from 1 October 2014 and 6 March 2015.

Directionally, the range of equity risk premium estimates from broker reports has contracted since our review of broker reports in our April and June 2015 decisions,[1999] as shown in Table 3-63.[2000] The return on equity estimates have contracted by a decrease in the upper end of the range, while the equity risk premium estimates have contracted at both ends of the range.

Table 3-63 Broker reports considered in April & June 2015 decisions

		Return on equity	Equity risk premium
Broker estimate—no imputation adjustment	Minimum	6.9	2.6
Broker estimate—no imputation adjustment	Maximum	11.2	5.2
Broker estimate—adjusted for imputation	Minimum	7.3	3.0
Broker estimate—adjusted for imputation	Maximum	12.0	6.0

Source: AER analysis of broker reports by Credit Suisse, JP Morgan, and Macquarie Bank that include a valuation for AusNet Services, Spark Infrastructure, APTNT, and/or DUET Group.

E.5 Other regulators' decisions

Table 3-64 shows the estimates of return on equity and premium above the risk free rate from other regulators' decisions (dated between November 2014 and March 2015) that were examined in our April and June 2015 decisions.[2001] We have focused on the equity risk premium rather than the overall return on equity to isolate the business-specific risk premium from movements in the risk free rate. As explained in step two,

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[1999] See: AER, *Draft decision: TransGrid transmission determination 2015–16 to 2017–18*, Attachment 3 - Rate of Return, November 2014, pp.142–143.

[2000] See: AER, *Final decision: Access arrangement final decision—Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd 2013-17*, March 2013, Part 3, pp. 62–64.

[2001] ERA, *Draft decision on proposed revisions to the access arrangement for the Mid-West and South-West gas distribution system submitted by ATCO Gas Australia Pty Ltd*, 14 October 2014; ACCC, *Attachments to ACCC final decision on State Water pricing application 2014-15–2016-17*, 26 June 2014; Northern Territory Utilities Commission, *2014 Network Price Determination: Final Determination—Part A Statement of Reasons*, 24 April 2014; ESCV, *Price review 2013: Greater metropolitan water businesses—Final decision*, 25 June 2013; IPART, *Hunter Water Corporation's water sewerage stormwater drainage and other services: I July 2013 to 30 June 2017*, 11 June 2013; ESCOSA, *Final determination statement of reasons: State Water's water and sewerage revenues 2013/14–2015/16*, 27 May 2013.

we have put more reliance on those decisions that include a return on equity for business comparable to the benchmark efficient entity. This means that greater reliance is placed on electricity and gas network service providers over other types of regulated businesses.

Table 3-64 Return on equity estimates from other regulators' decisions considered during our April-June 2015 decisions[2002]

Regulator	Decision	Date	Nominal vanilla return on equity	Equity risk premium
ACCC	Draft decision: Telstra's fixed line services	Mar 2015	6.70	4.20
ESCV	Consultation paper on proposed approach to Melbourne Water's 2016 price review	Feb 2015	NA	3.90
QCA	Draft decision: Gladstone Area Water Board price monitoring 2015-20	Feb 2015	6.54	4.16
IPART[a]	Fact sheet: WACC biannual update (Transport)	Feb 2015	10.17–10.30	5.40–7.47
IPART[a]	Fact sheet: WACC biannual update (Water)	Feb 2015	8.51–9.10	4.20–5.81
Tasmanian Economic Regulator	Draft report: 2015 price determination investigation: regulated water and sewerage services in Tasmania	Jan 2015	7.63	3.9
ERA	Revised draft decision: Review of the method for estimating the weighted average cost of capital for the regulated railway networks (Public Transport	Nov 2014	8.05	4.72

2002 Note that the risk characteristics of The Pilbara Infrastructure Pty Ltd (an operator of a rail network that transports iron ore freight) may be significantly different to those of the benchmark efficient entity (for example, due to demand risk). Similar concerns may be expressed about Brookfield Rail and IPART Transport decisions. We also note that the ERA's use of the Wright approach to estimating market risk premium is influenced by its annuity pricing framework. The ERA states: "A key consideration in the context of the rail WACC relates to the purpose. The estimate is required to contribute to the annuity that will deliver the value of the rail infrastructure assets, over their economic life. Given the length of the rail asset economic lives, the estimate is long term." [ERA, *Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railway Networks – Revised Draft Decision*, November 2014, p. 89.] Nevertheless, we have included these decisions for comparative purposes.

Regulator	Decision	Date	Nominal vanilla return on equity	Equity risk premium
	Authority)			
ERA	Revised draft decision: Review of the method for estimating the weighted average cost of capital for the regulated railway networks (Brookfield)	Nov 2014	10.65	7.32
ERA	Revised draft decision: Review of the method for estimating the weighted average cost of capital for the regulated railway networks (The Pilbara Infrastructure)	Nov 2014	15.61	12.28
ESCOSA	SA Water regulatory rate of return 2016–2020: draft report to treasurer	Nov 2014	7.67	4.80

Notes: For comparative purposes, all return on equity estimates have been converted to the post-company tax, pre-personal tax formulation consistent with the AER's foundation model.

[a] Calculated using IPART's supplied WACC model.

The equity risk premium from the AER's foundation model of 4.55 per cent is within the range of premiums recently estimated by other regulators. Directionally, the range of equity risk premium estimates from more recent decisions from other regulators appears consistent with those examined in our April and June 2015 decisions, as shown in Table 3-65.

Table 3-65 Return on equity estimates from recent decisions of other regulators

Regulator	Decision	Date	Nominal vanilla return on equity	Equity risk premium
ERA	ATCO Gas final decision	Jun 2015	7.28	5.32
QCA	Gladstone Area Water Board price monitoring 2015-20	May 2015	6.08	4.16
ESCV	Melbourne Water 2016 price review guidance paper	Apr 2015	NA	3.90
TER	TasWater 2015 price investigation final decision	Apr 2015	7.18	3.90

Regulator	Decision	Date	Nominal vanilla return on equity	Equity risk premium
ESCOSA	SA Water regulatory rate of return 2016-20 - final report	Mar 2015	NA	4.20

Notes: For comparative purposes, all return on equity estimates have been converted to the post-company tax, pre-personal tax formulation consistent with the AER's foundation model.

We now move to evaluating all the information including our foundation model estimate. In one sense, this is a sense check of the foundation model estimate. This provides us confidence that the return on equity estimate we determine will contribute to the achievement of the allowed rate of return objective.

E.6 Return on equity estimates from other practitioners

Our foundation model sets out our preliminary estimate of the return on equity for a benchmark efficient entity with comparable risks to SA Power Networks. Other market participants may, in the course of their operations, also produce return on equity estimates for entities similar to our benchmark entity. Evidence of return on equity estimates from other market participants is available from independent valuation (expert) reports, broker reports, and other regulators' decisions.

In the reasons for final decision section, we considered there are a number of limitations on the use of this material in setting an allowed rate of return for a regulated business, which mean that the use of this material should be carefully considered. The main limitations are:

- broker reports and independent valuation reports have a different objective to the allowed rate of return objective, which may affect the return on equity estimates
- lack of transparency on how the return on equity estimates are derived
- return on equity estimates from other market participants may not be completely independent of our foundation model estimate, it may be misleading to place significant reliance on them as a cross-check
- return on equity estimates from other market participants are generally not directly comparable to our benchmark entity

These limitations are discussed further below.

SA Power Networks proposed using valuation reports to inform estimates of the MRP.[2003] We note that consideration of the MRP estimates from broker and valuation

[2003] SA Power Networks, *Regulatory proposal 2015-20*, October 2014, p. 318.

reports is included in our consideration of the overall return on equity estimates from these reports (since the MRP is one component of the overall return on equity).

Differing objective

Valuers estimate a return on equity and overall rate of return to use as a discount rate to discount forecast cash flows. The discount rate (and return on equity) therefore must be related to the cash flows it is discounting. Notionally, the discount rate should reflect only the non-diversifiable risks faced by the business being valued. However, if the cash flows do not reflect all the diversifiable risks faced by the business being valued, the valuer may account for these risks by adjusting the discount rate.

For example, Grant Thornton in its report for Polymetals Mining stated that it increased its preliminary SLCAPM-based estimate of return on equity to account for:[2004]

> uncertainty associated with the early stage nature of the asset, risk associated with successfully converting mineral resources to ore resources, economic viability of extending the life of the mine, and higher technical and metallurgical recovery risk associated with Mt Boppy project due to pit mining of ore body at a greater depth compared to Marda project.

We consider that the type of risks discussed by Grant Thornton above are not systematic risks and therefore are not consistent with our application of the SLCAPM in the foundation model. The return on equity estimates from valuation reports may then not be valuable evidence in relation to the achievement of the allowed rate of return objective.

In response to our November 2014 draft decisions, Grant Samuel submitted that the use of uplift in their reports is unrelated to business-specific risk.[2005] We note that one of Grant Samuel's uplift scenarios was based on brokers' rate of return estimates.[2006] It is unclear what factors were underpinning the broker estimates relied on by Grant Samuel. In any case, Grant Samuel's submission, or any other submissions received, did not provide any new information about the uplifts applied by other independent valuers. We consider our concerns regarding uplifts by other independent valuers remains valid.

For valuations of regulated businesses, prevailing market expectations may be for the business to achieve cash flows worth well in excess of regulatory allowances. For cash flows from regulated activities, this may be done by outperforming regulatory allowances. The assumption of outperformance in future cash flows may be coupled with the use of a matching discount rate that is not entirely reflective of the true cost of capital.

[2004] Grant Thornton, *Polymetals Mining Ltd: Independent expert report and financial services guide*, 31 May 2013, p. 101.

[2005] Grant Samuel & Associates, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 5.

[2006] Grant Samuel & Associates, *Financial services guide and independent expert report to the independent board sub-committee in relation to the proposal by APA Group*, 3 March 2014, p. 76.

Such expectations are reflected in a valuation greater than 1 times the RAB. Grant Samuel's valuation range in its March 2014 report for Envestra would have resulted in a transaction multiple of between about 1.34 and 1.46 times Envestra's RAB.[2007]

We consider that expectations of outperformance of regulatory benchmarks should be addressed by re-evaluating the level of the benchmarks. This means investigating the best estimates of individual parameters (credit rating, capital structure, equity beta, etc.) after consideration of recent performance by regulated businesses. It is arguably inconsistent with the allowed rate of return objective to determine our best estimates of individual parameters and also expect routine material outperformance of these benchmarks at the overall return on equity level. To the extent that return on equity estimates from broker and valuation reports reflect expectations of regulated cash flows in excess of regulatory allowances, placing significant reliance on these estimates may not provide a return on equity that contributes to the achievement of the allowed rate of return objective.

In addition, to reflect the permanent nature of many transactions, brokers and valuers often need to adopt a perpetuity timeframe when valuing a business and estimating a relevant return on equity. The estimated return on equity must then reflect the expectations of investors over this timeframe. Valuers' and brokers expectations of required rate of return over this timeframe may differ from the expectations embedded in the prevailing market data used to estimate SLCAPM parameters.[2008] Brokers and valuers may apply an uplift to account for these differences since their reports may be relied upon in making a permanent transaction. This is contrasted to determining a regulatory rate of return where the return on equity only applies for the length of the regulatory period (typically five years) and is updated at the start of the subsequent regulatory period.

For example, Deloitte in its report for RHG Ltd stated that it increased its preliminary SLCAPM-based estimate of return on equity because:[2009]

[2007] Grant Samuel valued Envestra at between $4,122.1 million and $4,501.1 million [Grant Samuel & Associates Pty Ltd, *Financial Services Guide and Independent Expert's Report to the Independent Board Sub-committee in relation to the proposal by APA Group*, 3 March 2014, p. 32.]. This valuation includes corporate cost savings in a takeover situation. Adding back these cost savings results in a valuation of $4,027 million to $4,378 million [Grant Samuel, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 6].The combined projected (as at 1 March 2014) nominal RAB of Envestra's Victorian, South Australian, Albury, Wagga Wagga, and Brisbane gas distribution networks is about $3,006.4 million. We note Grant Samuel's submission that Envestra Ltd was in the middle of a substantial mains replacement program at the time of Grant Samuel's independent valuation report that would increase Envestra's RAB multiple over the short to medium term. We also note Grant Samuel's submission that its valuation of Envestra Ltd did not include expectations of outperformance of regulatory allowances. [Grant Samuel, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 6]. We remain uncertain of the practices of other independent valuers. We note that some brokers do anticipate outperformance of regulatory allowances (see section L.3 of Confidential Appendix).

[2008] For example, if a risk free rate estimate is based on yields on Government securities with a 10 year term-to-maturity, the yields may reflect market expectations of the ten year term, rather than perpetuity.

[2009] Deloitte, *RHG Limited: Independent Expert's Report and Financial Services Guide*, 5 November 2013, p. 62.

While the return on Australian Government bonds has declined, we do not consider there is sufficient evidence to suggest that investors have reduced their view of overall required returns. As such, the specific risk premium has been adjusted upwards to reflect this.

An uplift to account for a relatively low prevailing risk free rate is consonant with an expectation for the risk free rate to revert to long-term trend over the relevant timeframe (perpetuity).

In response to our November 2014 draft decisions, Grant Samuel submitted:[2010]

it is our view that the relevant period is always a perpetuity, even in the context of a five year regulatory period. The rate of return over the five year period can only be realised if the capital value is sustained at the end of the period. The sustainability of the capital value at the end of year five is in turn dependent on cash flows beyond year five (i.e. the cash flows in perpetuity).

We note that:

- risks associated with cash flows beyond the regulatory control or access arrangement period are addressed in the determination of capex, opex, and depreciation allowances for the subsequent regulatory control or access arrangement periods
- in estimating an allowed return on equity we must have regard to the prevailing conditions in the market for equity funds.

The limitations set out above do not apply to return on equity estimates from other regulators' decisions.

Transparency

Greater transparency on how the market participant arrived at its return on equity estimate provides greater certainty that the estimate is reflective of well accepted and theoretically sound economic and finance principles. It also provides greater certainty on whether or not the estimate is consistent with the foundation model estimate and the allowed rate of return objective. All else equal, greater reliance should be placed on more transparent estimates and less reliance on less transparent estimates.

Other regulators' decisions are generally well supported with explanatory information. Recent broker reports for listed comparable companies have included only a simple list of the return on equity estimate and underlying SLCAPM parameters with no or limited supporting information. Independent valuation reports vary in the extent to which their estimates are supported with explanatory information. In general, valuation reports tend to provide more supporting information about the estimated rate of return than brokers' estimates, but there are still a number of information gaps.

[2010] Grant Samuel, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 5.

An area of concern for broker and valuation reports is around accounting for dividend imputation.[2011] All of the valuation reports for comparator firms since 1999,[2012] and all the recent broker reports,[2013] appear to use a post-tax weighted average cost of capital with no explicit allowance for dividend imputation. Our return on equity estimate must account for Australia's dividend imputation system,[2014] therefore the return on equity estimates from broker and valuation reports may need to be increased for comparability.

However, we consider there is a lack of information in broker and valuation reports about the evidence and data sources used to arrive at initial estimates of market returns. Therefore, valuation reports contain only limited information on the extent to which their market risk premium estimates already reflect the value of imputation credits. For example, Grant Samuel in its report for Aquilla Resources states that its estimate of market risk premium "makes no explicit allowance for the impact of Australia’s dividend imputation system"[2015] and that "the evidence gathered to date as to the value the market attributes to franking credits is insufficient to rely on for valuation purposes".[2016] Grant Samuel refers to Australian studies of the market risk premium that both include and exclude the impact of dividend imputation.[2017] Grant Samuel does not estimate the proportion of franking credits distributed to shareholders, the value of franking credits distributed, or the value of retained franking credits.[2018]

As noted by Partington, the full set of assumptions should be laid out before appropriate adjustments can be fully understood.[2019] We consider that there is insufficient information to support any precise adjustment for dividend imputation, reducing the comparability of broker and valuation estimates.

2011 See: Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, Report prepared for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon Energy, Energex, Jemena Electricity Networks, Powercor, SA Power Networks, and United Energy, June 2015, pp. 55–58.

2012 See Table 3-20 of AER, *Draft decision: TransGrid transmission determination 2015–16 to 2017–18*, November 2014.

2013 Equity markets research reports by JP Morgan, Macquarie, and Credit Suisse distributed to clients between 15 July 2014 and 30 September 2014.

2014 NER cl.6.5.2(d)(2) , NER cl.6A.6.2(d)(2), NGR r.87(2)(4)(b).

2015 Grant Samuel & Associates Pty Ltd, *Financial services guide and independent expert's report in relation to the takeover offer by Baosteel Resources Australia Pty Ltd and Aurizon Operations Ltd*, appendix 2, 20 June 2014, p. 6.

2016 Grant Samuel & Associates Pty Ltd, *Financial services guide and independent expert's report in relation to the takeover offer by Baosteel Resources Australia Pty Ltd and Aurizon Operations Ltd*, appendix 2, 20 June 2014, p. 15.

2017 Grant Samuel & Associates Pty Ltd, *Financial services guide and independent expert's report in relation to the takeover offer by Baosteel Resources Australia Pty Ltd and Aurizon Operations Ltd*, appendix 2, 20 June 2014, p. 4. Grant Samuel refers to an Officer study that examined data prior to the introduction of the imputation tax system in Australia in 1988.

2018 Grant Samuel & Associates Pty Ltd, *Financial services guide and independent expert's report in relation to the takeover offer by Baosteel Resources Australia Pty Ltd and Aurizon Operations Ltd*, appendix 2, 20 June 2014, p. 15.

2019 McKenzie & Partington, *Report to the AER: Part A Return on Equity*, 1 October 2014, p. 38; Partington, *Report to the AER: Return on Equity (updated)*, April 2015, p. 58.

In response to our November 2014 draft decisions, Grant Samuel submitted:[2020]

> We have always made it clear in our reports that we do not believe that day to day market prices of Australian equities incorporate any particular value for franking credits attached to any future income stream and we have never made any adjustment for dividend imputation (in either the cash flows or the discount rate) in any of our 500 plus public valuation reports.

It is unclear whether the absence of 'any particular value' of imputation credits in market prices implies a belief that investors place no value on franking credits or if the value cannot be reliably determined. However, our concern extends further than Grant Samuel's views on market returns. Rather, our concerns are centred on the manner in which independent valuers consider various third-party MRP estimates and subsequently select a point estimate, potentially with the use of judgment and discretion. Third-party MRP estimates considered in valuation reports can include a mix of views on the value of imputation credits. In this case, it may be difficult to ascertain the relative impact of each third-party MRP estimate on the MRP estimate selected by the independent valuer.

In any case, the extent to which imputation credit value is reflected in other valuers' MRP estimates of valuers other than Grant Samuel remains ambiguous.

Independence

It is not clear that return on equity estimates from broker reports, valuation reports, and other regulators' decisions are completely independent from our own foundation model estimate, given the informative role of the AER guideline and the propensity for consensus among market participants.[2021]

For example, Grant Samuel in its report for DUET Group stated that it came to its beta estimate after:[2022]

> taking into account the ERA's October 2011 gas access arrangement decision for the Dampier Bunbury Pipeline (0.8) and the beta (0.8) adopted by the AER in its determination of the WACC for reset determinations for electricity distribution assets from May 2009 (e.g. in the recent determination for United Energy).

It may be erroneous to treat return on equity estimates from other market participants as entirely separate estimates against which our foundation model estimate can be compared. To give this material a direct role in determining the return on equity range,

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[2020] Grant Samuel, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 5.

[2021] Partington also noted the " there may be significant commonality (herding) in the cost of equity across reports by different firms" [Partington, *Report to the AER: Return on Equity (updated)*, April 2015, p. 65].

[2022] Grant Samuel & Associates Pty Ltd, *DUET Group: Financial Services Guide and Independent Expert's report in relation to a Proposal to Internalise Management*, 3 October 2012, p. 26.

as proposed by TransGrid, could be to effectively double-count the importance provided to the material in a way that is potentially misleading.

SA Power Networks' proposed role for valuation reports

SA Power Networks proposed using independent valuation reports to inform estimates of market risk premium.[2023] In its report prepared for these service providers, SFG states:[2024]

> In our view these reports provide relevant evidence which, if relegated to the final cross-check stage of the estimation process, is unlikely to ever receive any real weight.

We do not agree that use of relevant material to inform the overall return on equity (rather than to inform individual SLCAPM parameters) in and of itself will result in little weight being placed on that material. For example, in considering the role of dividend growth models we note that SFG's dividend growth model provides a return on equity for regulated NSPs in excess of the historical return on the market, which seems implausible. In this case, material on historical market returns has a quite significant consequence when used as a cross-check on the return on equity estimates from dividend growth models as we are unlikely to accept return on equity estimates in excess of expected returns to the market as a whole.

In practice, the reasons why a certain material may be used to inform the overall return on equity may simultaneously be reasons for limiting the reliance placed on that material. For example, some broker reports specify a return on equity estimate but do not specify all the parameters used to derive the return on equity estimate. In this case, the absence of parameter information requires use of the material at the overall return on equity level, but the lack of transparency on the derivation of the estimate may also be cause for caution in using parameter-level information.

As noted above, independent valuation reports often include uplifts to the return on equity or overall rate of return to account for risks not addressed in the cash flow forecasts. These uplifts may be made to the overall return on equity or overall rate of return, making it difficult to distil the final individual parameter estimate. This is acknowledged by SFG:[2025]

> we notes that certain assumptions must be made when seeking to extract an appropriate MRP estimate from an independent expert report (in particular, the extent to which various uplift factors should be incorporated into the MRP estimate).

[2023] SA Power Networks relied on SFG's estimate of MRP: see SFG, *The required return on equity for a benchmark efficient entity*, 25 February 2015, p. 33.

[2024] SFG Consulting, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon, and TasNetworks*, 6 June 2004, p. 72. Similar issues were also raised in: Frontier, *Key issues in estimating the return on equity for the benchmark efficient entity*, June 2015, pp. 55–58, 62.

[2025] SFG Consulting, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon, and TasNetworks*, 6 June 2004, p. 7.

We do not accept SFG's views that it is beneficial to make the assumptions highlighted by SFG when taking MRP estimates from valuation reports given overall return on equity estimates from these reports will be used to inform our overall return on equity estimate. In any case, we note that the MRP estimates from valuation reports accords with the other survey evidence of the MRP (see reasons for final decision section).

E.7 Review of valuation reports by Incenta and NERA

Incenta Economic Consulting (Incenta) analysed return on equity estimates from valuation reports dated between 10 October 2012 and 31 January 2015.[2026] Incenta's report states that:

- the SLCAPM does not appear to fully capture the systematic risk (as considered by independent valuers) of businesses with a low equity beta, such as regulated energy networks;[2027] and
- independent valuers tend to estimate a more stable return on the market than the AER (over the sample period), indicating there is an inverse relationship between the risk free rate and market risk premium.[2028]

These two issues are further discussed in the subsections below.

Incenta's report also states that "the AER omitted [in its November 2014 draft decisions] to discuss in detail the many concerns that independent experts have raised about the shortcomings of the SLCAPM model".[2029] Our November 2014 draft decisions and April-June 2015 decisions noted that there are limitations to the SLCAPM.[2030] We also noted the prevalence of the SLCAPM in recent valuation reports.[2031] In all the reports we examined,[2032] only one did not use the SLCAPM. All

2026 Incenta Economic Consulting, *Further update on the required return on equity from independent expert reports*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015.

2027 Incenta Economic Consulting, Further update on the required return on equity from independent expert reports, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, pp. 31–32.

2028 Incenta Economic Consulting, Further update on the required return on equity from independent expert reports, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 35.

2029 Incenta Economic Consulting, *Further update on the required return on equity from independent expert reports*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 18.

2030 AER, Draft Decision: ActewAGL, Attachment 3, November 2014, pp. 159-167.

2031 AER, Draft decision: ActewAGL, Attachment 3, November 2014, pp. 165, 177.

other reports used the SLCAPM as the initial or primary estimation method. Only five of the reports examined utilised an alternative estimation model (the dividend growth model), and four of these five reports used the alternative model as a cross-check on the primary estimate from the SLCAPM. Ten reports noted the theory size premiums associated with the Fama-French three-factor model, but none took the further step to estimate the Fama-French model. No reports discussed the Black CAPM. We consider that the current evidence from independent valuation reports supports our view that the SLCAPM is the clearly superior model to use as the foundation model.

Evidence of equity premiums and return on the market

Incenta submits that independent valuers tend to increase equity risk premium in the face of material decreases in the risk free rate.[2033] Incenta plots equity risk premium against the risk free rate and states that “it would be incorrect to assume that the total risk premium is independent of the risk free rate, but rather that there is a clear inverse relationship”. [2034] Similarly, NERA submits that independent valuers tend to increase market risk premium in the face of decreases in the risk free rate.[2035]

We note that there is mixed evidence in academic literature of any relationship between risk free rate and equity risk premium.[2036] However, we do not consider that the current available evidence supports the view that there is any clear relationship between the risk free rate and risk premiums. Commenting on Incenta's plot of equity risk premia from valuation reports (Figure 3.2 in Incenta's report), Partington states that "making reliable inference in a sample of 13 observations is extremely difficult", and "the inference in the report is highly speculative at best".[2037]

Figure 3-32 below shows the same style of analysis as that used in Figure 3.2 of Incenta’s report, however we have also added debt risk premiums. For the data shown in Figure 3-32, it is not clear whether any inverse correlation between risk free rate and equity risk premium is actually reflecting a positive correlation between equity risk

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[2032] In the November draft decisions we independent expert reports dated between 27 April 2013 and 31 July 2014 and that contained a discounted cash flow analysis. We have since updated our analysis to include repots dated up to 28 February 2015.

[2033] Incenta Economic Consulting, *Further update on the required return on equity from independent expert reports*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 18.

[2034] Incenta Economic Consulting, *Further update on the required return on equity from independent expert reports*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 19.

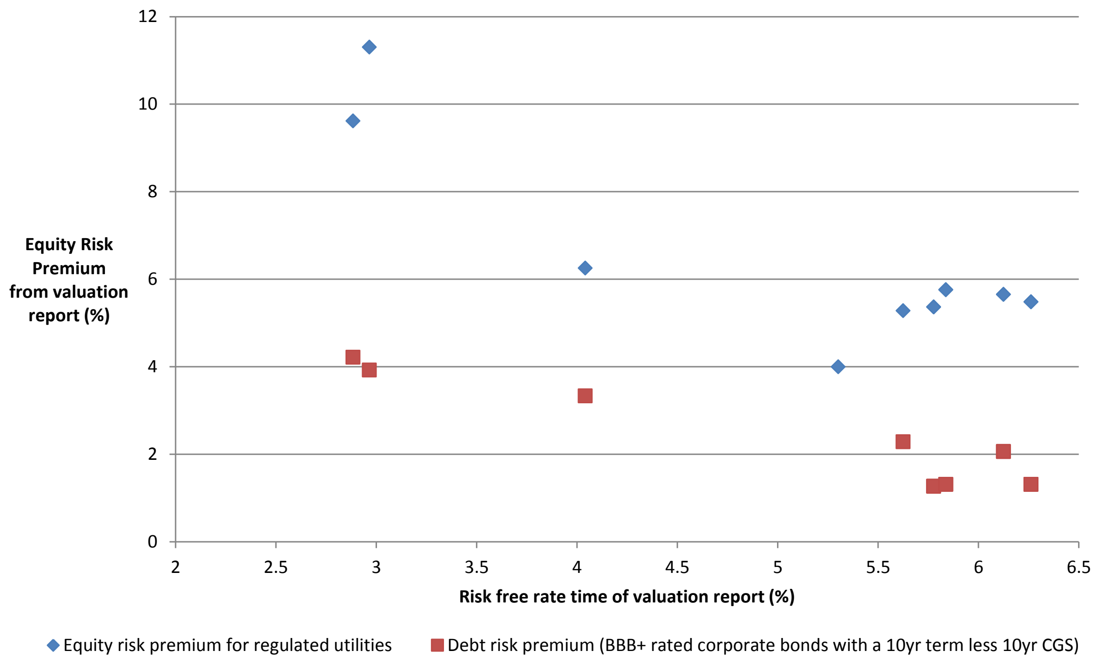
[2035] NERA, *The relationship between the market risk premium and risk free rate: evidence from independent expert reports*, a report for United Energy, April 2015, p. iv.

[2036] See: McKenzie & Partington, *Report to the AER: relationship between the cost of debt and the cost of equity*, 14 March 2013; Partington, *Report to the AER: Return on Equity (updated)*, April 2015, pp. 72–73.

[2037] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 28.

premium and debt risk premium. As discussed in step four, although the risk free rate has recently declined, debt risk premiums have also decreased over the past year.

Figure 3-32 Correlation between equity risk premium and risk free rate



Source: AER analysis of data sourced from the Thomson Reuters Connect 4 database

We also note that the sample size is small and each data point (valuation report) is for a different business. Therefore, differences in the valuer's equity beta estimate could drive differences in equity risk premium rather than movements in the risk free rate. Overall, we consider that there is insufficient data to draw accurate inferences in any direction.

Incenta submits that there is merit in examining directional evidence on the return on the market estimates from valuation reports.[2038] Examining the market return estimated by independent valuers facilitates the inclusion of all valuation reports (not just those reports for relevant businesses) and removes the influence of business-specific equity beta estimates. However, the market return may be less comparable to our foundation model return on equity as we would need to consider the extent to which the benchmark efficient entity is exposed to the systematic risks of the market. Partington also noted the need for caution in drawing time-trend inferences from valuation reports, stating:[2039]

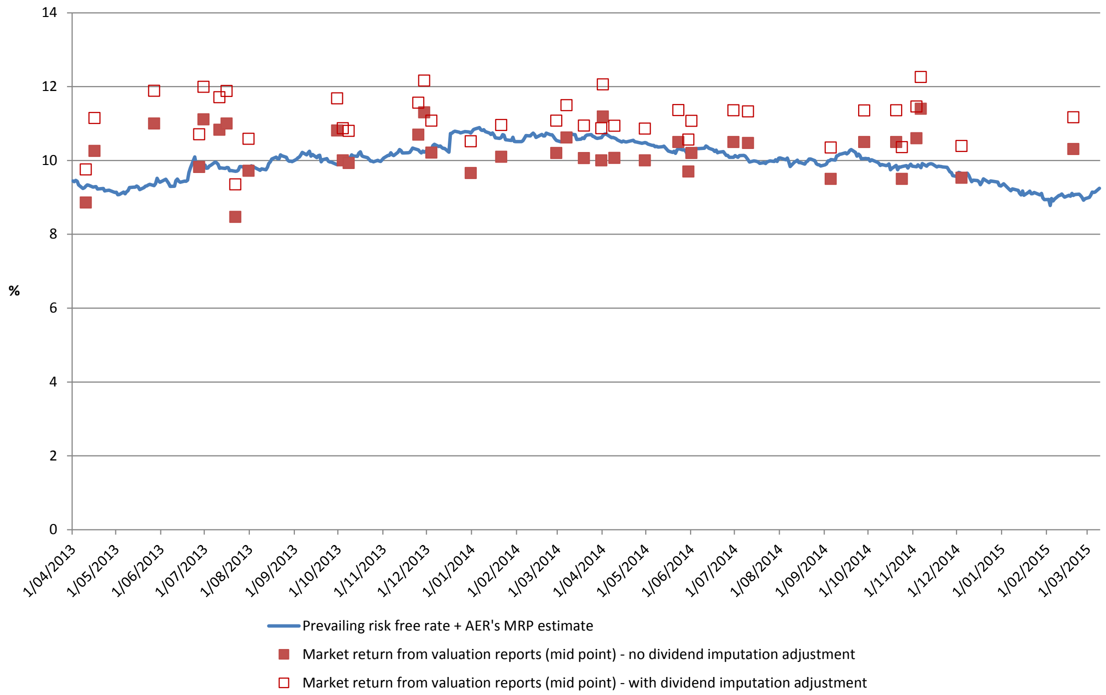
[2038] Incenta Economic Consulting, Further update on the required return on equity from independent expert reports, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 33.

[2039] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 64.

Variation through time, however, needs to be interpreted with caution given our comments about the size of year by year samples below and possible changes in the representativeness of the sample through time.

Figure 3-33 shows the return on the market estimated in valuation reports dated between 10 April 2013 and 28 February 2015.[2040] Overall, Figure 3-33 shows that the market return estimated by the SLCAPM using the AER's point estimate of the market risk premium is not inconsistent with the market returns estimated in valuation reports.[2041]

Figure 3-33 Market return from valuation reports



Source: AER analysis of data sourced from the Thomson Reuters Connect 4 database

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2040 Any uplifts (above the initial SLCAPM estimate) applied by the valuer to the return on equity or overall return on capital are not included in the market return. See section E.1. for a discussion on our preferred treatment of such uplifts. Of the 48 return on equity estimates in valuation reports between 10 April 2013 and 28 February 2015, 25 estimates included an uplift above the SLCAPM-based estimate. We consider only one of these uplifts to be expressly related to a low risk free rate—Deloitte's report for RGH Ltd on 5/11/2013, in which Deloitte stated "While the return on Australian Government bonds has declined, we do not consider there is sufficient evidence to suggest that investors have reduced their view of overall required returns. As such, the specific risk premium has been adjusted upwards to reflect this" [Deloitte, *Independent Expert's Report and Financial Services Guide* , 5 November 2013, p. 62].

2041 In particular in comparison to the market return estimates from valuation reports excluding any adjustment for dividend imputation, which we consider to be the more appropriate series for our purposes (see section E.1.).

NERA's analysis included regressing estimates of market risk premium from valuation reports against risk free rate estimates. NERA submits that this analysis shows that valuers tend to estimate higher values of market risk premium when the risk free rate is low.[2042]

NERA states:[2043]

> …expert reports have in the recent past chosen values for the risk free rate that lie above prevailing rates so as to lift the WACC that they compute. Consequently, in computing an estimate of the MRP that experts actually employ it is important to first determine what cost of equity they would use for the average firm, that is, for the market. To determine what cost of equity an expert would use for the market, we add the risk free rate that the expert uses to his or her choice of an MRP. We determine the MRP that an expert would use by subtracting from this cost of equity the yield on a 10-year Commonwealth Government Security (CGS).

It is not clear why NERA considers a valuer's estimate of market risk premium should be used to determine the valuer's estimated return on the market but should not be used to determine the valuer's estimated market risk premium. NERA instead prefers to use a measure of market risk premium defined as the valuer's estimated return on the market less the yield on Commonwealth government securities, presumably to re-inforce the point that some recent risk free rate estimates by valuers have differed from these yields, as shown in Figure 4.1 of NERA's report.[2044]

We acknowledge that a number of valuation reports have used a risk free rate estimate in excess of the yield on Commonwealth government securities and that, by implication, those valuation reports include a higher estimated market return.[2045] However, we do not consider that, on the whole, there is sufficient evidence that valuation reports support either:

- use of a risk free rate in excess of the prevailing yield on Commonwealth government securities; or
- an increased market risk premium when the yield on Commonwealth government securities is relatively low (that is, an negative relationship between market risk premium and yields on Commonwealth government securities).

This is because:

[2042] NERA, *The relationship between the market risk premium and risk free rate: evidence from independent expert reports*, a report for United Energy, April 2015, p. iv.

[2043] NERA, *The relationship between the market risk premium and risk free rate: evidence from independent expert reports*, a report for United Energy, April 2015, p. iii.

[2044] NERA, *The relationship between the market risk premium and risk free rate: evidence from independent expert reports*, a report for United Energy, April 2015, p. 20.

[2045] Than would otherwise be estimated if the yield on Commonwealth government securities was used as the risk free rate (all other factors equal).

- It is not clear that valuation reports using risk free rate estimates that exceed yields on Commonwealth government securities is a widespread and persistent practice. As shown in Figure 4.1 of NERA's report,[2046] valuer's estimates of the risk free rate have in general been in-line with the yield on Commonwealth government securities up until about late 2011. After this time, while a number of valuation reports used risk free rate estimates materially different from Commonwealth government security yields, a considerable number of valuation reports used risk free rate estimates commensurate with these yields. As noted by Partington & Satchell:[2047]

> Some of the experts clearly have a view that the risk free rate is substantially above the CGS rate, but on the basis of evidence it cannot be said that this is a consensus view.

- Even for those reports that used risk free rate estimates in excess of Commonwealth government security yields, it is not clear that increases in risk free rate estimates reflect factors relevant to the benchmark efficient entity. We noted in section E.6 the possibility that valuers increase risk free rate estimates to reflect differences in the investment horizon relevant to the valuation report and the term of the Commonwealth government security used to proxy the risk free rate. A recent valuation report from KPMG highlights this issue:[2048]

> In Australia, the spot yield to maturity of 10 year Government Bonds has traditionally been accepted as a proxy for the risk free rate in determining a cost of equity under the CAPM. Further, the market in 10 year Government Bonds is liquid such that, in our view, the current yield on Government Bonds represents the best indicator of the risk free opportunity cost of the assets for the forthcoming 10 year period at any particular point in time. In our view, it is appropriate to take into account both the current yield on 10 year Australian Government Bonds, as well as the longer term expected yield in order to calculate a blended risk free rate over a time horizon appropriate to the underlying business operations of Prima. In this regard, we note that long term estimates of the yield on 10 year Australian Government Bonds approximated 5.5%. Adopting the spot yield of 2.64% for a period of 10 years, followed by 5.5% from year 11 onwards results in a blended risk free rate estimate of 4.3%.

- The one-off nature of valuation reports requires valuers to consider the factors outlined by KPMG above. However, we frequently reset the allowed rate of return (typically every five years) allowing it to be updated for expected returns beyond the ten year expectations reflected in prevailing yields on Commonwealth government securities.

[2046] NERA, *The relationship between the market risk premium and risk free rate: evidence from independent expert reports*, a report for United Energy, April 2015, p. 20.

[2047] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 38.

[2048] KPMG, *Independent Expert Report for Prima Biomed*, 22 June 2015, p. 60.

- We consider, in the first instance, that a valuer's estimate of market risk premium is the valuer's best estimate of the market risk premium. It is not clear that a difference between the valuer's risk free rate estimate and prevailing yields on Commonwealth government securities reflects an uplift to market risk premium, given the points outlined above and given that the valuer had the opportunity to directly increase its market risk premium estimate. Partington & Satchell note that it the difference between the valuer's risk free rate estimate and prevailing yields on Commonwealth government securities that drives the results of NERA's regressions.[2049]
- It is not clear that uplifts separately applied to an initial return on equity or rate of return estimate (in contrast to an increased risk free rate estimate) should be attributed to the market risk premium or market return. In Table 4.2 of its report,[2050] NERA lists the uplifts found in its sample period that it considers are attributable to market-wide factors (rather than firm-specific factors). We note that nine out of the ten uplifts in Table 4.2 are from a single valuer. It is not clear the extent to which these nine uplifts reflect an uplift to the risk free rate ('low interest rates') or market risk premium. As noted above, it is not clear that uplifts to the risk free rate reflect efficient financing costs for a benchmark efficient entity.[2051]

Evidence of return for low beta companies

Incenta examines nine valuation reports by one valuer, Grant Samuel, and concludes that there is evidence that valuers uplift their return on equity estimates (above an initial SLCAPM-based estimate) to a larger extent for businesses with a relatively low equity beta.[2052] We do not consider this evidence to be persuasive, for the following reasons:

- We consider that there is not enough data in Incenta's analysis for accurate inferences to be drawn.
- The results shown in Figure 4.2 of Incenta's report appear highly sensitive to one data point (AIF).
- Analysis of only one valuer creates elevated risk of bias, although we note (as mentioned by Incenta[2053]) that Grant Samuel is well-respected within the industry.

[2049] Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 36.

[2050] NERA, *The relationship between the market risk premium and risk free rate: evidence from independent expert reports*, a report for United Energy, April 2015, p. 22.

[2051] See also: Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 53–55.

[2052] Incenta Economic Consulting, Further update on the required return on equity from independent expert reports, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 31.

[2053] Incenta Economic Consulting, Further update on the required return on equity from independent expert reports, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian

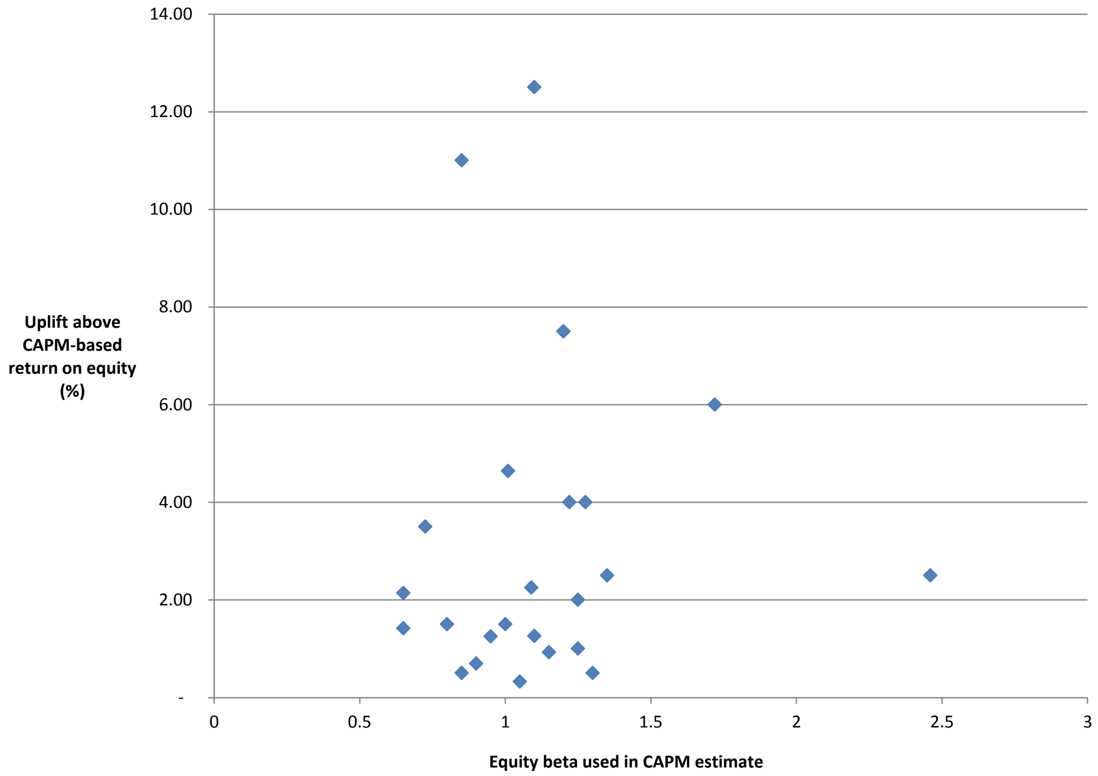
- There were 24 valuation reports[2054] dated between 10 April 2013 and 28 February 2015 that included an uplift above the initial SLCAPM-based return on equity estimate (including 6 reports by Grant Samuel that were analysed by Incenta).
    - None of these reports explicitly mentioned low-beta bias or the Black CAPM as a reason for an uplift.[2055]
    - There does not appear to be a strong correlation (in any direction) between the uplifts in these reports and the size of the equity beta estimate, as shown in Figure 3-34.

Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 18.

[2054] Grant Thornton for Polymetals Mining on 31/5/2013, Grant Thornton for Australian Power & Gas Company on 13/8/2013, RSM Bird Cameron for Ascot Resources on 17/9/2013, Grant Samuel for Clough Ltd on 11/10/2013, BDO for Australian Wealth Investments on 14/10/2013, Deloitte for RHG Ltd on 5/11/2013, Leadenhall for Spencer Resources on 13/11/2013, RSM Bird Cameron for Xceed Resources on 14/11/2013, Deloitte for Greencross Ltd on 11/12/2013, Leadenhall for FRR Corporation on 17/12/2013, Grant Samuel for CFS Retail Property Trust Group on 7/2/2014, Grant Samuel for Envestra Ltd on 4/3/2014, PKF Lawler for Savcor Group on 26/3/2014, Value Advisor Associates for TriAusMin Ltd on 9/4/2014, Grant Samuel for Westfield Group on 11/4/2014, Deloitte for Nexus Energy on 5/5/2014, Grant Samuel for David Jones Ltd on 22/5/2014, Grant Thornton for Mungana Goldmines on 23/5/2014, Grant Samuel for Aquila Resources on 20/6/2014, Titan Partners for Armidale Investment Corporation on 2/9/2014, William Buck for MDS Financial Group on 17/10/2014, KPMG for Arena REIT on 3/11/2014, KPMG for Empire Oil & Gas on 3/11/2014, Grant Thornton for Macquarie Radio Network on 19/2/2014.

[2055] This is despite 8 of the 24 reports mentioning the size premium from the Fama-French three-factor model as a reason for an uplift.

Figure 3-34 Correlation between valuer's uplift and equity beta



Source: AER analysis of data sourced from the Thomson Reuters Connect 4 database

Frontier Economics submitted that broker reports tend to estimate a higher risk free rate than the prevailing yield on Australian government securities with a 10-year term to maturity, with the result that broker reports do not use a mechanistic application of the SLCAPM .[2056] In a concurrent determination process, Energex referred to Frontier and submitted that broker reports apply a version of the Black CAPM in practice.[2057]

In general, while most broker reports clearly use a CAPM framework, few provide detailed information on the extent to which the CAPM is mechanistically applied or whether discretionary adjustments are used. However, we note that:

- None of the broker reports we examined made reference to the Black CAPM.[2058]

2056 Frontier Economics, *Key issues in estimating the return on equity for the benchmark efficient entity*, Report prepared for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon Energy, Energex, Jemena Electricity Networks, Powercor, SA Power Networks, and United Energy, June 2015, p. 58.

2057 Energex, *Revised Regulatory Proposal*, 3 July 2015, p. 100.

2058 We examined broker reports from Credit Suisse, Deutsche, Goldman Sachs, JP Morgan, Macquarie, and Morgan Stanley dated between and 31 July 2015.

- We are aware of at least one broker that has recently stated that it estimates the risk free rate to be the yield on government bonds with a 10-year term to maturity.[2059]
- We are aware of at least one broker that has recently updated its risk free rate estimate, stating that it had previously used a static valuation methodology resulting in a static risk free rate estimate that diverges from the yield on government bonds as that yield moves over time.[2060] Therefore, the difference between the broker's risk free rate estimate and the yield on government bonds did not necessarily reflect a zero-beta premium or uplift to account for the Black CAPM or low-beta bias.

[2059] And which was calculated using a 12-month averaging period. See section L.2 of our confidential appendix for a complete reference to the relevant broker reports.

[2060] See section L.2 of our confidential appendix for a complete reference to the relevant broker reports.

F Return on equity material

Clauses 6.5.2(e) (distribution) and 6A.6.2(e) (transmission) of the National Electricity Rules and clause 87(5) of the National Gas Rules require us to have regard to relevant estimation methods, financial models, market data and other evidence. We had regard to all of the material submitted to us, however, all are not of equal value and therefore not equally relevant. Table 3-66 lists the information (and classes of information) we had regard to in estimating the expected return on equity including the information that we did not rely on.

Table 3-66 Information and their role in estimating the return on equity

Material (step one)	Role (step 2)
Equity models	
Standard (forward looking) Sharpe-Lintner CAPM	Foundation model
Wright CAPM specification	(a) No role in directly estimating the return on equity for regulated infrastructure businesses (b) Limited directional role in to inform movements in overall return on equity
Historical input based CAPM specification	No role
Black CAPM	(a) No role in estimating equity beta or directly estimating the return on equity for regulated infrastructure businesses; (b) Limited role informing the equity beta point estimate
Fama French Model	No Role
Dividend Growth Model	(a) No role in estimating equity beta or directly estimating the return on equity for regulated infrastructure businesses (b) Limited role informing the MRP point estimate
Risk free rate	
Yields on 10 year Commonwealth government securities	Used as the proxy for the risk free rate.
MRP	
Historical excess returns	Given the most reliance in informing the MRP
Dividend growth models (AER's construction)	Given the second most reliance in informing the MRP
Survey evidence	Given some reliance in informing the MRP (point in time estimate)
Conditioning variables (dividend yields, credit spreads, implied volatility)	Given some reliance in informing the MRP (directional information only)
Other Australian regulators' MRP estimates	Cross check on how we consider information for informing the MRP
Dividend growth models (SFG's construction)	Does not inform our MRP estimate

Material (step one)	Role (step 2)
Imputation credit adjustment (AER, Brailsford et al)	Adjust the MRP estimate under the DGM and historical excess returns
Imputation credit adjustment (SFG, Officer)	Does not inform our MRP estimate
Equity beta	
Conceptual analysis	Cross check of Australian empirical estimates
Australian empirical estimates	Primary determinant of equity beta range, with significant weight in determining the point estimate
International empirical estimates	Inform equity beta point estimate
Evidence from the Black CAPM ((a) empirical evidence; (b) theoretical principles)	(a) No role in estimating equity beta; (b) Inform equity beta point estimate
Empirical evidence from dividend growth models (SFG's construction)	No role in estimating equity beta
Empirical evidence from the Fama–French three factor model	No role in estimating equity beta
Other information	
Wright approach	Directional role to inform movements in overall return on equity
Return on debt relative to the return on equity	Directional role to inform movements in overall return on equity
Return on equity estimates from valuation reports, broker reports, and other regulators' decisions	Directional role to inform movements in overall return on equity
Realised returns from asset sales and financial statements	No role

Source: AER analysis.

Material submitted

In determining our return on equity estimate for the benchmark efficient entity we have reviewed the material submitted by service providers and other stakeholders.[2061] While this decision is for SA Power Networks, we have also considered material that was submitted by other service providers whose regulatory and revised regulatory proposals are currently under consideration by us.[2062]

2061 Whilst this attachment includes a comprehensive list of the material reviewed by us, there could be material that may have been inadvertently omitted. The AER website also lists all of the material according to the stage at which these were provided, by whom and in which determination process

2062 The service providers are: SA Power Networks, Energex, Ergon Energy, United Energy, Jemena Electricity Networks, AusNet Services, CitiPower, Powercor, ActewAGL Gas Distribution, Australian Gas Networks, and APTNT (Amadeus Gas Pipeline).

Expert reports submitted by service providers

- The following is a list of reports commissioned by the service providers:[2063]
- SFG Consulting:
    - *The required return on equity: Initial review of AER draft decisions: Note for ActewAGL, Ausgrid, Essential Energy and Endeavour Energy*, 19 January 2015;
    - *The required return on equity for the benchmark efficient entity, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015.
    - *The required return on equity for the benchmark efficient entity, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 25 February 2015.
    - *The required return on equity for the benchmark efficient entity, A report for Ausgrid, Endeavour Energy and Essential Energy,* 12 March 2015.
    - *Using the Fama-French model to estimate the required return on equity, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015.
    - *Beta and the Black Capital Asset Pricing Model, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13 February 2015.
    - *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, AusNet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 18 February 2015
    - *Estimating the required return on equity, Report for Energex*, 28 August 2014
    - *Updated estimate of the required return on equity, Draft report for Ergon,* 14 August.

[2063] Although a substantive amount of these reports were submitted to us in the past, most of them have been resubmitted as part of review process for the October and November 2015 decisions.

- *Updated estimate of the required return on equity, Report for SAPN,* 8 September 2014.
- *Updated estimate of the required return on equity, Report for SAPN,* 19 May 2015.
- *The required return on equity: Initial review of AER draft decisions, Report for Energex,* 30 January 2015.
- *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity, Report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy,* 27 March 2015.
- *Cost of equity: Update report for Jemena Gas Networks' averaging period—19 January to 16 February 2015: Report for Jemena Gas Networks*, 27 March 2015.
- *Alternative versions of the dividend discount model and the implied cost of equity, Report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, Transend and TransGrid,* 15 May 2015.
- *Cost of equity in the Black Capital Asset Pricing Model, Report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks,* 22 May 2014.
- *The Fama-French model, Report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA Power Networks*, 13 May 2014.
- *The required return on equity for regulated gas and electricity network businesses, Report for Jemena Gas Networks, ActewAGL Distribution, Ergon and Transend*, 27 May 2014.
- *Equity beta, Report for Jemena Gas Networks, ActewAGL and Networks NSW,* 12 May 2014.

- NERA Economic Consulting:
  - *Historical estimates of the market risk premium, A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, February 2015.
  - *Empirical Performance of Sharpe-Lintner and Black CAPMs, A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, CitiPower, Energex, Powercor, SA Power Networks, and United Energy*, February 2015.
  - *Memo: Revised estimates of the Market Risk Premium*, 14 November 2014.
  - *Review of the Literature in Support of the Sharpe-Lintner CAPM, the Black CAPM and the Fama-French Three-Factor Model, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas

Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy, March 2015.

 - *Further Assessment of the Historical MRP: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors A report for ActewAGL Distribution, AGN, APA, AusNet Services, CitiPower, Energex, Ergon Energy, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy,* June 2015.
 - *The Cost of Equity: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors A report for ActewAGL Distribution, AGN, APA, AusNet Services, CitiPower, Energex, Ergon Energy, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy,* June 2015.

- Houston Kemp:
  - *Economic review of ERA's Draft Decision, A report for Johnson Winter and Slatery*, 27 November 2014.
  - *AER Preliminary for Energex – Contribution to NEO and NEO preferable decision,* July 2015.
  - *Implications for Jemena Gas Networks (NSW) of Increasing Competition in the Consumer Energy Market, A report for Jemena Gas Networks,* 27 February 2015.
- Incenta, *Further update on the required return on equity from Independent expert reports,* February 2015.
- Frontier Economics:
  - *An updated estimate of the required return on equity for the benchmark efficient entity, Report prepared for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon, Energex, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy,* June 2015.
  - *An updated estimate of the required return on equity*, June 2015 (Ergon).
  - *An updated estimate of the required return on equity*, June 2015 (Energex).
  - *An updated estimate of the required return on equity,* June 2015 (Australian Gas Networks).
  - *Review of the AER's conceptual analysis for equity beta, A report for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon, Energex, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy,* June 2015.
  - *Key issues in estimating the return on equity for the benchmark efficient entity, A report for ActewAGL Distribution, AGN, AusNet Services, CitiPower, Ergon, Energex, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy,* June 2015.
  - *Cost of equity estimates over time (Ergon),* June 2015.

- Synergies Economic Consulting, *Response to Issues Raised by the Consumer Challenge Panel (Report for Ergon Energy),* September 2014.
- Grant Samuel, *Response to AER draft decisions*, January 2015
- *Grant Samuel, Letter to the Directors of TransGrid,* 12 January 2015.
- CEG, *Estimating the cost of equity, equity beta and MRP,* January 2015
- Prof Bruce Grundy, *Letter from Bruce Grundy to Justin De Lorenzo – 9 January 2015,* January 2015
- David Newberry, *CEPA: Expert report,* January 2015
- Herbert Smith Freehills, *AER draft decision – return on equity,* 13 March 2015
- *CEG, Measuring expected inflation for the PRTM,* June 2015.

The following reports were also submitted:

- Economic Science Prize Committee of the Royal Swedish Academy of Sciences, *Scientific background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013*.
- Matt Rogers, *Energy = Innovation: ten disruptive technologies, McKinsey on Sustainability & Resource Productivity*.
- Ryan Kerin, *A dimmer light: the changing regulatory environment causes revenue to decline*.
- IBISWorld, *Industry Report D2630 Electricity Distribution in Australia*, December 2014.
- Citi Group, *Energy Darwinism, The evolution of the energy industry*, October 2013.
- Rocky Mountain Institute, *The Economics of Grid Defection, When and where distributed solar generation plus storage competes with traditional utility service.*
- UBS, *Global Utilities, Autos & Chemicals: Will solar, batteries and electric cars re-shape the electricity system*?

Submissions from the Consumer Challenge Panel

The Consumer Challenge Panel provided the following submissions:

- CCP Sub-Panel–Bruce Mountain, *Energex, Ergon and SAPN revenue controls*, January 2015
- CCP Sub-Panel–Hugh Grant, *AER draft TransGrid determination and TransGrid's revised revenue proposal*, 6 February 2015
- CCP Sub-Panel, *Response to AER draft TransGrid determination TransGrid's revised revenue proposal*, February 2015
- CCP Sub-Panel-Bruce Mountain, *Advice on AER preliminary decision and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015.

- CCP Sub-Panel-Hugh Grant, *Advice on AER preliminary decisions and Energex and Ergon Energy revised proposals,* September 2015.

Submissions from stakeholders

- The following service providers commented on SA Power Networks revised proposal and/or our return on equity draft decision:
- AusNet Services, Preliminary Decisions QLD/SA Electricity Distribution Determinations 2015-20, 3 July 2015
- Energy Consumers Coalition of South Australia, AER preliminary decision: A response by Energy Consumers Coalition of South Australia, June 2015.
- ElectraNet, Submission: AER's preliminary determination on SA Power Networks 2015-2020 regulatory proposal, 3 July 2015.
- Energy Retailers Association of Australia, Re Preliminary Decision SA Power Networks determination 2015-16 to 2019-20, 3 July 2015
- Origin, Re Submission to AER Preliminary Decision SA Power Networks, 3 July 2015.
- South Australian Council of Social Service (SACOSS), SACOSS Submission to AER on SA Power Networks 2015-2020 AER Preliminary Decision, June 2015
- Spark Infrastructure, Appropriate rate of return for electricity distribution businesses, 3 July 2015.
- Malko Energy Consulting, Statement of Dr J Robert Malko, 3 July 2015.
- Ronald L. Knecht, Witness Statement, 3 July 2015.
- CitiPower/Powercor, Submission in relation to the current regulatory determination processes for SAPN, Energex, Ergon Energy, AGN, and ActewAGL, 24 July 2015.
- Jemena, Submission on recent proposals made by SAPN, AGN, AAD, Energex and Ergon Energy, 24 July 2015.
- Multinet Gas, Submission in relation to current regulatory determination process for SAPN, AGN, Energex and Ergon, 24 July 2015.
- United Energy, Submission in relation to current regulatory determination process for SAPN, AGN, Energex and Ergon, 24 July 2015.
- UnitingCare, Submission in response to revised regulatory proposals for 2015-20, SA Power Networks, Electricity Distribution business and AER preliminary determination, 24 July 2015.
- Energy Consumers Coalition of South Australia, The SAPN revised proposal: A response by Energy Consumers Coalition of South Australia, June 2015.
- Energy Users Association of Australia, Submission to the AER: AER draft determination for SA Power Networks & SA Power Networks Revised Proposal, 24 July 2015.

G Return on debt approach

In attachment 3, we set our decision on the return on debt approach and the key reasons for that decision (section 3.4.2). In this appendix we provide further detailed analysis to support our decision. We also respond to the issues raised in the service providers' proposals and submissions from other stakeholders concerning the return on debt approach.

The service providers submitted a large volume of material on the topic of how we move from the on-the-day approach to a trailing average approach. Most of this material is provided in the light of our recent decisions. This material includes the efficient financing practices under the on-the-day approach and the interpretation of the rules.

This appendix is structured as follows:

- Transition to the trailing average approach–sets out our response to matters raised by the service providers in support of their proposals on transition. Specifically, this section explains why we maintain our position to progressively transition to a trailing average approach (option 2). It also sets out our considerations on the types of transition (base rate, debt risk premium or total return on debt) and the transition paths.

In this appendix we use the term: 'Service providers' to refer to the businesses subject to this determination process.

- 'Victorian distribution network service providers' to refer to AusNet Services, Jemena, CitiPower, Powercor and United Energy.
- 'Networks NSW' or 'NSW distribution service providers' to refer to Ausgrid, Endeavour Energy and Essential Energy.
- 'Recent decisions' to refer to our decisions published in November 2014,[2064] April 2015[2065] and June 2015.[2066]

The service providers relied on reports from several consultants. The consultants commissioned by the service providers are listed in the following table.[2067]

2064 Our draft decisions for Networks NSW, TransGrid, ActewAGL, JGN, TasNetworks, Directlink

2065 Our final decisions for Networks NSW, TransGrid, ActewAGL, JGN, TasNetworks, Directlink and preliminary decisions for SA power Networks, Energex and Ergon Energy.

2066 Our final decision for JGN.

2067 We note that the service providers also submitted a large volume of expert reports submitted to us during the rate of return guideline development and the recent determination process.

Table 3-67 Consultants commissioned by service providers on the return on debt approach

Service provider	Consultant	Comments
Energex	QTC,[2068] Frontier Economics,[2069] HoustonKemp Economics[2070]	QTC and Frontier reports are joint reports for Energex and Ergon Energy (QTC EE and Frontier EE). The Frontier EE is largely similar to SFG report commissioned by JGN (SFG for JGN).[2071] The key difference is that Frontier EE is updated to incorporate a review our recent decisions. As such, by responding to Frontier EE we have also effectively responded to SFG for JGN.[2072]
Ergon Energy	QTC, Frontier Economics, CEG	These reports from QTC and Frontier are similar to the QTC and Frontier submitted by Energex. The CEG report is the same as that submitted by JGN in the recent decision (CEG for JGN).[2073]
SA Power Networks	CEG, SFG, [2074] Professor Schlogl	SA Power Networks (SAPN) submitted two CEG reports; including one commissioned by JGN (CEG for SAPN and CEG for JGN).[2075] CEG for SAPN heavily draws from CEG for JGN. One of the differences is that some of the numbers are specific to service providers.[2076] Also, CEG for SAPN provides a review of academic literature on the relationship between DRP and the risk free rate (proxy for the base rate). By responding to CEG for SAPN, we have also effectively responded to CEG for JGN.[2077] The SFG report is the same as SFG for JGN. Professor Schlogl report is the same as that submitted by United Energy (Schlogl UE) (see below).
AusNet, CitiPower,[2078] Powercor	CEG	The CEG report is the same as CEG for JGN.
Jemena	UBS,[2079] CEG, SFG[2080]	The UBS, CEG and SFG reports are the same UBS, CEG and SFG reports submitted by JGN in the recent decision

2068 QTC, *Return on debt transition analysis*, June 2015; QTC, *PTRM-weighted trailing average approach*, June 2015.

2069 Frontier Economics *Cost of debt transition*, June 2015.

2070 HoustonKemp Economists, *AER preliminary decision for Energex - contribution to the NEO and NEOP preferable decision*, July 2015.

2071 JGN commissioned this report in response to the AER's draft decision for JGN: CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015.

2072 We addressed issues raised in SFG for JGN in the recent decision for JGN.

2073 CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015.

2074 SFG, *Return on debt transition arrangements under the NGR and NER*, February 2015.

2075 CEG, *Transition to the trailing average rate of return on debt assessment and calculations for SAPN*, June 2015.

2076 CEG, *Transition to the trailing average rate of return on debt assessment and calculations for SAPN*, June 2015, p.6. For more details, see CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015.

2077 We addressed issues raised in CEG for JGN in the recent decision for JGN.

2078 CitiPower also relied on the SFG report for JGN, Jemena and United Energy (SFG, Return on debt transition arrangements under the NGR and NER, February 2015). However, it appears CitiPower did not submit that report as part of its regulatory proposal.

2079 UBS, *Transaction costs and the AER return on debt draft determination*, March 2015.

2080 SFG, *Return on debt transition arrangements under the NGR and NER*, February 2015.

Service provider	Consultant	Comments
		(UBS for JGN, CEG for JGN and SFG for JGN, respectively).
United Energy[2081]	CEG, SFG, Professor Schlogl	United Energy submitted three CEG reports: one commissioned by United Energy (CEG for UE),[2082] one commissioned by JGN (CEG for JGN as above); and a report on optimal hedging (CEG hedging).[2083] CEG 'on hedging' was jointly commissioned by AGN, CitiPower, Powercor, APA Group (Amadeus), and United Energy.[2084] CEG for UE and CEG for JGN are largely similar. The main difference is some of the numbers in CEG for UE's analysis have been revised to be service provider specific. Schlogl for UE is a review of CEG for JGN, which agrees with CEG's findings. As such, by responding to CEG for United Energy, we have also responded to CEG for United Energy and Schlogl for UE. The SFG report is the same as SFG for JGN.
ActewAGL (gas)	CEG; UBS, SFG, Frontier Economics[2085]	ActewAGL submitted four CEG reports: one commissioned by JGN (CEG for JGN as above); two commissioned by ActewAGL electricity;[2086] and a new report commissioned by ActewAGL gas (CEG for ActewAGL).[2087] The new report largely draws on CEG for JGN. However, it also discussed the relationship between DRP and the base rate (risk free rate). It is broadly similar to CEG for SAPN (see above). ActewAGL also submitted two UBS reports: one that was initially submitted by TransGrid (UBS for TransGrid) and one that was initially submitted by Networks NSW in the recent decisions UBS for Networks NSW).[2088] For simplicity we focus on UBS for TransGrid[2089]

2081 United Energy also referred to a large volume of expert reports submitted during the rate of return guideline development process as background to its proposal on the return on debt. See United Energy, Regulatory proposal, April 2015, p.2.

2082 CEG, Hybrid method for the transition to the trailing average rate of return on debt - assessment and calculations for United Energy, April 2015

2083 CEG, Efficient use of interest rate swaps to manage interest rate risk, June_2015. United Energy submitted this report as part of its submission to the QLD/SA process. This report was jointly commissioned by AGN, CitiPower, Powercor, APA Group, and United Energy (see paragraph 12).

2084 United Energy submitted this report as a submission to the QLD/SA determination process.

2085 The SFG and Frontier report are largely similar, with the key difference that Frontier focussed on Network NSW while SFG primarily applied to JGN. See Frontier Economics, Cost of transition for NSW distribution networks, January 2015.

2086 CEG, Debt transition consistent with the NER and NEL, May 2014; CEG, Efficient debt financing costs, January 2015. We addressed issues raised in these reports in the recent decision for ActewAGL electricity.

2087 CEG, Application of AER criteria to methods for estimating efficient debt finance costs, June 2015.

2088 UBS, Financeability Analysis following AER Draft decision - January 2015.

2089 UBS for Network NSW and UBS for TransGrid are largely similar. The key difference between the two reports is that the latter did not discuss financeability issues. Therefore, in responding to UBS for TransGrid, we also effectively respond to UBS for Networks NSW.

Service provider	Consultant	Comments
Amadeus	CEG	CEG on hedging (see above)
AGN	CEG,[2090] HoustonKemp[2091]	Two new reports including one that heavily draws on a CEG for JGN (CEG for AGN) and CEG on hedging (see above).

Source: Service provider's proposals and revised proposals

G.1 Transition to the trailing average approach

Our decision is to maintain the transition path we proposed in the rate of return guideline and which we adopted in the recent decisions. As set out in section 3.4.2, this means we set the return on debt by starting with an on-the-day rate for the first regulatory year and gradually transition into a trailing average approach (option 2).

All the service providers in this determination process have proposed a hybrid transition to the trailing average (option 3). This approach combines a 10 year trailing average DRP with a base rate that starts with the on-the-day approach and is gradually transitioned to the trailing average. However, in contrast to option 3, the service providers proposed to use an average of 1 to 10 year swap interest rates as a proxy for the base rate.[2092]

Ergon Energy, Energex and SA Power Networks have changed their initial proposal of option 2 after we accepted it in the preliminary decision. The service providers' proposal reflects a departure from their initial position expressed during the rate of return guideline development where they supported the QTC approach that we adopted.[2093]

In proposing the hybrid transition, the service providers and their consultants have raised a number of issues with our preferred approach (option 2), including:

- Efficient financing practices under the on-the-day approach – the service providers consider our 'construct of efficient financing practices for a benchmark efficient entity subject to the on-the-day approach may be incorrect' because they considered:[2094]

2090 CEG, The hybrid method for the transition to the trailing average – Assessment and calculations for AGN, June 2015; CEG, Efficient use of interest rate swaps to manage interest rate risk, June 2015. The first report is largely similar to that submitted by United Energy; only with the small difference that it refers to the NGR/NGL and numbers for ActewAGL.

2091 HoutonKemp Consulting, Australian Gas Networks – AER Gas Price Review, June 2015.

2092 Option 3 uses a 10 year interest rate as a proxy for the base rate.

2093 APA Group, *Submission on the draft guideline*, October 2013, p. 33; Ergon Energy, *Submission on the draft guideline*, October 2013, p. 6; Jemena, *Submission on the draft guideline*, October 2013, p. 1; SP AusNet, *Submission on the draft guideline*, October 2013, p. 3.

2094 CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 231; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 239; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 340; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of*

- It pre-supposes a benchmark efficient entity being regulated – Some service providers and their consultant CEG considered efficient financing practices should inform the regulatory practice rather than the opposite.[2095]
- It assumes a benchmark efficient entity would hedge 100 per cent of the base rate component of the return on debt whereas, they submit, it was efficient to hedge only a portion of the base rate.[2096]

- Single versus multiple benchmarks – one service provider questioned our adoption of single benchmark efficient entity; stating that there was more than one financing strategy under the on-the-day approach.[2097]
- The interpretation of the rules – the service providers submitted our approach to apply a transition to the debt risk component of the return on debt involves a misinterpretation of the rules because they considered it incorporates a multiple regulatory control period perspective.[2098] They also submitted our approach is inconsistent with the Law because they considered it would not provide them with a reasonable opportunity to recover their efficient costs.[2099]

Return, July 2015, p. 46; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11.

2095 CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 231; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 239; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 340; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 46; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 10-11.

2096 Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 339-340; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 55-56; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 10; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 16-17.

2097 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on equity-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11.

2098 SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 384-387; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 232; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 240; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 92; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 339; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 112.

2099 CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 232-233; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 240-241; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 92; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 339; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 109.

- Transaction costs – the service providers proposed to include swap transaction costs as part of the proposed return on debt.[2100]

Retailers and consumer groups supported our approach.[2101] Among other reasons, their submissions highlighted:

- The thorough and consultative nature of the rate of return guideline development process. We developed the rate of return guideline over a 12 month period of extensive consultation with a broad range of stakeholders, including all the service providers involved in the current determinations.[2102]
- They consider the service providers have not made a persuasive case to depart from the transition to a trailing average set out in the rate of return guideline. .[2103]
- The service providers have not demonstrated how their proposed departures from the rate of return guideline and the resulting excessive returns would better achieve the rate of return objective or better meet consumers' long term interests.[2104]
- The hybrid transition to the trailing average cost of debt is contrary to the approach in financial markets and to the logic of the AER's trailing average approach. The hybrid transition is backward-looking and includes a period of very high debt costs due to the global financial crisis. [2105]

2100 Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 105; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 349; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 53; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 14; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 22; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 111; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 114; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 238-239; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 246.

2101 Energy Retailers Association of Australia, Re: Issues paper – Victorian electricity distribution pricing review 2016-2020, 13 July 2015, p. 1; Origin Energy, Re: Submission to Victorian Electricity Distributors Regulatory Proposals, 13 July 2015, p. 9; Origin Energy, Re: Submission to Victorian Electricity Distributors Regulatory Proposals, 13 July 2015, p. 12.

2102 CCP2, CCP2 Advice to the AER on the AER's Preliminary Determinations on Energex and Ergon's 2015-20 Revenues - Final Version - 3 September 2015, p.13; CCP for Victorian EDPR

2103 CCP2, CCP2 Advice to the AER on the AER's Preliminary Determinations on Energex and Ergon's 2015-20 Revenues - Final Version - 3 September 2015, p.13; CCP for Victorian EDPR

2104 CCP2, CCP2 Advice to the AER on the AER's Preliminary Determinations on Energex and Ergon's 2015-20 Revenues - Final Version - 3 September 2015, p.13; CCP3, CCP3_advice_to_AER_on_Victorian_DNSP_regulatory_proposals, 5 August 2015, p.2; Victorian Energy Consumer and User Alliance, Submission to the AER, Victorian Distribution Networks' 2016-20 Revenue Proposals, July 2015, pp. 12-13.

2105 South Australian Council of Social Service (SACOSS), Submission on AGN's regulatory proposal for the 2016-2021 Access Arrangement period, 8 August 2015, p.10. SACOSS also refers to its SACES report in its submission to the SAPN preliminary decision. See South Australian Centre for Economic Studies, Independent review of parameters used in the calculation of the proposed weighted average cost of capital, June 2015.

We disagree with the submissions of the service providers, and largely agree with the retailers and consumer groups' submissions. We address each of the concerns raised by the service providers in the following sections.

G.1.1 Efficient financing practices under the on-the-day approach

We are satisfied that holding a staggered long term (10 years) debt portfolio and using interest rate swaps to hedge the base rate over the regulatory control period was an efficient financing practice for a benchmark efficient entity subject to the on-the-day approach. As set out in section 3.4.2 of this attachment, we do not expect all service providers would have adopted precisely this strategy. However, we consider it represents a reasonable approximation of the range of efficient financing practices that a benchmark efficient entity would have adopted under the on-the-day approach. This view is supported by Chairmont.[2106]

- The service providers made differing submissions on efficient financing practices:
  - Energex, Ergon Energy and SA Power Networks appear to agree with our view of a simplified characterisation of efficient financing practices; specifically that a benchmark efficient entity would hedge 100 per cent of the base rate.[2107]
  - The Victorian distribution network service providers, AGN, ActewAGL and Amadeus submitted that our approach presume that 100 per cent of the base rate is hedged. Contrary to our view, they considered only a portion of the base rate could be efficiently hedged.[2108] To justify their view, these service providers cited several reasons, including:
    - A negative correlation between the risk free rate (proxy for the base rate) and the debt risk premium.[2109] The service providers relied on analysis by CEG and Professor Schlogl.[2110]

[2106] Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.26; Chairmont, *Financial practices under regulation: past and transitional*, October 2015, p. 13 .

[2107] SA Power Network, Energex and Ergon did not explicitly submit that a benchmark efficient entity could only efficiently hedge a portion of the base rate.

[2108] Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 339-340; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 55-56; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 16-17; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 231; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 239; APTNT, Amadeus Gas Pipeline: *Access Arrangement Revision Proposal - Submission*, August 2015, p. 143; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 55-56.

[2109] Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 339-340; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*,

- The liquidity constraint–United Energy and ActewAGL suggested the domestic swap market was not sufficiently deep to accommodate the volume of swap needs.[2111]
- The uncertainty about the averaging period–United Energy suggested the averaging period was in dispute at the previous determination (2009).[2112]

We consider each of these points in the following sections. We also note that despite including this commentary, only Amadeus based its proposal on this proposition. Amadeus's proposal is based on an assumption that under the on-the-day approach a benchmark efficient entity would have hedged 33 per cent of the base rate.[2113] Whereas, the debt methodology proposed by all the other service providers is based on an assumption that benchmark efficient entity would have hedged 100 per cent of the base rate.

Negative correlation between the risk free rate and the debt risk premium

Some service providers submitted that there was a negative correlation between the risk free rate and debt risk premium (DRP), and that this implied:[2114]

July 2015, p. 55-56; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 16-17; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 231; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 239; APTNT, Amadeus Gas Pipeline: *Access Arrangement Revision Proposal - Submission*, August 2015, p. 143; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 55-56.

2110 CEG, *Transition to the trailing average rate of return on debt Assessment and calculations for SAPN*, June 2015, p.36 and Appendix A; CEG, *The hybrid method for the transition to the trailing average rate of return on debt, assessment and calculations for AGN*, July 2015, Appendix D, pp.95-105; CEG, *Efficient use of interest rate swaps to manage interest rate risk*, June 2015; CEG, *Application of AER criteria to methods for estimating efficient debt finance costs (Memorandum)*, June 2015; Schlogl, E, *The AER's JGN draft decision on the cost of debt — a review of the critique by the Competition Economists Group (CEG) Prepared for United Energy and Multinet Gas*, April 2015, paragraph 12. While Professor Schlogl did not explicitly discuss the correlation between the base rate and the debt risk premium, he supported CEG's view and indicated that other strategies such as minimum variance hedging strategies which may capture some of the risk due to the variation in the debt risk premium.

2111 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 17.

2112 United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 17.

2113 Amadeus Gas Pipeline, Access arrangement revision proposal submission, August 2015, p.143.

2114 Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 339-340; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 55-56; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal*

- a natural hedge exists between the base rate and DRP
- therefore, hedging 100 per cent of the base rate may not have been efficient. In contrast, it may have been efficient to leave some proportion of the base rate un-hedged in order to retain some proportion of natural hedge against the DRP.

Some of these submissions referred to analysis undertaken by CEG in support of these arguments.[2115] CEG submitted that it adapted an empirical approach used by Lally in a previous paper in order to test which portion of hedging the base rate will minimise interest rate risk. CEG concluded that:[2116]

> Based on the analysis in this report, I consider that the use of interest rate swaps that would have minimised interest rate risk for the benchmark efficient entity under the 'on the day' regulatory regime would have involved hedging around 1/3 of base interest rate exposure at the beginning of the regulatory period. The remaining 2/3 of the debt portfolio would not be affected by the use of interest rate swaps and would be best modelled based on a trailing average of past debt costs.

We engaged both Chairmont and Lally to review CEG's analysis and the related commentary in the proposals currently before us on hedging less than 100 per cent of the base rate. Overall, we are not persuaded by CEG's analysis for the reasons set out in the following paragraphs.

As indicated by Chairmont, whether or not there is a negative correlation between the DRP and base rate is a secondary consideration. Chairmont's analysis suggested that a financing strategy of partial hedging (which is labelled 'Strategy 1' in Chairmont's report) nearly always resulted in substantially higher starting portfolio costs than all strategies that involved a fully hedged base rate for the period December 2011 to June 2015. Chairmont concluded that:[2117]

> At this point in time the evidence does not support the notion that Strategy 1 is efficient. It creates an additional and avoidable interest rate risk in the base component which has an unstable and unreliable relationship to changes in the DRP. There is no dispute about there being a negative correlation over time between DRPs and base rates, as the data set used here also has a negative correlation. However, it does not automatically follow that a negative correlation between two variables means that a successful trading (arbitrage) strategy can be generated from that relationship.

for the 2016 to 2020 regulatory period Attachment, April 2015, p. 16-17; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 231; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 239; APTNT, Amadeus Gas Pipeline: *Access Arrangement Revision Proposal - Submission*, August 2015, p. 143; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 55-56.

2115 CEG, *Efficient use of interest rate swaps to manage interest rate risk*, June 2015.

2116 CEG, *Efficient use of interest rate swaps to manage interest rate risk*, June 2015, p. 4.

2117 Chairmont, *Financial practices under regulation: past and transitional*, October 2015, p. 33-34.

> Even in the early 2000's Graphs 2 and 3 showed that including fixed rate risk with DRP risk added to overall volatility rather than reducing it. At that time, even with limited data, there were early warning signals on the efficiency of this strategy.

Further, in undertaking quantitative analysis on this strategy, Chairmont concluded that:[2118]

> As shown in Graph 1, for all the starting points from 2011 until now the results show for a hedge ratio of 50% Strategy 1 was:
>
> – Always more expensive than AER's Basic Approach (the hybrid approach), ranging from 75bp to 180bp higher.
>
> – Always the highest cost of all of the strategies considered here
>
> – Most of the time above the Guideline allowance.

Lally was not also persuaded by CEG's proposition that a negative correlation between the base rate and the debt risk premium entails a natural hedge between these two variables; such that it would be efficient to hedge only a portion of the base rate.[2119] In particular, Lally noted that CEG's analysis does not undercut the fundamental point that private sector service providers hedge the interest rate risk. This is a fundamental point because:

- Private firms need to raise capital directly from capital markets. To do so require discipline given that private firms face higher refinancing and bankruptcy risk (relative to their government-owned counterpart).[2120]
- As set out in this decision, we rely on industry norms among the privately owned firms in estimating aspects of the debt methodology, including debt term, credit rating, the use of staggered debt and hedging practices.
- CEG analysis did not rely on the practices of the privately owned firms in Australia.

Lally agreed with this view. Lally stated:[2121]

> …in order to prefer CEG's conclusion, one would have to ignore the fact that private-sector firms do use swaps, and ignore the fact that these swaps reduce expected interest costs, and define risk in relation to the entire cost of debt (rather than just the base rate), and to conclude that the best data to determine the optimal course of action is from 1986-2015.

Furthermore, CEG's analysis focused only on one of the reasons for which a benchmark efficient firm would completely or largely hedge the base rate (reduction of interest rate risk). It does not address other reasons, including the expectation that a

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2118 Chairmont, *Financial practices under regulation: past and transitional*, October 2015, p. 23.

2119 Lally, M., *Review of submissions on transition issues for the cost of debt*, October 2015, pp.13–25.

2120 Lally, M., *Review of submissions on the cost of debt* , 21 April 2015, p. 4.

2121 Lally, M., *Review of submissions on transition issues for the cost of debt*, October 2015, p. 23.

fully hedged base rate would reduce expected costs. This effect arises because, by fully hedging the base rate, the service provider's base rate costs reflect a 5 year term as opposed to a 10 year term.[2122] To the extent that the benchmark efficient entity hedges less than 100 per cent of the base rate, it dilutes the cost-reducing effect.

In summary we are not persuaded by CEG's analysis because it:

- ignored the financing practices of private firms.
- focused only on one reason for which a benchmark efficient entity would completely or largely hedge the base rate.

Liquidity constraint of the domestic swap market

United Energy and ActewAGL suggested the domestic swap market was not sufficiently deep to accommodate interest rate swap requirements of large businesses.[2123] United Energy considered a benchmark efficient entity could not efficiently hedge 100 per cent of the base rate under the on-the-day approach.[2124]

In our recent decisions for TransGrid and Networks NSW, we were not persuaded that the potential liquidity constraint of the domestic interest rate swap market would have fundamentally changed the financing practices of a benchmark efficient entity.[2125] We are still not persuaded because the UBS report did not support United Energy and ActewAGL's position.[2126]

UBS submitted that in 2009 the interest rate requirement of TransGrid combined with that of the businesses with the same determination timing as TransGrid was too large ($18,263m; 60 per cent of the RAB) to be accommodated by the domestic interest rate swap market.[2127]

- United Energy's interest rate swap needs at the time were less than that amount ($1,162m) and even much less than the combined needs for the Victorian

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2122 Generally, 5 year debt is cheaper than 10 year debt due to the term premium.

2123 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator,* June 2015, p. 11; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 17. United Energy and ActewAGL relied on UBS advice to TransGrid. See UBS, *Analysis of Liquidity of Interest Rate Swaps*, January 2015. In addition, ActewAGL relied on UBS advice to Networks NSW. See: UBS, *Financeability - Debt issuance and capital structure*, January 2015.

2124 United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 17.

2125 AER, *Final decision for TransGrid, Attachment 3–rate of return - Attachment 3 rate of return*, April 2015, Appendix G12. Analogous reasons were set out in the final decision for Ausgrid, Endeavour Energy and Essential Energy.

2126 United Energy also submitted a UBS report commissioned by Networks NSW, which we considered in the recent decisions.

2127 This included Ausgrid, Essential Energy, Endeavour Energy, TasNetworks and ActewAGL electricity. See UBS, *Analysis of Liquidity of Interest Rate Swaps*, January 2015, p.2.

electricity distribution service providers ($5,660m).[2128] In addition, United Energy did not address our reasons we set out in TransGrid decision. [2129]

- ActewAGL did not have did not have interest rate swap needs– it was 100 per cent financed.[2130]

We note that the Australian Competition Tribunal is currently considering rate of return and gamma decisions of the AER released in April 2015 for Ausgrid, Endeavour Energy, Essential Energy and ActewAGL and in June 2015 for Jemena Gas Networks. A number of key areas of disagreement between the AER and the service providers are being considered as part of this review process.

Uncertainty about the averaging period

United Energy suggested a benchmark efficient entity could not have hedged 100 per cent of the base rate when facing uncertainty about the averaging period.[2131] United Energy referred to the dispute over the averaging period in the 2009 NSW determination.

In the recent decisions for Networks NSW, we were not persuaded that uncertainty about the averaging period during the 2009 determination was a valid reason that would have fundamentally altered the efficient financing practices of a benchmark efficient entity under the on-the-day approach.[2132] We are still not persuaded because it is unclear to us how the alleged uncertainty relates to United Energy. In addition, United Energy did not address the reasons we set out in the NSW decisions or provide contrary evidence to persuade us otherwise.

In the recent determinations, Networks NSW submitted that it was not possible to hedge while the averaging period around the 2009 determination was in dispute. We considered that any uncertainty about the averaging period at the 2009 determination would have resulted from the actions of the Networks NSW. Specifically:

- The NSW distribution network service providers chose an averaging period that was inconsistent with our known policy at the time. Our policy is that the averaging period be nominated in advance and as close as possible to the start of the regulatory period.
- They appealed our 2009 decision.

[2128] The numbers for United Energy and the Victorian electricity distribution businesses are calculated as 60 per cent of the opening RAB reported in the AER's *2009 state of the energy market report*, p.156.

[2129] AER, *Final decision for TransGrid, Attachment 3–rate of return, Appendix G12*. Analogous reasons were set out in the final decision for Ausgrid, Endeavour Energy and Essential Energy.

[2130] ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator,* June 2015, p. 11.

[2131] United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 17.

[2132] AER, *Final decision for Ausgrid, Attachment 3–rate of return*, Appendix G12.3. Analogous reasons were set out in the final decision for Endeavour Energy, Essential Energy and TransGrid.

- In appealing our decision, these businesses nominated backward looking averaging period and their choice was upheld by the Tribunal.

G.1.2 Regulated benchmark efficient entity

Some service providers also submitted our position on efficient financing practices under the on-the-day approach may be incorrect because they consider it pre-suppose the benchmark efficient entity is regulated.[2133] It is unclear to us whether these service providers are suggesting a benchmark efficient entity should be an unregulated entity operating in a workably competitive environment. However, we address this matter because Networks NSW and ActewAGL (electricity) have raised a similar point in the ongoing Tribunal review. Networks NSW and ActewAGL (electricity) submitted that we made an error in wrongly characterising a benchmark efficient entity as regulated in the recent decisions.

In the rate of return guideline, we proposed to adopt a conceptual definition of the benchmark efficient entity that is 'a pure play, regulated energy network business operating within Australia'.[2134] For the reasons set out in the explanatory statement of the rate of return guideline, we maintained this view in the recent decisions. [2135] We also maintain the same view in this decision.

The Energy Network Association (ENA) supported our conceptual definition of a benchmark efficient entity during the guideline development process. The ENA stated:[2136]

> "In the ENA's view, the benchmark entity should be: A 'pure-play' regulated electricity or gas network business operating within Australia without parental ownership providing the same scale and scope of standard control / reference services to the same customer base at the current time."

Most service providers in the current determination supported the ENA's submission.[2137]

[2133] Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 340; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 55-56; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 231; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 239.

[2134] AER, Explanatory statement–rate of return guideline, December 2013, p.32.

[2135] AER, Explanatory statement–rate of return guideline, December 2013, p.32.

[2136] Energy Networks Association submission - Rate of Return Guidelines Issues Paper – 20130218, February 2013, p.15 & p.37.

[2137] Jemena, *Submission to rate of return guideline issues paper*, February 2013, p. 3 and p. 22; ActewAGL, *Submission - Rate of Return Guidelines Issues Paper – 20130215*, February 2013, p. 1; AGN (then Envestra), *Submission - Rate of Return Guidelines Issues Paper*, February 2013, p. 4; CitiPower, Powercor and SA Power, *Submission to rate of return guideline issues paper*, February 2013, p. 7; United Energy and Multinet, *Submission - rate of return guideline issues paper*, p.8; SP AusNet, *Submission rate of return guideline issues paper*, February

We make the following observations:

First, the allowed rate of return objective make reference to the provision of 'standard control services', which by definition are regulated services.

Second, under the on-the-day approach the benchmark efficient entity was regulated. In transitioning this regulated entity from the on-the-day to a trailing average approach, we cannot ignore the fact that it was regulated in the past.

Third, the notion of a benchmark efficient entity in the allowed rate of return objective applies to the overall rate of return; that is, to each of the components of the rate of return (equity, debt, gearing) and to gamma. The service providers' allegations highlight a significant (opportunistic) inconsistency. The service providers only submit our characterisation of a benchmark efficient entity as regulated may be incorrect in relation to the return on debt, and specifically, in relation to how we should transition to a 'trailing average' return on deb – this is only one component of the return on debt. The service providers did not submit our characterisation of a benchmark efficient entity as regulated is incorrect in respect of:

- the return on equity
- the gearing ratio
- other elements of the return on debt, such as the benchmark credit rating and benchmark debt term.

Fourth, our estimate of the equity beta , benchmark credit rating and debt term (components of debt) and benchmark gearing ratio are all informed by industry aggregate medians, averages or portfolios (as the case may be) of actual regulated energy networks. The service providers appear to have no concern with us using information on regulated energy networks in any other aspect of the rate of return, but only raise concern when information on regulated energy networks is used to inform the return on debt approach; specifically transition.

G.1.3 Single versus multiple benchmarks

Some service providers questioned our adoption of a single benchmark efficient entity.[2138] The service providers based their distinction between benchmarks on the observed financing practices they considered efficient under the on-the-day approach. However, they have differing views on the issue:

2013, p. 1; Ergon Energy, *Submission rate of return guideline issues paper*, February 2013, p. 3 and p. 6. We note that some service providers did not make individual submissions as to whether a benchmark efficient entity should regulated. (e.g. APA Group).

2138 AGN, Attachment 10.1, p.46; ActewAGL, appendix 8.01, p.11; Jemena, Attachment 9.2, p.93–94.

- AGN and ActewAGL submitted stated:[2139]

> …if the AER is correct there is only one [benchmark], then the 'correct strategy' would be the trailing average approach.

- JEN suggested the hybrid financing strategy should be considered efficient in the circumstance.[2140] However, JEN's proposed hybrid strategy appears to be one where only a portion of the base rate is hedged–this is different from the financing strategy we considered efficient under the on-the-day approach.[2141]

In the recent decisions, we were not persuaded by the proposition to adopt multiple benchmarks based on service providers' financing strategies. We are still not persuaded because the service providers did not provide new evidence.

In the recent decisions, we considered that the question is not whether there was more than one efficient financing strategy under the on-the-day approach. Rather, the question is which of the alleged multiple financing practices better approximate the financing strategy of a benchmark efficient entity under the on-the-day approach. We concluded that holding 10 year floating rate staggered debt portfolio with interest rate swap overlay was a reasonable approximation of the efficient financing strategies a benchmark efficient entity would adopt under the on-the-day approach.[2142] Chairmont and Lally supported our view in their earlier advice.[2143]

In the recent decisions, the contention was between the following strategies:

- 10 year floating rate staggered debt portfolio with interest rate swap overlay, or

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2139 ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 46.

2140 Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 93-94.

2141 In the explanatory statement of the rate of return guideline, we considered it efficient for a benchmark efficient entity subject to the on-the-day approach to: (1) borrow long term (10 year) debt and stagger the borrowing so that only a small proportion (around 10 per cent) of the debt matured each year; (2) borrow using floating rate debt (or to borrowed fixed rate debt and convert this to floating rate debt using fixed-to-floating interest rate swaps at the time of issuing the debt and which extended for the term of the debt, being 10 years); and (3) enter into floating-to-fixed interest rate swaps at, or around, the time of the service provider's averaging period and which extended for the term of the regulatory control period, being typically 5 years). This financing practice is premised on a benchmark efficient entity hedging 100 per cent of the base rate. We maintained this view in the recent decisions. See for example: AER, *Final decision–Ausgrid distribution determination–Attachment 3: Rate of return*, April 2015, p.3-496. Analogous reasons were includes in our November 2014final decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, JGN.

2142 AER, *Final decision–Ausgrid distribution determination–Attachment 3: Rate of return*, April 2015, pp.3-496-497. Analogous reasons were includes in our November 2014final decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, JGN.

2143 Chairmont, Cost of debt Transitional analysis, April 2015, pp.29-45; Lally, M., *Review of submissions on the cost of debt*, January, pp.8–10.

- 10 year fixed rate staggered debt portfolio with no interest rate swap overlay.[2144]

However, in the current determinations, the contention is slightly different. While it still includes a 10 year fixed rate staggered debt portfolio with no interest rate swap overlay strategy,[2145] service providers and CEG alleged that it was efficient for a benchmark efficient entity to hedge only a portion (less than 100 per cent) of the base rate.[2146] We engaged Chairmont and Lally to assess this matter in the light of the material put to us. Chairmont and Lally reaffirmed their initial advice on these matters.[2147]

G.1.4 Matters related to the interpretation of the rules - a transition on the debt risk premium

The service providers submitted that the AER's approach to debt risk premium (DRP) transition is not consistent with the legislative requirements. [2148] In particular, service providers submitted that:

- DRP transition is inconsistent with the rules, because:
    - DRP transition does not match a benchmark efficient entity's efficient financing practices. As a consequence, service providers submit that transition on the DRP would create a mismatch between allowed and expected DRP.[2149]
    - Consideration of efficient financing costs over the life of the assets is inconsistent with the rules, and is therefore irrelevant.[2150]
    - The NPV principle is not explicitly referred to in name or concept anywhere in the NEL or the NER. In support of this argument, service providers submitted that the NPV principle has not been formally recognised by the

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2144 AER, *Final decision–Ausgrid distribution determination–Attachment 3: Rate of return*, April 2015, pp.3-496-497. Analogous reasons were includes in our November 2014final decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, JGN.

2145 As submitted by ActewAGL. See ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 11.

2146 CEG, *Efficient use of interest rate swaps to manage interest rate risk*, June 2015, Appendix B.

2147 Chairmont, Financing practices under regulation: past and transitional, October 2015, p.13; Lally, M., Review of submissions on transition issues for the cost of debt, October 2015, p.52.

2148 SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 384-387; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 232; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 240; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 92; AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 339; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 112.

2149 Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 92; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, June 2015, p. 10-11; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 232; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 240.

2150 Energex, *2015-20 revised regulatory proposal*, July 2015, p. 109.

Tribunal or any other court as being implicit in the requirements of economic regulation instruments.[2151]

  - Under the rules, any windfall gains or losses are irrelevant to the task of setting a benchmark efficient allowance for facing costs of the following regulatory period.[2152]

- DRP transition is inconsistent with the law, because:

  - Service providers submitted that it would not provide a reasonable opportunity to recover efficient costs as a result of recent declines in credit spreads over swap rates and because of legacy embedded costs. As a result, service providers submit that it is inconsistent with the revenue and pricing principles.[2153]

  - Service providers submitted that DRP transition would result in a 'clawback', which is inconsistent with the principles of incentive regulation. They considered it a deliberate under compensation to account for past windfall gains.[2154]

We are not persuaded by these submissions. They are largely consistent with submissions made by service providers in recent decisions.[2155] Our responses to these issues are set out as follows:

- Matters associated with the interpretation of the rules
- Legislative connection between the NPV principle and historical development of the rules
- Matters associated with the law (NEL/NGL)

Matters associated with the interpretation of the rules

As set out in section 3.4.2, we are satisfied that our approach is consistent with the rules because it has regard to the effects of changing the method to estimate return on debt.[2156] The issue of whether it is consistent with the rules to adopt a single or a multiple regulatory control period perspective in respect of setting the return on debt

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[2151] SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 385; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 48-49.

[2152] AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 50.

[2153] Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 92; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 48; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 17; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 109; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 232; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 240.

[2154] SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 386; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 140-141; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p. 50;

[2155] See for example, JGN, *Revised proposal - Appendix 07.10 Return on debt response*, 27 Feb 2015

[2156] NER, cl.6.5.4(k)(4); NGR, r.87(11)(d) (and therefore the rate of return) seems to be raised as a matter of legal interpretation. As discussed in section 3.4.2 of this final decision, we consider that the rules are concerned with both a single and multiple regulatory periods perspective.

- Under the rules, we are required to determine a rate of return for a service provider that is commensurate with efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider.[2157]
- Simultaneously, the rules require us to have regard to a number of factors when estimating the return on debt. These factors include any impacts (including in relation to the cost of servicing debt across regulatory control periods) on a benchmark efficient entity that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory control period to the next.[2158]

In this determination, we have changed the methodology from the on-the-day to the trailing average. So, we must consider the impacts of doing so. The rules explicitly anticipate one form of impact extending across regulatory control periods–the cost of servicing debt. Therefore, 'any impacts' seem to include any other impact that stretches across regulatory control periods. This would seem to include any over or under recovery that would result from changing the approach to estimate the return on debt.

As discussed in the section 3.4.2, we consider our gradual transition to the trailing average approach provides a service provider with a reasonable opportunity to recover efficient financing costs over the life of its assets. For the base rate component, we consider the allowed and actual return on debt of a benchmark efficient entity would have broadly matched in each regulatory control period.[2159]

However, in respect of the debt risk premium, the allowed and actual return on debt of a benchmark efficient entity would not have matched in each regulatory control period. This is because changes in interest rates may create differences between the allowed and actual return on debt of a benchmark efficient entity during a regulatory control period. However, a consistent application of either the on-the-day or trailing average approach would account for these differences, because it promotes revenue with an expected present value equal to the present value of the entity's efficient costs. This outcome is consistent with the NPV principle which we discussed further below. However, when the method to estimate the return on debt changes during the life of regulated assets; the NPV principle is unlikely to hold automatically. Any existing accumulated differences between the allowed and actual return on debt of a benchmark efficient entity would remain. As a result, the service provider will receive a

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[2157] NER, cl.6.5.2(c); NGR, r.87(3).

[2158] NER, cl.6.5.2(k)(4); NGR, r.87(11)(d).

[2159] This match arises because a benchmark efficient entity is and was able to undertake hedging arrangements under the on-the-day approach. Chairmont, *Cost of debt Transitional analysis*, April 2015, pp.29–39; Lally, M., *Review of submissions on the cost of debt*, April 2015, p.28.

return on debt that is different from that of a benchmark efficient entity, and consumers will pay prices that reflect this difference.

In these circumstances, departures from the NPV principle do not result from efficiency changes, but from changing the estimation method. For this reason, we consider the resulting benefits or detriments are windfall gains or losses that the regulatory regime should avoid. In other words, regardless of who faces the benefit or detriment, applying a hybrid transition from one return on debt approach to another could have undesirable consequences. As discussed in section G.1.5, we accept that it is difficult in practice to determine the magnitude of accumulated windfall gains or losses with a sufficient degree of precision. Nonetheless, for the reasons set out in section 3.4.2 we are satisfied that the rate of return guideline approach (option 2) will promote achievement of the NPV principle over the life of the assets.

The possibility of a departure from the NPV principle should concern both regulated entities and consumers. Neither could know in advance whether they would face a benefit or detriment. It may be that service providers do not hold this concern in this case because it is aware, through hindsight, of how applying or not applying a gradual transition would affect its interests. The proposals of service providers appear to reflect this view. As set out in section 3.4.2, we consider a gradual transition reflects the NPV principle which is embedded in the regulatory framework. We discuss the legislative connection between the NPV principle and the rules development in more detail below.

Legislative connection between the NPV principle and historical development of the rules

Under the rules, we must use the building block approach to calculate the revenues for distribution and transmission determinations.[2160] The adoption of the building block model dates back to at least 2004, when the ACCC released its statement of principles for the regulation of electricity transmission revenues (SRP). The ACCC stated:[2161]

> The building block model consists of two equations which are known as the revenue equation and the asset base roll forward equation. These two equations are used to determine an allowed stream of revenues for each TNSP for as long as it remains regulated. Ignoring any incentive rewards or penalties, these equations together ensure that the present value of the allowed revenue stream is equal to the present value of the expenditure stream of the regulated firm.

The requirement to ensure that the present value of the allowed revenue stream is equal to the present value of the expenditure stream of the regulated firm for as long as it remains regulated, ignoring any incentive rewards or penalties, is the NPV principle. This requirement, or the NPV principle, is useful to inform whether a particular regulatory approach would provide a service provider with a reasonable

[2160] NGR, r. 76; NER, cl. 6.4.

[2161] ACCC, *Statement of principles for the regulation of electricity transmission revenues*, 2004, p.5.

opportunity to recover at least efficient costs.[2162] Under the law, we are to take into account that a regulated service provider is provided with a reasonable opportunity to recover at least its efficient costs.[2163] Lally advised that this principle in the law is 'equivalent' to the NPV principle.[2164]

In 2006, in its rule determination for the electricity transmission regime (chapter 6A of the NER), the AEMC adopted the ACCC's SRP. The AEMC stated:[2165]

> In line with the views expressed in many submissions, the Revenue Rule draws heavily on existing practice and experience. The principal components of the Statement of Regulatory Principles (SRP), developed by the Australian Competition and Consumer Commission (ACCC) and adopted by the Australian Energy Regulator (AER), have been reflected in the Revenue Rule, including:
>
> - the adoption of a revenue cap approach;
>
> - a post-tax revenue model using the building blocks methodology; and
>
> - an incentive regime to promote and balance expenditure efficiency and service reliability.

In 2006, the Standing Committee of Officials of the Ministerial Council on Energy (MCE) stated:[2166]

> SCO is mindful that the AEMC engaged in extensive consultation on developing the detail of the transmission revenue rules and was working from a base of consistent regulation developed by the Australian Competition and Consumer Commission under their Statement of Regulatory Principles for Electricity Transmission Revenue Regulation. The approach of officials in the initial NGR is not intended to limit future development of the NGR through the AEMC rule change process. Officials have taken high level guidance from the AEMC's approach, where possible, to increase consistency and commonality, reflecting the common revenue and pricing principles that guide the electricity and gas regimes.

The MCE also stated:[2167]

> Building block approach

2162 NGL, s. 24(3); NEL, s. 7A(2).

2163 NGL s. 24(3); NEL, s. 7A(2).

2164 Lally, *The risk free rate and the present value principle*, 22 August, 2012. Lally's advice refers to NEL. The NGL has an analogous requirement–that a regulated service provider is provided with a reasonable opportunity to recover at least its efficient costs. SFG also appears to support using the NPV principle to assess rate of return approaches. SFG, *Preliminary analysis on rule change proposals*, February 2012, p.47.

2165 AEMC, *National Electricity Amendment (Economic Regulation of Transmission Services) Rule*, 2006, pp. iv-v and p.34.

2166 MCE, *Legislative Package: Initial National Gas Rules*, 2006, p.4.

2167 MCE, *Legislative Package: Initial National Gas Rules*, 2006, p.9.

> Rule 25 replaces s 8.4 of the Gas Code, and in doing so explicitly establishes the "building block methodology" as the method by which target revenue is to be determined. The building block methodology is the same as the Cost of Service method provided for in the Gas Code.
>
> The NGR removes the Net Present Value and Internal Rate of Return methods for calculating target revenue (or total revenue) used in s 8.4 of the Gas Code, which are conceptually identical to the building block or Cost of Service method.

In 2007, the MCE stated the following:[2168]

> To achieve the MCE's objective of consistency where appropriate, the Exposure Draft of distribution revenue Rules largely builds on the AEMC's approach to economic regulation of electricity transmission.
>
> …a common element of regulation between prescribed transmission services (which applies a revenue cap as the price control method) and standard control distribution services is determining a revenue requirement using a building block approach.

Matters associated with the law

For the reasons set out in section 3.4.2, we are satisfied that DRP transition is consistent with the requirement to provide service providers with a reasonable opportunity to recover at least efficient financing costs. Also, we disagree that DRP transition constitutes a clawback or a deliberate attempt to under compensate service providers to account for past windfall gains. As set out in section 3.4.2, we are satisfied our approach is designed to neutralize the one-off impact (positive or negative) of the regulatory regime change. This is consistent with the NPV principle.

In addition, a benchmark efficient entity would have been compensated at the prevailing interest rates had the on-the-day approach continue–this would not have been perceived as a clawback. Adopting DRP transition sets the return on debt in respect of DRP in the similar manner it would have been set under the on-the-day approach, however only for the first regulatory year. Lally agrees with our view. Lally stated:[2169]

> Fourthly, in respect of the AER's proposed transitional process for the DRP, this is designed to largely neutralize the large one-off impact of the regime change on the regulated sector, which is good regulatory policy in general, and it also avoids the use of contentious historical DRP data. Many submissions favour immediate adoption of the trailing average DRP but present no arguments that counter these desirable features of the AER's proposed approach.

[2168] MCE, *Changes to the National Electricity Rules to establish a national regulatory framework for the economic regulation of electricity distribution – Explanatory Material*, 2007, p.5.

[2169] Lally, M., *Review of submissions on transition issues for the cost of debt,* 2015b, p. 51.

> Fifthly, and also in respect of the AER's proposed transitional process for the DRP, two submissions in respect of particular businesses claim that the present value of the differences between the DRP allowances received and incurred are adverse up to the date of the regime change and the AER's proposed transitional process would aggravate this situation rather than ameliorate it. However, these alleged future effects from the AER's proposed process are not consequences of it but of the combined effect of the GFC and the timing of the regulatory resets for these businesses, and would have arisen had the old regime been maintained.

The service providers appear to acknowledge that the key rationale for their rejection of DRP transition is the recent fall in interest rates. For example, to explain why it adopted our approach in its initial proposal, SA Power Networks stated:[2170]

> We considered that on the prevailing market data at the time, this transition would deliver a reasonable approximation for the transition that a real electricity network business will have to go through in response to the adoption of the trailing average form of regulation.[2171]

SA Power Networks also stated:

> Since lodging our original proposal, the DRP has fallen further, and this 'on-the-day fall relative to efficient hybrid debt financing practices further depressed the overall weighted average cost of capital relative to market rate. We realised that, to deliver a market based return, it would also be necessary to remedy flaws in the AER's approach on debt by bringing it back into alignment with the efficient hybrid financing practices of a benchmark efficient entity.

Energex submitted:[2172]

> At the time it [Energex] submitted its original proposal, based then on the prevailing interest rate environment the potential difference between either applying the transition or moving to the trailing average immediately was not material. In its original proposal, Energex therefore did not propose to depart on this issue. However, since the original proposal was lodged, the interest rate environment had materially changed and the prevailing DRP has fallen considerably. Accordingly, there is now a more significant difference between the trailing average cost of debt and the prevailing rate, which translates into a material mismatch between the regulated and actual cost of debt.

Similarly, United Energy stated:[2173]

2170 SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 380.

2171 In its initial proposal, SA Power Networks stated there were only 'minor differences' between its view and ours in respect of the return on debt approach. See SA Power Network, Regulatory proposal, December 2014, p.303.

2172 Energex, *2015-20 revised regulatory proposal*, July 2015, p. 106.

2173 United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 17.

> As a result of recent declines in credit spreads over swap rates, the allowed return on debt under the form of the transition to the trailing average that has been set out in the Guideline will be significantly below the required return on debt for the benchmark efficient entity, because of the legacy of embedded debt costs that are being borne by the benchmark entity. The transition method that is favoured by the AER will not result in reasonable estimates of the return on debt for the benchmark efficient entity. If the transition method described in the Rate of Return Guideline were to be implemented, then there would be a mismatch between the allowed return on debt and the required return on debt for the benchmark efficient entity.

G.1.5 Estimating overall windfall gains or losses

In recent decisions, we had regard to high-level analysis by Lally suggesting that the benchmark efficient service provider had accumulated substantial windfall gains. In response to this analysis, service providers submitted new reports from QTC and CEG that proposed alternative approaches to estimate any overall windfall gains or losses.[2174] In response to this new information, we engaged both Chairmont and Lally to review these submissions.

The analyses by Lally, QTC and CEG all employed different methods and assumptions. However, there are some common issues which affect all of these approaches. These are:

- historical data availability
- treatment of previous regulatory estimates of prevailing rates on debt
- firm-specific versus sectoral results.

Having regard to these issues, we are persuaded that this exercise is not achievable to a sufficient degree of precision. As a result, we have not relied on analysis of whether our transitional approach will erode past windfall gains or losses in making this decision. That is, in evaluating whether the transition approaches will allow the service provider the opportunity to recover at least its efficient costs, we have not relied on analysis of past or future windfall gains or losses.

Historical data availability

To estimate the magnitude of past or transitional windfall gains or losses, it is necessary to estimate a series of 'actual' debt portfolio costs. By comparing these portfolio costs to the allowed return on debt, the magnitude of under or over recoveries

[2174] QTC, *Return on debt analysis*, July 2015; CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for SAPN*, June 2015; CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for AGN*, June 2015.

may be estimated. The analysis by Lally, QTC and CEG all broadly follows this approach.[2175]

However, to estimate trailing average portfolio costs in any year, it requires 10 years of historical data relative to that year.[2176] For example, to measure portfolio costs in 2015-–16, data series from 2005–06 are required. For recent years, this is not problematic as there is sufficient high quality data available to estimate the historical portfolio. However, Chairmont stated:[2177]

> Based on our research and the papers of Lally, QTC and CEG it is concluded that there is insufficient history of relevant BBB bond data to measure over and under compensation for an adequate time period to come to any definitive conclusion about the net result over the life of energy assets.
>
> All authors including Chairmont use good data going back to 2001. Prior to this date, the data used incorporated different asset types which at best can provide a rough approximation. For example, Chairmont's use of the spread between Government bonds and swaps as a proxy was for illustrative purposes and is not precise enough to be used to determine actual pricing enforceable on a firm.

Using this relatively reliable data range enables us to estimate a 'complete' portfolio from approximately 2010 onwards. For each year earlier than 2010, the calculations require that either:

- the analysis includes older data which is of questionable reliability—as per the CEG approach[2178]
- the analysis makes assumptions about the older data—as per the CEG approach and the QTC approach[2179]
- the analysis is limited to more recent data and hence regulatory periods—as per the Lally approach[2180]

Under any of these approaches, we are able to estimate over or under compensation during the preceding regulatory period with a relatively high degree of confidence. In all

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2175 QTC, *Return on debt analysis*, July 2015; CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for SAPN*, June 2015; CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for AGN*, June 2015.

2176 Or 9 years and 1 year of prevailing data, depending on the approach adapted to averaging periods.

2177 Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 38-39.

2178 In particular, CEG relies on an illustrative proxy set out by Chairmont, which Chairmont has since described as ' not precise enough to be used to determine actual pricing enforceable on a firm'. See: CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for SAPN*, June 2015; Chairmont, *Financing practices under regulation: Past and transitional*, October 2015, p. 37.

2179 QTC assumes that data for all years prior to 2001–02 is equal to the prevailing rate in 2001–02. QTC, *Return on debt analysis*, June 2015, p. 8

2180 Lally, *Transitional arrangements for the cost of debt*, November 2014, pp. 18–19.

of the three sets of analysis (Lally, CEG, QTC),[2181] the analyses suggest that service providers experience windfall gains during the preceding regulatory period. This is because allowed DRPs were set at or around the GFC, when prevailing DRPs were relatively high, while the trailing average portfolio included predominantly debt raised at lower rates.

Both the QTC and CEG reports suggested that the relevant service providers were undercompensated under the regulatory periods prior to last.[2182] However, their analysis is sensitive to assumptions or less reliable data that are used in order to resolve issues of data availability. For this reason, as the length of our historical analysis increases, our confidence in the results decreases. Nonetheless, to the extent we rely on analysis of windfall gains or losses, we agree it is preferable that we should consider windfall gains or losses over the full period for which the assets are regulated. Since we are persuaded that this exercise is not achievable to a sufficient degree of precision, we have not relied on analysis of whether our transitional approach will erode past windfall gains or losses in making our decision.

Treatment of previous regulatory estimates of prevailing rates on debt

Another issue that arises in undertaking longer-term historical analysis of windfall gains or losses is the treatment of previous regulatory estimates of the return on debt. This issue arises particularly where analysis is undertaken for specific firms, having regard to their actual allowed returns on debt.

In its analysis, QTC substituted prevailing estimates of the DRP made by regulators for market estimates for the same years. This means that the analysis did not only identify windfall gains or losses arising from the mismatch between allowed and actual DRPs that is caused by the use of the 'on the day approach'. Instead, it corrected for wider mismatches in the allowances set by past regulators. As a result of these corrections, the analysis required the problematic selection of competing alternative estimates.

Lally described this issue as follows:[2183]

> … because the approach suggested by the QTC uses both actual past allowances and DRP estimates drawn from market data, conflicts between these two sets of numbers are inevitable, and there is no satisfactory means of resolving this. The QTC's (2015, page 8) approach is to substitute regulatory determinations for its market data based estimates of the DRP wherever they conflict, for the purpose of estimating the DRP incurred. For example, the DRP allowance of 0.64% that was granted to EE in mid-2005 represents not only the compensation given but it also displaces the QTC's market-based estimate of

[2181] Lally, *Transitional arrangements for the cost of debt*, November 2014, pp. 18–19; CEG, CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for SAPN*, June 2015, p. 36;

[2182] CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for SAPN*, June 2015; QTC, *Return on debt analysis*, June 2015, p. 8.

[2183] 'EE' refers to Energex and Ergon Energy. Lally, *Review of submissions on transition issues*, October 2015, p. 30-31.

> the DRP at that time of 0.81%, for the purposes of estimating the DRP incurred by EE at that time. In effect, the historical DRP estimate arising from the market data in 2005 (0.81%) is judged to be wrong because a regulatory determination (0.64%) conflicts with it, and therefore the DRP incurred by that firm at that time is judged to be 0.64% rather than 0.81%. However, if the regulator's judgement is considered to be superior to the contemporaneous estimate arising from the selected DRP series, one could not place much reliance upon the results from the selected DRP series at other points in time as well, and therefore losses or gains calculated through the use of this DRP series could also not be relied upon. Furthermore, if another (otherwise identical) firm currently regulated by the AER had faced a regulatory determination in mid-2005 from a different regulator to the one regulating EE in 2005, and the regulatory determination was (say) 0.85%, the selected historical DRP series would be supplanted by the figure of 0.85% in 2005 for the purpose of estimating the DRP incurred by that firm at that time. Thus, if this process were adopted by the AER, it would have to simultaneously estimate the DRP incurred in mid-2005 at 0.64% for EE and 0.85% for an otherwise identical firm. Obviously, both of these numbers cannot be correct. So, the only internally consistent approach would be to use a single historical series of DRP estimates in order to determine the incurred costs of all firms, and these estimates would typically conflict with regulatory determinations at the reset dates. This would then lead to the AER judging most past regulatory determinations to be wrong (including its own), and therefore clawing back past regulatory determinations that were too 'high' whilst compensating for those that were too 'low', as judged by retrospective use of a DRP series that the AER has currently selected for this purpose.

We agree that either course of action is problematic. The two alternatives are:

- adopt a consistent series of market data instead of intermittently using the regulatory estimates of prevailing rates—this means that the whole data series is consistent. However, it also means that the outcomes of the analysis implicitly correct for regulatory 'errors', where the regulatory estimate is inconsistent with the market estimate as viewed at the time of the analysis.
- adopt regulatory estimates of prevailing rates instead of a consistent series of market data—this avoids correction for past regulatory 'errors'. However, it means that the analysis implicitly assumes the series of market data is unreliable compared to past regulatory estimates. This casts doubt on the remaining results in the analysis.

In light of this shortcoming, we are not satisfied that either approach is likely to produce results in which we can have a high degree of confidence. Nonetheless, for the reasons set out in this section, we have not relied on estimates of historical windfall gains or losses in making this decision. That is, in evaluating whether the transition approaches will allow the service provider an opportunity to recover at least its efficient costs, we have not relied on analysis of past or future windfall gains or losses.

Firm specific versus sectoral results

QTC and CEG analyses reported specific calculations in the circumstances of particular firms.[2184] However, under the allowed rate of return objective, we are required to make our decision with regard to the benchmark efficient entity.[2185] By using firm specific results, the outcomes combine:

- effects arising from the shift between the 'on the day' approach and a trailing average approach, regardless of transition
- effects attributable to the choice of transition approach
- the individual service provider's particular reset timing.

As stated by Lally: [2186]

> The relevance of these points to EE and the approach suggested by the QTC is thus. In respect of the benefits to the industry as a whole, any alleged disadvantages to EE must be considered in light of that benefit to the industry. Secondly, in respect of the transitional regime leaving businesses no better or worse off than they would have been had the regime change not occurred, the adverse impact on EE that the QTC has highlighted is not a consequence of the regime change or even the regime change with a transitional period. None of the past losses are caused by the transitional process, nor are the future expected losses identified by the QTC because they would still have occurred had the old regime remained in place. These losses are principally caused by the combined effect of the GFC and the timing of the regulatory resets for EE. The QTC's argument, in effect, is that the future losses that would have been suffered under the continued operation of the old regime could be avoided by immediate adoption of the new regime rather than use of a transitional process.

Due to this combined attribution, we are not persuaded that the QTC or CEG analysis appropriately identifies the causes for future outcomes. Nonetheless, for the reasons set out in this section, we have not relied on estimates of historical windfall gains or losses in reaching our position.

G.1.6 Swap transaction costs

The service providers proposed to add 23 basis points per annum of transaction costs associated with as part of their proposed return on debt.[2187] Most service providers relied on CEG's advice.[2188]

2184 CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for SAPN*, June 2015; CEG, *Transition to the trailing average rate of return on debt: Assessment and calculations for AGN*, June 2015; QTC, *Return on debt analysis*, June 2015.

2185 NER, cl.6.5.2(c); NGR, r.87(3).

2186 'EE' refers to Energex and Ergon Energy. Lally, *Review of submissions on transition issues*, October 2015, p. 31-32.

2187 AusNet Services, *Regulatory proposal 2016-20*, 30 April 2015, p. 349; United Energy, *2016 to 2020 Regulatory Proposal - rate of return on debt proposal for the 2016 to 2020 regulatory period Attachment*, April 2015, p. 22; ActewAGL, *Access Arrangement Information for the 2016-21 ACT, Queanbeyan and Palerang Access Arrangement, Appendix 8.01: Return on debt-detailed proposal, Submission to the Australian Energy Regulator*, We are not satisfied that customers should pay for the service providers' reduction in interest rate risk that results from hedging. NERA supported this view.[2189] In 2007, NERA assessed whether network service providers should be compensated for hedging costs. NERA concluded:[2190]

> It is important to note that the beneficiaries of this reduction in risk are not Powerlink's customers but rather are Powerlink's owners. Unlike operating expenditure required to ensure the network's ongoing reliability, expenditure on interest rate hedging only benefits the owners of the asset. This raises the obvious question:
>
> "Why should Powerlink be compensated for risk reductions that, if they are efficient, will pay for themselves?"

In addition, historically, we have not provided an explicitly allowance for transaction costs associated with swap contracts. As set out in the 2009 WACC review, we consider the service providers received a fair compensation in the past and had scope to employ these allowances to pursue efficient practices as they saw fit.[2191] For example, the service providers were compensated based on:

- A broad BBB credit rating even though the benchmark credit rating was BBB+
- A 10 year debt term (risk free rate and DRP) even though the benchmark efficient entity would have incurred a 5 year risk free rate due to hedging.

In the 2009 WACC review, when considering the appropriate term for the risk free rate, we decided to maintain the 10 year. In doing so, we acknowledged that this would result in over compensation based on the observation that privately-owned business hedged the risk free rate component of the return on debt over the regulatory control period; effectively incurring a 5 year risk free rate. We concluded:[2192]

> On this basis the AER considers it inappropriate to allow any explicit compensation for any additional transaction costs (e.g. hedging costs) at the time of a reset.

June 2015, p. 14; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 151; CitiPower, *Regulatory proposal 2016-2020*, April 2015, p. 238-239; Powercor, *Regulatory proposal 2016-2020*, April 2015, p. 246; Jemena Electricity Networks (Vic) Ltd, *2016-20 Electricity Distribution Price Review Regulatory Proposal, Attachment 9-2, Rate of return proposal*, April 2015, p. 105; AGN, *2016/17 to 2020/21 Access Arrangement Information, Attachment 10.1: Rate of Return*, July 2015, p.53; Energex, *2015-20 revised regulatory proposal*, July 2015, p. 111.

2188 CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015.

2189 NERA, *Hedging for regulated businesses*, April 2007. This report was authored by Dr Hird who is also the author of the CEG report on which the service providers relied to support their proposal of an explicit allowance for swap transaction costs.

2190 NERA, *Hedging for regulated businesses*, April 2007, p. 7.

2191 AER, *Electricity transmission and distribution network service providers Review of the weighted average cost of capital (WACC) parameters – final decision*, May 2009, p.168.

2192 AER, *Electricity transmission and distribution network service providers Review of the weighted average cost of capital (WACC) parameters – final decision, May 2009*, p.168.

Lally also agreed with our view by stating: [2193]

> However, it is also true that the AER used the ten-year risk free rate at these five-yearly resets rather than the five-year risk free rate, the latter should have been used, and the benefit to the firms from this (ten-year rates are generally higher) outweighs the transactions costs of the swaps.

Lally concluded that hedging would have been self-funding because the saving in converting 10 year debt into 5 year debt would have offset the cost of the hedge.

We responded to this matter in our recent decision for TransGrid and JGN.[2194] The service providers did not address the reasons set out in these decisions.

G.1.7 Other issues raised by the service providers

Energex and QTC

QTC's rationale

Energex and the QTC submitted that the QTC's primary objective in proposing a debt transition (which we adopted (option 2) was to obtain broad stakeholder support for a trailing average approach that applies to the total 10-year benchmark debt yield.[2195] Specifically, the QTC considered that at the time:[2196]

- Some service providers were concerned that their existing base rate hedges would need to be unwound prior to maturity.
- The AER was concerned that service providers would opportunistically switch between the on-the-day and trailing average approaches based on differences between the prevailing and historical average benchmark debt yield.
- A continuous historical time series of the 10-year BBB+ debt risk premium (DRP) was not available at the time.

Energex and the QTC appear to suggest that these concerns no longer relevant because they consider that:[2197]

> Subsequent to QTC's original proposal the AER determined service providers will not have the option to automatically switch between different return on debt approaches, and that the same trailing average approach will apply to all service providers. Furthermore, historical estimates of the 10-year benchmark debt yield are now available from the Reserve Bank of Australia (RBA) from

[2193] Lally, M., Transitional arrangements for the cost of debt, November 2014, p.31.

[2194] AER - *Draft decision TransGrid transmission determination - Attachment 3 - Rate of return* - November 2014, pp.3-295-296.

[2195] Energex, *2015-20 revised regulatory proposal*, July 2015, p. 111; Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 105; QTC Return on debt analysis - July 2015, p. 3.

[2196] QTC Return on debt analysis - July 2015, p. 3.

[2197] QTC Return on debt analysis - July 2015, p.3.

January 2005. As a result, concerns over opportunistic switching by service providers and data availability are no longer relevant.

In response, we make the following observations:

- Apart from trying to get all the stakeholders to accept the trailing average approach at the time, there were genuine issues in respect of how to commence this new approach. Energex and the QTC failed to acknowledge these issues. Specifically, the QTC's transition was also designed to avoid any unintended consequences of switching from the on-the-day to a trailing average approach.[2198] One of these effects was pointed out by SFG. SFG criticised the trailing average approach on the basis that it would reflect historical rates rather than prevailing rates (the rate of return is prospective). The QTC agreed with SFG that the rate of return should be prospective; that is, it should reflect prevailing interest rates rather than the historical interest rates. The QTC stated: [2199]

  > SFG's criticism of the moving average model, that it reflects historical rates rather than prevailing cost of funds, is in QTC's view only relevant if historical information is incorporated at the point when a firm switches from the existing framework into the new model. Absent any transitional rules, a decision by a firm to switch into the moving average method therefore allows a choice to be compensated at the prevailing cost of funds or a historic cost of funds (albeit that from one year's time the moving average will over time start to reflect prevailing rates). This issue can be addressed by assuming that, at the point of switching over, the rates for all previous periods are equal to the prevailing rate. This type of transitional rule is incorporated in QTC's proposal to avoid any short-term unintended consequences.

- The QTC also stated:[2200]

  > The moving average approach would only be applied prospectively. In the first year, that year's data would be weighted 100 per cent, then progressively new data would be weighted in. There is no need to determine prior year values, and in fact to do so would allow the potential for arbitrage, if the election to use the moving average approach resulted in a higher starting rate.

- Another concern raised by stakeholders at the time was that a trailing average will capture the Global Financial Crisis (GFC) interest rates; and therefore result in a higher rate of return. The QTC at the time assured the stakeholders that this will not be the case because its proposed transition is prospective. However, the trailing average DRP that the QTC now advocate will in fact capture the GFC DRP and result in higher DRP relative to the prevailing rates. The QTC stated:[2201]

2198 QTC, *Response to the AEMC direction paper on rules change*, April 2012, p.35.

2199 QTC*, Response to the AEMC direction paper on rules change*, April 2012, p.35.

2200 QTC, *Response to the AEMC direction paper on rules change*, April 2012, Attachment 2: Moving Average Approach Design Paper (draft), p. 9.

2201 QTC, *Response to the AEMC direction paper on rules change*, April 2012, Attachment 2: Moving Average Approach Design Paper (draft), p. 10.

> Historical data for the Global Financial Crisis would not be incorporated, because the transitional rule only allows the use of current data at the time of the election to use the moving average approach.

- At the time, the QTC acknowledged that a benchmark efficient entity DRP is likely to be consistent with a trailing average rather than the prevailing DRP. The QTC considered that it could be argued the benchmark DRP that should apply from the start of the next regulatory control period should be based on the trailing average. However, the QTC was not persuaded it would be the correct approach because it would include embedded costs, which it considered should not be included to maintain the forward looking feature of the rate of return. The QTC stated:[2202]

> However, as noted previously, it is not the intention of the moving average approach that it should provide a recovery of embedded debt costs *at the time of the switch* [emphasis added]. Therefore it is suggested that the general transitional rule should apply, consistent with other WACC parameters.

- However, in its recent report for Energex and Ergon Energy, the QTC appears to ignore all the above considerations. Specifically, the QTC alleged that by applying the transition (designed by QTC) to DRP we 'intentionally produce a starting allowed return on debt that is lower than the efficient cost of debt under the hybrid strategy'.[2203] Contrary to the QTC, for the reasons set out earlier, we consider that under our approach, the level of allowed DRP is driven by the level of prevailing DRP–rather than the application a transition. As set out earlier, the service providers acknowledged the effect of current low interest rates.
- In respect of the issue of opportunistic behaviour, for the reasons set out in section 3.4.2, we are not persuaded it is less relevant now than at the time the QTC proposed its approach. For example, JGN, Energex, Ergon, SA Power Networks switched from supporting option 2 in their initial proposals to proposing option 3 in the revised proposals. The Victorian distribution service providers switched from supporting option 2 during the rate of return guideline development to now advocate option 3 in their regulatory proposal. To us, this is an indication of opportunistically switching between approaches based on the approach that is perceived to yield a higher return on debt.

Efficient financing costs over the life of the assets

Energex submitted the concept of efficient financing costs over the life of the assets is irrelevant.[2204] We disagree.

Our approach to the meaning of efficient financing costs was broadly supported by expert advice commissioned by us (Chairmont, Lally), and by advice commissioned by

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2202 QTC, *Response to the AEMC direction paper on rules change*, April 2012, Attachment 2: Moving Average Approach Design Paper (draft), p. 7.

2203 QTC, *Return on debt analysis* - July 2015, p. 3.

2204 Energex, *2015-20 revised regulatory proposal*, July 2015, p. 109.

the service providers, including Energex (Professor Gray (Frontier and SFG).[2205] For example, Chairmont stated:[2206]

> This is a good high level definition because it captures the required balancing of cost and risk. It also foreshadows the contentious areas in the transitional arrangements debate.

Similarly, Frontier (commissioned by TransGrid) stated:[2207]

> In my view it is reasonable to consider that efficient service providers would be seeking to minimise the expected present value of its financing costs over the life of its assets. In this endeavour, the service provider would weigh up considerations such as the rate of interest (long-term debt is, on average, more expensive than short-term debt), refinancing and interest rate risk (for example, the firm would bear a very large cost if it was unable to refinance on reasonable terms during a financial crisis), and transaction costs (for example, there are fixed costs associated with every debt issuance and with hedging activities).

SFG and Frontier (commissioned by Energex) made a similar statement to Frontier (commissioned by TransGrid).[2208]

QTC

The QTC submitted a benchmark efficient entity should be viewed as a stand-alone entity. [2209] The QTC considered that it was incorrect for Lally to suggest that ownership structure or status is relevant when determining the allowed return on debt. In his November 2014 report Lally expressed concerns regarding a differential application of a transition to service providers based on the timing of their regulatory cycles.[2210]

Specifically, Lally acknowledged that businesses are subject to different regulatory cycles, and as a result, they would experience different gains or losses arising from the DRP spike induced by the GFC. Lally considered a transition to the trailing average

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2205 Chairmont, Cost of debt: Transitional analysis, April 2015, pp.26–30; Lally, Review of submissions on the cost of debt, April 2015, pp.7–8. Frontier, TransGrid cost of debt transition, January 2015, p.7. SFG, Return on debt transition arrangements under the NGR and NER–draft report for Jemena gas networks, Jemena electricity networks and United Energy, February 2015, p.12. Lally stated the usual practice in financial economics is to assume firms seek to maximise shareholder wealth. He described the difference between this description and our description as 'subtle'.

2206 Chairmont, Cost of debt: Transitional analysis, April 2015, p. 29 .

2207 Frontier, TransGrid cost of debt transition, January 2015, p.7.

2208 SFG, *Return on debt transition arrangements under the NGR and NER–draft report for Jemena gas networks, Jemena electricity networks and United Energy*, February 2015, p.12; Frontier, *Cost of debt transition*, June 2015, paragraph 16. The quotes from Frontier and SFG are similar. We note that SFG and Frontier for Energex do not specifically make reference to the term 'over the life of its assets', whereas Frontier for TransGrid does. However, there is nothing in SFG's report to indicate that it disagrees with our or Frontier's characterisation of efficient financing costs. We also note that the Frontier and SFG reports have the same author.

2209 QTC, *Return on debt analysis* - July 2015, p. 7.

2210 Lally, M. , *Transitional arrangements for the cost of debt*, November 2014, pp. 4–5.

should apply differently to businesses based on this observation. However, Lally favoured a uniform application of a transition. Lally stated:[2211]

> Again, I do not support such differential treatment because the appropriate treatment for each business is far from clear, because doing so would establish an undesirable precedent, and because the corporate groups to which regulated businesses belong are typically involved in a range of different regulated activities with different cycle commencement dates and this would push all businesses towards the average outcome of about 1.3% of debt value in present value terms.

We do not have a firm view on whether a benchmark efficient entity should be standalone or a corporate group. In the recent decisions, we considered this matter. Our consideration is set out in the final decision for Ausgrid.[2212] We were satisfied that whether a benchmark efficient entity is standalone or a corporate group would not have significantly alter the financing practices we considered efficient under the on-the-day approach. This view was supported by Chairmont.[2213]

Ergon Energy

Ergon Energy submitted that we raised new matters in the recent decision in relation to the efficient financing practices of a benchmark efficient entity.[2214] We disagree.

Ergon Energy has misunderstood our recent decisions. We did not have any substantive 'new findings' in the recent decisions in relation to efficient financing practices under the on-the-day approach. Our position in the recent decisions on efficient financing practices was consistent with our position during the development of the rate of return guideline.

In the recent decisions, we stated:[2215]

> We consider an efficient financing practice of the benchmark efficient entity under the on-the-day approach would have been to borrow long term and stagger the borrowing so that only a small proportion of the debt matured each year. We consider the benchmark efficient entity would have combined this practice with interest rate swap contracts to match the risk free rate component of its return on debt to the on-the-day rate. Specifically, we consider an efficient financing practice would have been:
>
> - to borrow long term (10 year) debt and stagger the borrowing so that only a small proportion (around 10 per cent) of the debt matured each year

2211 Lally, M. , *Transitional arrangements for the cost of debt*, November 2014, pp. 4–5.

2212 AER, *Final Decision for Ausgrid –Attachment 3 rate of return,* April 2015, pp.3-487–488.

2213 Chairmont, *Cost of debt Transitional analysis*, April 2015, p.8.

2214 Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 149.

2215 For example: AER, Draft decision–JGN access arrangement 2015–20–Attachment 3: Rate of return, November 2014, p.114. We made analogous statements in the decision for Ausgrid, TransGrid, ActewAGL, Essential Energy, Endeavour Energy.

- to borrow using floating rate debt (or to borrow fixed rate debt and convert this to floating rate debt using fixed-to-floating interest rate swaps at the time of issuing the debt and which extended for the term of the debt, being 10 years), and
- to enter into floating-to-fixed interest rate swaps at, or around, the time of the service provider's averaging period and which extended for the term of the access arrangement period, being typically 5 years).

This is consistent with our view on efficient financing practices that we expressed during the rate of return guideline development process. In the explanatory statement to the final rate of return guideline, we stated:

> Under the 'on the day' approach, the benchmark efficient entity can manage its interest rate risk in a number ways.[2216]
>
> …
>
> For example, the benchmark efficient entity could hold a floating-rate debt portfolio with staggered maturity dates. It could then overlay this with 'pay fixed' interest rate swaps to hedge the base rate to the regulatory allowance for the duration of the regulatory control period. This strategy would address its refinancing risk and limit the potential mismatch between the regulatory return on debt allowance and its expected return on debt to their DRP components.[2217]
>
> …
>
> Given the observed practices of regulated network businesses and the definition of the benchmark efficient entity, we consider that the following practice is likely to constitute an efficient debt financing practice of the benchmark efficient entity under [sic] current 'on the day' approach: holding a debt portfolio with staggered maturity dates and using swap transactions to hedge interest rate exposure for the duration of a regulatory control period. [2218]

Accordingly, we are not satisfied that Ergon's characterisation of our recent decisions is a change in circumstances (or other reason) why we should accept Ergon's proposed hybrid transition.

Ergon also submitted that other service providers (SA power Network and JGN) changed their initial proposal of option 2.[2219] We are not satisfied this is valid reason to adopt Ergon's proposed hybrid transition.

[2216] AER, Better regulation–Explanatory statement to the final rate of return guideline, December 2013, p.105.

[2217] AER, Better regulation–Explanatory statement to the final rate of return guideline, December 2013, p.105.

[2218] AER, Better regulation–Explanatory statement to the final rate of return guideline, December 2013, p.107.

[2219] Ergon Energy, *Regulatory Proposal 2015-20 (revised), Appendix C: Rate of Return*, July 2015, p. 149.

SA Power Networks and CEG

SA Power Networks and CEG submitted that the AER did not impose a transition in past when it changed the return on debt methodology from the rolling average applied by The Essential Services Commission of South Australia (ESCoSA) (2005-2010) to the AER's on-the-day approach (2010-2015).[2220] Based on this SA Power Networks and CEG considered the AER and Lally did not establish any windfall gain actually occurred for SA Power Networks.[2221]

For the reasons set out in section 3.4.2, we are satisfied a gradual transition to a trailing average approach would result in a return on debt that contribute to the rate of return objective. Also, in respect of applying a transition now and not in the past, we make the following observations:

- Under the new rules, the AER has greater flexibility in setting the return on debt. The new rules make provision for the AER to have regard to any impact on a benchmark efficient entity of changing the method to estimate the return on debt from one regulatory control period to another.[2222] In exercising its flexibility (discretion), the AER took into account the revenue and pricing principles.
- In contrast, under the previous rules, the on-the-day approach was mandatory and the flexibility concerning whether and how the AER might allow businesses to recover efficient costs was constrained.

G.1.8 Form of transition

Our decision is to estimate an on-the-day rate on debt for the first year of the transition period regulatory control period and gradually transition this rate to a trailing average approach over 10 years. This is consistent with the transitional arrangements in the resent decisions. In making this decision, we assessed different potential transition paths. For the reasons set out in attachment 3, we are satisfied that a return on debt resulting from this approach would contribute to the achievement of the allowed rate of return objective. :

In section 3.4.2, we set out four options for the return on debt approach. Those options are:

- Option 1—Continue the on-the-day approach
- Option 2—Start with an on-the-day rate for the first regulatory year and gradually transition into a trailing average approach over 10 years

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[2220] SAPN, *Revised Regulatory Proposal 2015-20*, July 2015, p. 388; CEG, *Transition to the trailing average rate of return on debt assessment and calculations for SAPN*, June 2015.

[2221] CEG, *Transition to the trailing average rate of return on debt assessment and calculations for SAPN*, June 2015, paragraphs 146-150.

[2222] NER, cl. 6.5.2(k)(4); NGR, r. 87(11)(d).

- Option 3—Hybrid transition. Start with an on-the-day rate for the base rate component and gradually transition into a trailing average approach over 10 years. And combine with a backwards looking historical DRP (that is, no DRP transition).
- Option 4—Adopt a backwards looking trailing average approach (that is, no transition on either the base rate or DRP components of the return on debt)

Two of these options include a transition on the base rate component of the return on debt (options 2 and 3). In attachment 3, we also noted that there were possible variations associated with some of those options. In particular, there are variations available for how we transition the base rate component of the return on debt. In this section, we consider the alternatives for how the base rate is transitioned (under either option 2 or 3). Those alternatives are:

- Variation A: Lally's transition path using a floating rate reset annually[2223]—during the first year of the new regime, the base rate component of the return on debt would be weighted 90 per cent at the prevailing floating rate during that year and 10 per cent at the prevailing risk free rate. In the second year, the base rate component would be weighted 80 per cent at the prevailing floating rate in the second year, 10 per cent at the prevailing risk free rate in the second year, and 10 per cent at the risk free rate from the first year, and so forth for the remaining years. Under this transition path a benchmark efficient entity would not need to engage in further interest rate swaps at the start of the new regulatory regime to match the base component of its actual return on debt with the allowed return on debt. While this option would eliminate the mismatch between the actual and allowed return on debt, Lally advised that it would require the adoption of a transition path for the debt risk premium different from that for the risk free rate. Accordingly, adopting different transition paths for the base rate component and the debt risk premium component adds complexity.
- Variation B: QTC transition path largely based on that developed by the Queensland Treasury Corporation (QTC).[2224] It uses 10 year risk free rate set for 10 years—under this approach, the trailing average commences based on the prevailing rate in the first year, and this is progressively updated as set out in the draft decision. Lally estimated that this option would reduce to close to zero the mismatch between the actual and allowed return on debt of a benchmark efficient entity.[2225] Also, it has the advantage that it can be applied to the debt risk premium component as well as the base rate component, avoiding the additional complexity

[2223] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.8–12.

[2224] We based variation B (our transition) on the approach recommended by QTC. We refer to this as 'the QTC approach'. The key difference between Variation B and the transition path proposed by QTC is that the latter is based on a weighted trailing average. During the Guideline process, we proposed to adopt a simple trailing average to estimate the return on debt. This view was maintained in the recent decisions.

[2225] Lally estimated the residual mismatch to 0.5 per cent per year. For more details, see: Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.8–12.

of variation A.[2226] This transition path was also subject to extensive consultation during the guideline development and the draft decision processes. Most submissions on the return of debt supported this type of approach to the commencement of the trailing average.[2227]

- Variation C: alternative transition path using 10 year risk free rate reset after 5 years—this option is similar to variation B for the first regulatory control period under the new regime, but differs for the second regulatory control period. For the second regulatory control period, the return on debt on the portion of the debt portfolio that is yet to be updated is reset to the prevailing rate at the start of the second regulatory control period. The key difference between variation B and C is that the latter places less weight on the prevailing return on debt from the start of the first regulatory control period. The return on debt in the first regulatory control period would be identical under variations B and C. In essence, variation C more closely replicates a continuation of the on-the-day approach for existing debt, where the allowed return on debt was reset at each regulatory control period. However, Lally compared variation B and C under various interest rate scenarios and concluded:[2228]

  > So, despite the fact that this alternative transitional regime has greater conceptual appeal, its results are less satisfactory, and therefore the AER's proposed scheme is superior.

- Variation D: Chairmont's transition path using the average of 1 to 10 swap rate set for 10 years[2229]—the mechanics of this option are similar to that of variation B with the key difference that the rate applying is the average 1 to 10 year swap rate. Also, variation D applies only to the risk free rate component.

Each of these variations has strengths and weaknesses. Our consideration in assessing them included whether a variation:

- provides an achievable financing strategy with matching regulatory policy
- results in over or under compensation and to what extent.

[2226] Lally estimated the residual mismatch to 0.5 per cent per year. For more details, see: Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.4-5.

[2227] PIAC, *Public Interest Advocacy Centre • A missed opportunity?- Submission to the Australian Energy Regulator's Draft Determination for Ausgrid, Endeavour Energy and Essential Energy*, February 2015, pp.44–45; Origin, *Submission to AER draft determination for NSW electricity distributors*, February 2015, pp.16–19; AGL, *Submission on NSW electricity distribution network determinations 2014-19: AER draft decisions and revised regulatory proposals,* February 2015, p.3; Ergon Energy, *Submission on the draft decisions: NSW and ACT distribution determinations 2015–16 to 2018–19*, February 2015, p.6

[2228] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.12.

[2229] Lally and CEG also considered a similar transition path. For more details, refer to Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.6; CEG, *Critique of the AER's JGN draft decision on the cost of debt*, February 2015, p.17. This transition path was also considered by the Regulatory Economic Unit (REU) (formerly Regulatory Development) of the ACCC. For more details, refer to: ACCC, Regulatory Economic Unit (formerly Regulatory Development), *Estimating the cost of debt: A possible way forward*, April 2013, pp.45–49.

- is simple to implement–what complexity is involved in respect of its application to both the risk free rate and the debt risk premium.
- was consulted on–the desirability of avoiding change given the guideline and draft decision consultation.

Variation A and D – Lally and Chairmont

In comparing variation A and variation D, our considerations are that:

- Both have achievable financing strategies with a matching regulatory policy.[2230] The relevant regulatory policy is that the trailing average would apply to all new debt. while for existing debt a benchmark efficient entity may enter into a series of swaps contracts. Lally described the process as:[2231]

  > …the regulated businesses entering into a series of swap contracts upon the commencement of the new regime, to swap each of their prevailing floating-rate exposures into a fixed rate for the remainder of the borrowing. Thus, the debt with one year to maturity would be swapped into one-year fixed-rate debt; the debt with two years to maturity would be swapped into two-year fixed-rate debt, etc.

- Because of this both transition paths would achieve a close match between cost and allowance; that is, there would be no under or over compensation under either.[2232]
- Both are more complex than variation B and variation C.[2233] However, variation D (Chairmont) is less complex than variation A (Lally) because it does not require updating each year. In addition, both require a different transition path for debt risk premium.[2234] This feature adds complexity. Variation A (Lally) path is also more complex than variation D (Chairmont) on this front.
- Both are a departure from the guideline. Through the draft decision, stakeholders have had the opportunity to comment on variation A (Lally). But, we received no response from stakeholders. Stakeholders have not had an opportunity to comment on variation D (Chairmont).[2235] But, they better reflects the underlying rationale from the guideline and draft decision than variations B and C (in respect of the risk free rate).[2236]

[2230] Chairmont, *Cost of debt Transitional analysis*, April 2015, p.48; Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.13–14.

[2231] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.10.

[2232] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.7–11; Chairmont, *Cost of debt Transitional analysis*, April 2015, p.48.

[2233] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.10–11 and p.38; Chairmont, April 2015, p.8.

[2234] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.38; Chairmont, Cost of debt Transitional analysis, April 2015, p.48.

[2235] We commissioned Chairmont after the publication of the draft decision for these businesses.

[2236] Chairmont, *Cost of debt Transitional analysis*, April 2015, p.11.

Variation B and C –QTC 10 year and alternative 5 year reset

In comparing variation B and variation C, our considerations are that:

- Both have achievable financing strategies with a matching regulatory policy.[2237] As discussed in section 3.4.2, the relevant regulatory policy is that the trailing average would apply to all new debt while the on-the-day approach would continue to apply to existing debt.
- Variation B (based on QTC) has the same underlying financing strategy as variation D (Chairmont's). However, Chairmont considered variation B represents a simplification that leads to over-compensation.[2238] We agree with this assessment.
- Variation C (alternative 5 year reset path) is based on a similar financing strategy as that adopted by firms under on-the-day approach. It is also likely to over-compensate the base rate for same reasons as variation B.
- Both are relatively simple to implement, relative to variation D (Chairmont) and variation A (Lally), but simplicity creates over-compensation.
- Both also allow the same transition path for the base rate and debt risk premium. This feature adds to simplicity.
- Variation C (alternative) continues the on-the-day rate regime more closely than variation (QTC). Variation B (QTC) reflects the transition path that was consulted on through the rate of return guideline and adopted in the draft decision. Variation C (alternative) was consulted on through the draft decision. But we received response from stakeholders.

Table 3-68 summarises our assessment of different transition paths.

Table 3-68: Transition paths—assessment summary

Criteria	Variation A (Lally)	Variation B (based on QTC)	Variation C (Alternative)	Variation D (Chairmont)
an achievable financing strategy with matching regulatory policy	Yes	Yes	Yes	Yes
results in over or under compensation and to what extent	No	Yes Less than variation C	Yes More than variation B	No
simple to implement (e.g. same path applying to both the base rate and the	No Less than variation D	Yes	Yes	No More than variation A

[2237] Chairmont, Cost of debt Transitional analysis, April 2015, p.48; Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.13–14.

[2238] Chairmont, *Cost of debt Transitional analysis*, April 2015, p.8.

Criteria	Variation A (Lally)	Variation B (based on QTC)	Variation C (Alternative)	Variation D (Chairmont)
debt risk premium)				
was consulted on	Yes Draft decision only	Yes Guideline and draft decision	Yes Draft decision only	No

Source: AER's analysis

In section 3.4.2, we set out our reasons for a gradual transition to a trailing average approach (adopting option 2). Based on the above assessment of different transition path variations, on balance, we maintain variation B (QTC). This is consistent with the transition path from the guideline and the recent decisions. Specifically, we will pair option 2 with variation B (QTC). This provides simplicity by adopting the same transition path for both the base rate and debt risk premium components on the return on debt. As noted above, this option is likely to over compensate a benchmark efficient entity on the base rate.

However, if we were to adopt option 3, we would pair this with variation D. This provides a better match to a benchmark efficient entity's financing costs over the next regulatory control period.

H Return on debt implementation

In attachment 3, we set our decision on how to implement our return on debt approach and the key reasons for that decision (section 3.4.2). In this appendix we provide further detailed analysis to support our decision. We also respond to the issues raised in service providers' proposals and submissions from other stakeholders concerning the return on debt implementation.

Specifically, the matters addressed in this appendix are:

- Matters associated with the calculation of our industry median credit rating including choice of comparator set and length of estimation period

H.1 Credit rating

In section 3.4.2 of attachment 3, we set out our position and key reasons on the benchmark credit rating. In this section, we set out further supporting details behind our calculation of the median credit rating of a sample of firms that are comparable to the benchmark efficient entity (the industry median). We also respond to issues raised by service providers on the calculation of the industry median.

We are satisfied that the industry median, based on our comparator set, supports a benchmark credit rating of BBB+. Stakeholders took differing positions on the benchmark credit rating. Service providers proposed a BBB benchmark credit rating. Consumer groups support a BBB+ benchmark credit rating or higher. They also suggest that the average cost of debt for service providers is lower than implied by their credit ratings. Some consumer groups propose that the AER has provided a significantly higher cost of debt allowance than is appropriate.[2239] We are not satisfied these submissions provide reason to depart from our BBB+ benchmark credit rating.

In this section we set out the comparator set we use to estimate the industry median. We also respond to the following issues raised by stakeholders:

- whether the current industry median is BBB+ or BBB (raised by service providers)
- the length of the period used to estimate the industry median (raised by service providers)

[2239] CCIQ, Submission to the Australian Energy Regulator on Energex's regulatory proposal for the 2015-20 revenue determination, January 2015; VECUA, Submission to the AER: Victorian Distribution Networks' 2016-20 revenue proposals; EURCC, Proposal to change the National Electricity Rules in respect to the calculation of the return on debt, October 2011; ECCSA, AER review of SAPN application 2014: ECCSA response to AER's preliminary decision, June 2015; CCP, *Bruce Mountain: Comments on the AER's Preliminary Decision on the Weighted Average Cost of Capital (WACC) for Energex, Ergon and SA Power Networks, July 2015; SACES, Independent estimates of the WACC for SAPN: Report commissioned by the SACOSS, January 2015, pp. 13-14*

- whether certain businesses should be excluded from the comparator set used to estimate the industry median (raised by Victorian service providers and SA Power Networks)
- whether credit ratings are a good indicator of the return on debt (raised by consumer representatives)

H.1.1 Comparator Set

We draw our comparator set for estimating the benchmark credit rating from Standard and Poor's industry report cards, with the exclusion of a firm that is owned by an Australian state government.[2240] This is made up of the following businesses:

- APT Pipelines Ltd
- ATCO Gas Australian LP
- DBNGP Trust
- DUET Group
- ElectraNet Pty Ltd
- Energy Partnership (Gas) Pty Ltd
- Australian Gas Networks Ltd— previously Envestra Ltd
- ETSA Utilities
- Powercor Australia LLC
- AusNet Services — previously SP AusNet Group
- SGSP Australia Assets Pty Ltd — previously SPI (Australia) Assets Pty Ltd
- The CitiPower Trust
- United Energy Distribution Pty Ltd.

We consider the median credit ratings over different time periods using our comparator set. Table 3-69 sets out these median credit ratings.

[2240] That is Ergon Energy Corp Ltd.

Table 3-69 Median credit rating—Comparator set of firms

Time period	Median credit rating	Time period	Median credit rating
2015 (to date)	BBB+	2010–2015	BBB/BBB+
2014–2015	BBB+	2009–2015	BBB
2013–2015	BBB+	2008–2015	BBB+/BBB
2012–2015	BBB/BBB+	2007–2015	BBB/BBB+
2011–2015	BBB/BBB+	2006–2015	BBB/BBB+

Source: Bloomberg, AER analysis

While Table 3-69 shows some support for a credit rating of BBB, we consider it shows stronger support for a credit rating of BBB+.

H.1.2 Current Industry Median

Table 3-70 sets out the median credit ratings across our comparator set since the 2006 calendar year end. This includes the following rating changes over time:

- On 18 December 2013, ATCO Gas Australian LP was upgraded from BBB to A-
- On 18 December 2013, Powercor Australia LLC was downgraded from A- to BBB+
- On 20 December 2013, DUET Group became non-rated (NR) rather than having a credit rating of BBB-
- On 20 December 2013, AusNet Services was upgraded to A-, rather than BBB+
- On 20 December 2013, SGSP Australia Assets Pty Ltd was upgraded to BBB+, rather than BBB.
- On 28 November 2014, ElectraNet Pty Ltd was upgraded to BBB+ from BBB
- On 11 August 2014, Envestra Ltd was upgraded to BBB+ from BBB.

Table 3-70 Median credit ratings of network service providers over time

Issuer	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
APT Pipelines Ltd	NR	NR	NR	BBB	BBB	BBB	BBB	BBB	BBB	BBB
ATCO Gas Australian LP	NR	NR	NR	NR	NR	BBB	BBB	A-	A-	A-
DBNGP Trust	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
DUET Group	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	NR	NR	NR
ElectraNet Pty Ltd	BBB+	BBB+	BBB+	BBB	BBB	BBB	BBB	BBB	BBB+	BBB+

Issuer	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Energy Partnership (Gas) Pty Ltd	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
Australian Gas Networks Ltd	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB	BBB+	BBB+
ETSA Utilities	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
Powercor Australia LLC	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	BBB+
AusNet Services	A	A	A-	A-	A-	A-	A-	A-	A-	A-
SGSP Australia Assets Pty Ltd	NR	NR	A-	A-	A-	A-	A-	BBB+	BBB+	BBB+
The CitiPower Trust	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	BBB+
United Energy Distribution Pty Ltd	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB
Median (year)	BBB/ BBB+	BBB/ BBB+	BBB+	BBB	BBB	BBB	BBB	BBB/ BBB+	BBB+	BBB+

Source: Bloomberg, Standard and Poor's, AER analysis.

H.1.3 Length of estimation period

We consider it is useful to have regard to variability in the median credit rating throughout time. This recognises the trade-off between using shorter term and longer term historical data. On one hand, shorter term data is more likely to reflect current expectations. On the other hand, longer term data may reduce the influence on the median from firm specific or idiosyncratic factors.

Service providers made different submissions on the length of the estimation period. The majority of service providers submitted that the length of the estimation period should be approximately five years, such as the period used by CEG.[2241]

[2241] AusNet Services, *Initial Regulatory Proposal, April 2015*, p. 335; CitiPower, *Initial Regulatory Proposal*, April 2015, pp. 227-228; Jemena, *Initial Regulatory Proposal*, April 2015, p. 103; Powercor, *Initial Regulatory Proposal*, April 2015, pp. 235-236; United Energy, *Initial Regulatory Proposal*, April 2015, p.106; SAPN, Revised regulatory

In response to these proposals, we note the following:

- In this decision, we consider how the median credit rating has changed over different periods—from over the last decade to the current year. The majority of these time periods support a median credit rating of BBB+. As such, we have had regard to data over the short, medium and longer term.
- A further consideration in our decision making is that the credit rating is intended to apply to the regulatory cycle over the next five years. This issue was also identified by Lally[2242]. Therefore it is necessary to form a judgement as to the future direction of credit ratings for a benchmark efficient entity. We consider our consistent and transparent approach in allowing network operators to recover their efficient costs will allow a benchmark efficient entity to maintain their present credit rating level.

This view is also shared by credit ratings agency Moody's, in their 2015 report, which has stated: [2243]

> We expect that the Australian Energy Regulator (AER) will maintain its long standing approach to setting rates of return and allowing the networks to fully recover costs. This transparency underpins the predictability of their cashflows and provides networks with a window to implement countermeasures to manage revenue reductions if required. Revenue reductions in recent decisions reflect low interest rates as opposed to changes in regulatory intent. We have maintained a stable outlook for industry since early 2014.

Therefore, we are not persuaded that a change from a benchmark credit rating of BBB+ to BBB is supported by the evidence. We disagree that a credit rating of BBB will generate a rate of return that is commensurate with the efficient financing costs of a benchmark efficient entity. We consider that the majority of evidence over the short, medium and long term supports continuing a benchmark credit rating of BBB+.

We apply a benchmark credit rating of BBB+ for this regulatory control period. However, since independent data service providers publish data for a broad BBB band, we note this approach will more likely overstate than understate the efficient financing costs of a benchmark efficient entity. Lally has also recognised this view, even though he considers the appropriate credit rating is BBB to BBB+.[2244] Various stakeholders have also recognised this view.[2245]

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proposal 2015–20, June 2015, pp. 388-389; ActewAGL, Regulatory Proposal, Appendix 8.01: Detailed return on debt proposal, June 2015, pp. 6

2242 Lally*,* *Implementation issues for the cost of debt*, November 2014, p. 4.

2243 Moody's, *2016 Outlook - Australia's regulated electricity and gas networks,* 29 June 2015

2244 Lally, *Implementation issues for the cost of debt*, November 2014, p. 4.

2245 CCIQ, Submission to the Australian Energy Regulator on Energex's regulatory proposal for the 2015-20 revenue determination, January 2015; VECUA, Submission to the AER: Victorian Distribution Networks' 2016-20 revenue proposals; EURCC, Proposal to change the National Electricity Rules in respect to the calculation of the return on debt, October 2011; ECCSA, AER review of SAPN application 2014: ECCSA response to AER's preliminary decision, June 2015; CCP, *Bruce Mountain: Comments on the AER's Preliminary Decision on the Weighted Average Cost of Capital (WACC) for Energex, Ergon and SA Power Networks, July 2015;* SACES, *Independent estimates of the WACC for SAPN: Report commissioned by the SACOSS,* January 2015, pp. 13-14

H.1.4 Exclusions to the comparator set

We draw our comparator set for estimating the benchmark credit rating from Standard and Poor's industry report cards, with the exclusion of one business which is owned by an Australian state government.[2246] In its report for ActewAGL, CEG submitted we should exclude some of these businesses from our comparator set.[2247] We do not agree with this position.

CEG suggested CitiPower, Powercor and ETSA should arguably constitute one observation because they are all part of the same corporate group.[2248] We do not agree with this position. It appears that if a credit rating agency rates a particular issuer (whether it is a parent or a subsidiary); the rating applies to the creditworthiness of that particular issuer.[2249] Parent companies can issue debt, but subsidiaries can also issue their own debt.[2250] As evidence of this, these businesses can have different separate credit ratings. For instance, Powercor Australia LLC has had a different credit rating (BBB+) at the same time that CitiPower Trust and ETSA Utilities had a different rating (A-).

Even if we were to treat firms in the same corporate group as one observation, we do not consider this would affect the credit rating. For instance, Lally noted:[2251]

> This argument for using only one observation across these three firms is reasonable. However, the same argument would apply to DUET, Energy Partnership (wholly owned by DUET) and DBNGP (80% owned by DUET).

We do not agree with CEG's approach of deleting observations. However, if we were to apply this rationale, we would apply it as Lally has.[2252] That is, we would also count the subsidiaries of DUET Group as one observation.[2253] Table 3-71 shows that adopting this approach would have no impact on the median credit rating.

2246 That is, Ergon Energy Corp Ltd.

2247 CEG, *Attachment 7.01: WACC estimates, a report for the NSW DNSPs*, May 2014, p. 65; CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, 24 May 2014, pp. 14–15.

2248 These businesses are 51% owned by Cheung Kong Infrastructure Holdings Ltd.

2249 A credit rating is a credit rating agency's assessment of the creditworthiness of an issuer of financial securities. See Viney, C., 'McGrath's financial institutions instruments and markets, McGraw–Hill Australia, Ed 4, 2003, p. 17.

2250 For example, Standard and Poor's has rated DUET Group as an issuer of debt in the past (although DUET Group is currently non-rated). Standard and Poor's has also rated DBNGP Trust, Energy Partnership (Gas) and United Energy Distribution as separate issuers of debt, although these are subsidiaries of DUET Group.

2251 Lally, *Implementation issues for the cost of debt*, November 2014, p. 29.

2252 Lally, *Implementation issues for the cost of debt*, November 2014, pp. 28–31.

2253 DUET Group, *Annual report 2014*, p. 110.

Table 3-71 Median credit ratings, combining corporate groups

Issuer	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
APT Pipelines Ltd	NR	NR	NR	BBB	BBB	BBB	BBB	BBB	BBB	BBB
ATCO Gas Australian LP	NR	NR	NR	NR	NR	BBB	BBB	A-	A-	A-
DUET Group	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	NR	NR	NR
ElectraNet Pty Ltd	BBB+	BBB+	BBB+	BBB	BBB	BBB	BBB	BBB	BBB+	BBB+
Envestra Ltd	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB	BBB+	BBB+
AusNet Services	A	A	A-	A-	A-	A-	A-	A-	A-	A-
SGSP Australia Assets Pty Ltd	NR	NR	A-	A-	A-	A-	A-	BBB+	BBB+	BBB+
The CitiPower Trust	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	BBB+
United Energy Distribution Pty Ltd	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB
Median (year)	BBB/ BBB+	BBB/ BBB+	BBB+	BBB	BBB	BBB	BBB	BBB/ BBB+	BBB+	BBB+

Source: Bloomberg (Standard and Poor's), AER analysis.

CEG suggested removing AusNet Services and SGSP Australia Assets Pty Ltd from the comparator set (or reducing their credit ratings).[2254] This is because they both had credit rating support from their Singaporean Government ownership, and credit rating agencies put them on negative watch when they diluted this ownership in 2013.[2255] Victorian network service providers, in their proposals, have stated the issue is that Singapore Government ownership has maintained the credit rating at a higher level

2254 CEG refers to SPI (Australia) Assets and SP AusNet Group. However, these companies are now SGSP Australia Assets Pty Ltd and AusNet Services respectively.

2255 CEG, *Attachment 7.01: WACC estimates, a report for the NSW DNSPs*, May 2014, p. 65.

that it would have otherwise been over this period, and therefore the credit rating is not reflective of efficient private service provider.[2256]

We do not consider partial government ownership is an important factor in the assigned rating by Standard and Poor's. We consider that Australian federal or state government owned service providers may have different incentives compared to foreign government owned and privately owned service providers. In our view, foreign government owned firms, particularly those that hold minority investments, would be operated in a similar manner to privately owned firms with parent support, with regards to the likelihood of timely and sufficient government or parent company support in extraordinary circumstances.[2257]

In addition to this ECCSA, has expressed concerns that Envestra contributed to our benchmark given Envestra's gearing has exceeded 80 per cent.[2258]

Overall, we note that there are a range of possible reasons for excluding firms from the comparator set that could be put forward. These potential reasons include excluding firms within the same corporate group, excluding firms with parent ownership, excluding firms with gearing levels that differ from our benchmark 60 per cent level, and excluding firms with non-regulated activities. The merits of each of these can be debated, and we assess several of these reasons above. If each of these exclusion criteria were applied it would likely leave a sample that is too small to draw meaningful conclusions on. In such a case, we would likely find there were insufficient reasons to depart from the previous benchmark, which is BBB+.

Accordingly, our preferred approach is to include the full sample of privately owned (i.e. non-Australian government owned) energy network service providers, while recognising the strengths and limitations of this approach. However, whether applying all or none of the potential exclusion criteria, we would likely maintain a BBB+ benchmark credit rating.

2256 AusNet Services, *Initial Regulatory Proposal, April 2015*, p. 335, CitiPower, *Initial Regulatory Proposal*, April 2015, pp. 227-228; Jemena, *Initial Regulatory Proposal*, April 2015, p. 103; Powercor, *Initial Regulatory Proposal*, April 2015, pp. 235-236; United Energy*, Initial Regulatory Proposal*, April 2015, p.106

2257 This is supported by Standard and Poor's who have stated that they consider the importance of the entities role to government and whether it could be considered a core investment when undertaking credit ratings assessments

2258 ECCSA, *AER review of SAPN application 2014: ECCSA response to AER's preliminary decision*, June 2015

I Methodology to annually update the return on debt

Our final decision on the return on debt approach is to:

- estimate the return on debt using an on-the-day rate (that is, based on prevailing market conditions) in the first regulatory year (2015-16) of the 2015–20 period, and
- gradually transition this rate into a trailing average approach (that is, a moving historical average) over 10 years.[2259]

Because our return on debt approach involves annual updates to the return on debt, this means that the return on debt will be, or potentially will be, different for different regulatory years in the regulatory control period.[2260] The rules require that the resulting change to SA Power Networks' annual building block revenue requirement is to be effected through a formula specified in the distribution determination.[2261] For the purposes of clause 6.5.2(L) our final decision is that the resulting change to SA Power Networks' annual building block revenue requirement is to be effected through:

- the automatic application of the return on debt methodology specified in this appendix (appendix I)
- using the return on debt averaging periods specified in confidential appendix L, and
- implemented using SA Power Networks' final determination post-tax revenue model (PTRM) in accordance with section 3 of the AER's PTRM handbook for distribution network service providers.[2262]

The return on debt methodology in this appendix specifies our final decision:

- methodology on the return on debt approach, and
- methodology to implement the return on debt approach

I.1 Approach to estimating the return on debt

This section sets out our final decision methodology on the return on debt approach. Below we specify the allowed return on debt formulae for each year of the 10 year transition path. In each formula:

[2259] This final decision determines the return on debt methodology for the 2015–20 period. This period covers the first five years of the 10 year transition period. This decision also sets out our intended return on debt methodology for the remaining five years. However, we do not have the power to determine in this decision the return on debt methodology for those years. Under the NER, the return on debt methodology for that period must be determined in future decisions that relate to that period.

[2260] NER, cl.6.5.2(i) and cl.6A.6.2(i); NGR r. 87(9)

[2261] NER, cl.6.5.2(l) and cl. 6A.6.2(l); NGR r. 87(12)

[2262] AER, *Final decision—Amendment—Electricity DNSPs PTRM handbook*, 29 January 2015.

$_aR_{a+10}$ corresponds to the estimated return on debt that was entered into in year a and matures in year a+10–which is to be calculated using the return on debt implementation methodology in section I.2 and the service provider's return on debt averaging periods specified in confidential appendix K

$_bkd_{b+1}$ refers to the allowed return on debt for regulatory year b+1.

In the first regulatory year of the transitional period (2015–16), the allowed rate of return on debt will be based on the estimated prevailing rate of return on debt for that year (similar to the 'on the day' approach):

$$_0kd_1 \ = \ _0R_{10}$$

In the second regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first and second regulatory years of the transitional period:

$$_1kd_2 \ = 0.9 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11}$$

In the third regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first, second, and third regulatory years of the transitional period:

$$_2kd_3 \ = 0.8 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11} + 0.1 \cdot \ _2R_{12}$$

In the fourth regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first, second, third and fourth regulatory years of the transitional period:

$$_3kd_4 \ = 0.7 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11} + 0.1 \cdot \ _2R_{12} + 0.1 \cdot \ _3R_{13}$$

In the fifth regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first, second, third, fourth and fifth regulatory years of the transitional period:

$$_4kd_5 \ = 0.6 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11} + 0.1 \cdot \ _2R_{12} + 0.1 \cdot \ _3R_{13} + 0.1 \cdot \ _4R_{14}$$

The calculation for all subsequent regulatory years until the transitional period is completed is set out below:

$$_5kd_6 \ = 0.5 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11} + 0.1 \cdot \ _2R_{12} + 0.1 \cdot \ _3R_{13} + 0.1 \cdot \ _4R_{14} + 0.1 \cdot \ _5R_{15}$$

$$_6kd_7 \ = 0.4 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11} + 0.1 \cdot \ _2R_{12} + 0.1 \cdot \ _3R_{13} + 0.1 \cdot \ _4R_{14} + 0.1 \cdot \ _5R_{15} + 0.1 \cdot \ _6R_{16}$$

$$_7kd_8 \ = 0.3 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11} + 0.1 \cdot \ _2R_{12} + 0.1 \cdot \ _3R_{13} + 0.1 \cdot \ _4R_{14} + 0.1 \cdot \ _5R_{15} + 0.1 \cdot \ _6R_{16} + 0.1 \cdot \ _7R_{17}$$

$$_8kd_9 \ = 0.2 \cdot \ _0R_{10} + 0.1 \cdot \ _1R_{11} + 0.1 \cdot \ _2R_{12} + 0.1 \cdot \ _3R_{13} + 0.1 \cdot \ _4R_{14} + 0.1 \cdot \ _5R_{15} + 0.1 \cdot \ _6R_{16} + 0.1 \cdot \ _7R_{17} + 0.1 \cdot \ _8R_{18}$$

$${}_9kd_{10} = 0.1 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13} + 0.1 \cdot {}_4R_{14} + 0.1 \cdot {}_5R_{15} + 0.1 \cdot {}_6R_{16} + 0.1 \cdot {}_7R_{17} + 0.1 \cdot {}_8R_{18} + 0.1 \cdot {}_9R_{19}$$

I.2 Implementing the return on debt approach

This section sets out our final decision methodology to implement the return on debt approach. This section specifies:

- our choice of data series
- extrapolation and interpolation issues with adjusting our choice of data series
- step-by-step calculation to calculating the final RBA and BVAL estimate
- contingencies associated with implementing our choice of data series, if the data series we have chosen to estimate the return on debt are unavailable or change in future regulatory years

I.2.1 Choice of data series

Our final decision on the choice of data series is to adopt a simple average of the debt data series published by the Reserve Bank of Australia (RBA) and Bloomberg that match, as close as available, our benchmarks of a BBB+ credit rating and a 10 year debt term. Specifically our final decision is to adopt a simple average of:

- The RBA broad-BBB rated 10 year curve, extrapolated to an effective term of 10 years (the RBA curve)
- The Bloomberg Valuation Service (BVAL) broad-BBB rated curve (the BVAL curve). Depending on the maximum term published at the time, this will be either the BVAL:
    - 10 year estimate[2263] where it is available
    - 7 year estimate extrapolated to a 10 year term using the 7–10 year margin from the RBA curve. This will be used where the 7 year estimate is available and the 10 year estimate is not available.
    - 5 year estimate extrapolated to a 10 year term using the 5–10 year margin from the RBA curve. This will be used where the 5 year estimate is available and neither the 10 year estimate nor the 7 year estimate are available.

I.2.2 Choice of data series—Extrapolation and interpolation issues

Our final decision on extrapolation and interpolation issues is to maintain the approach set out in our draft decision. This refers to:

[2263] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate.

- extrapolation—where we need to extend a curve beyond its observed or published range. For example, before April 2015, Bloomberg publishes its BVAL curve to a maximum term of 7 years, whereas we require an estimate for a 10 year term.
- Interpolation—where we need a value for which there is no published estimate but it lies between two published estimates. For example, the RBA only publishes its curve estimates for one day each month, but we require estimates for each business day.

Specifically, we will make the following adjustments as set out in Table 3-72 and Table 3-32.

Table 3-72 Adjustments to the RBA curve

Adjustment Type	Amendment made?	Comments
Interpolation to construct daily estimates.	Yes	The RBA curve only provides an estimate for one business day at the end of each month. In our experience, averaging periods commonly start and/or end on dates during the month. We will address this issue by linearly interpolating between month end values where possible. While we are satisfied that interpolation over business days is also reasonable, we will interpolate over all days because: • this is consistent with our widely accepted approach to interpolate estimates of the risk free rate using CGS • interpolating over all days is simpler to implement • it is impractical to interpolate over business days for estimating the risk free rate, as this would require calculations relative to specific trading days 10 years in advance • the difference to the estimates between interpolating over business days or interpolating over all days is immaterial.[2264] Where this is not practical due to timing, we will hold the last available RBA monthly estimate constant until the end of the averaging period. It would not be practical to linearly interpolate between two RBA monthly estimates where the allowed return on debt must be estimated and incorporated into the annual debt update process before the publication of the next RBA monthly estimate after the end of the averaging period. Our final decision on the annual debt update process is set out in the annual debt update process section of attachment 3.
Extrapolation to target term.	Yes	The 'effective term' of the RBA bond sample is commonly less than 10 years. For this reason, Lally recommended that the spread component of the yield should be extrapolated from its effective term at publication to the benchmark term (10 years).[2265] We agree with Lally's recommendation to extrapolate the spread component of the RBA's published yield in order to match it with the benchmark term of

[2264] For example, the difference between approaches between 2 June 2014 to 30-June 2014 was 22 basis points, which means it would have changed the return on debt by 0.0022 per cent.

[2265] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

Adjustment Type	Amendment made?	Comments
		debt. However, we do not agree it is necessary to extrapolate the base component. As identified by the RBA and Lally,[2266] the base component of the published 10 year yield already matches the benchmark term of debt. Therefore, extrapolating this component would result be erroneous and lead to overcompensation in most circumstances, where the yield curve is upward sloping.
Conversion to effective annual rate	Yes	The RBA's published methodology does not explicitly specify whether the published yields should be interpreted as effective annual rates. Effective annual rates are a consistent basis on which to compare bond rates and imply that the coupon payments compound during the year. We therefore consulted the RBA, who informed us that 'the spreads and yields in F3 can be best thought of as annual rates with semi-annual compounding'.[2267] Therefore, this would require conversion into an effective annual rate, using the same approach as is applied to the BVAL yield estimate.

Source: AER analysis

Table 3-73 Adjustments to the BVAL curve

Adjustment Type	Amendment made?	Comments
Interpolation to construct daily estimates	No	Bloomberg publishes daily estimates.
Extrapolation to target term	Depends on maximum term published by Bloomberg	For most of the time that the BVAL curve has been published, it has had a maximum term of 7 years. However, between September 2014 and November 2014, it was published to a maximum 5 year term.[2268] In April 2015, Bloomberg revised its methodology for the BVAL curve (BVCSAB10) and it now publishes a 10 year estimate.[2269] For the periods where 7 years is the maximum term, we extrapolate the spread component of the 7 year yield estimate to the 10 year target term. We have done so using the margin between the spread components of the extrapolated RBA 7 and 10 year yield estimates, converted to effective annual rates. We add to this extrapolation the difference between the base CGS estimates from 7 to 10 years. That is: BVAL yield 10 years = BVAL yield 7 years + difference in CGS from 7 to 10 years + difference in RBA extrapolated

[2266] See the 'notes' tab in RBA, *Aggregate measures of Australia corporate bond spreads and yields*, available at: http://www.rba.gov.au/statistics/tables/xls/f03hist.xls; Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

[2267] RBA, *Email in response to: AER follow up question on the basis of YTM quotations in RBA statistical table F3*, 16 October 2014.

[2268] Specifically, from 15 September 2014 to 3 November 2014.

[2269] Specifically, 14 April 2015.

Adjustment Type	Amendment made?	Comments
		spread to CGS from 7 to 10 years As recommended by Lally,[2270] we are satisfied this approach is comparably reliable to the more complex approaches submitted by other stakeholders,[2271] but is simpler to implement and based on publicly available data. For the period where 5 years is the maximum term, we extrapolate the spread component of the 5 year yield estimate to the 10 year target term using an analogous methodology to that used to extrapolate from 7 to 10 years. For the period where 10 years is the maximum term, we do not extrapolate the estimate.
Conversion to effective annual rate	Yes	Bloomberg publishes its yield as annual rates with semi-annual compounding. This needs to be converted into an effective annual rate.

I.2.3 Choice of data series—Step-by-step guide to calculations

Below we describe the step-by-step processes of calculating:

- the adjusted RBA estimate
- the adjusted BVAL estimate
- the final estimate—where we combine our implementations of the RBA estimate and the BVAL estimate.

These formula steps relate to the approach specified in this final decision. In the event that data availability changes during the regulatory control period, the formulas below will change to reflect the contingencies set out in section I.2.4.

Calculation of the adjusted RBA estimate

1. Download RBA table F3—'Aggregate measures of Australian corporate bond yields' from the RBA website.
2. From this file, download the 7 and 10 year 'Non-financial corporate BBB-rated bonds—Yield' entries for dates:
   a. from the most recent published RBA date prior to the commencement of the nominated averaging period for debt
   b. to the first published RBA date following the conclusion of the nominated averaging period for debt

2270 Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

2271 Incenta, *Methodology for extrapolating the debt risk premium*, June 2014, pp. 2–3.

c. all published dates between a. and b.

3. Download, from RBA table F16—'Indicative Mid Rates of Commonwealth Government Securities - 2013 to Current', daily yields on CGSs for dates within the service provider's averaging period.

4. Linearly interpolate between the two nearest bonds straddling 7 years remaining term to maturity,[2272] and the two nearest CGS bonds straddling 10 years remaining term to maturity. This should be done using the following formula: [2273]

   yield interpolated = yield lower straddle bond + (yield upper straddle bond - yield lower straddle bond) * (date 10 years from interpolation date - maturity date lower straddle bond) / (maturity date upper straddle bond - maturity date lower straddle bond).

5. Linearly extrapolate the published RBA 10 year yield (from step 2) from its published effective term to an effective term of 10 years using the formula below:[2274]

   yield_{10} = yield_{10} year published + [(spread to swap_{10} year published - spread to swap_{7} year published)/(effective term_{10} year published - effective term_{7} year published)] * (10 - effective term_{10} year published).

6. Linearly extrapolate the published RBA 7 year yield (from step 2) from its published effective term to an effective term of 7 years using the formula below:[2275]

   yield_{7} = yield_{7} year published + [(spread to swap_{10} year published - spread to swap_{7} year published)/(effective term_{10} year published - effective term_{7} year published)] * (7 - effective term_{7} year published).

7. Subtract from the extrapolated 10 year RBA yield on each publication date the interpolated CGS yield on that date. For the 10 year term, use the RBA series as adjusted in step 5. These are the adjusted RBA 10 year spreads.[2276]

8. Obtain daily RBA spread estimates by linear interpolation of the adjusted RBA spreads (from steps 5 and 6) for both 7 and 10 year terms between the published dates identified in step 2. Use the adjusted RBA spread estimates as calculated in step 6. This should be done using the following formula:

[2272] That is, the bond with the nearest maturity date that is earlier than 10 years from the interpolation date, and the bond with the nearest maturity date than is later than 10 years from the interpolation date.

[2273] This formula relies on the operation in Microsoft Excel, dates can be subtracted from one another to work out the number of days in between two dates.

[2274] As per Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

[2275] As per Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

[2276] We have re-calculated the published 'spread to CGS' by subtracting our estimate of the interpolated CGS, as calculated in step 4, from the RBA's published yield to maturity. This allows us to combine daily data from the CGS with an estimate of the spread calculated correctly with reference to both the RBA's yield estimate and our estimate of CGS.

spread interpolated = spread first straddling publication date + (date interpolation - date first straddling publication date) * (spread second straddling publication date - spread first straddling publication date) / (date second straddling publication date - date first straddling publication date)

Note: If the annual return on debt estimate must be finalised before a final published RBA month-end estimate is available, hold the last observed RBA spread constant to the end of the averaging period.

9. Add to these daily spreads (from step 8), daily interpolated estimates of the CGS (from step 4) for all business days in the service providers averaging period. Specifically:

   a. add the 7 year interpolated CGS estimates to the 7 year interpolated RBA spreads. These are the interpolated RBA daily 7-year yield estimates.

   b. add the 10 year interpolated CGS estimate to the 10 year interpolated RBA spread. These are the interpolated RBA daily 10-year yield estimates.

10. Convert the interpolated daily yield estimates (from step 9) to effective annual rates, using the formula:2277

    effective annual rate = $((1 + \text{yield} / 200)^2 - 1)*100$

11. Average the yield estimate for the 10 year RBA yield estimate over all business days in the service provider's averaging period. This is our adjusted RBA estimate.

Calculation of the adjusted BVAL estimate

1. For dates after 14 April 2015, download the 10 year Corporate BBB rated Australian BVAL curve (BVCAB10). For dates before 14 April 2015, Download from Bloomberg the 7 year Corporate BBB rated Australian BVAL curve (BVCSAB07 index) for all business days in the service provider's averaging period.[2278]

2. For dates before 14 April 2015, add to the 7 year yield the difference between the 7 and 10 year daily RBA adjusted yields (as calculated in steps 5 and 6 of the RBA process). This is the extrapolated daily estimate of the BVAL 10 year yield.[2279]

3. For all dates, convert the 10 year yields into effective annual rates, using the formula:

[2277] In this formula, the term 'published yield / 200' is based on the yield being published as a number (e.g. 2.0) rather than a percentage (e.g. 2 %, or 0.02). The RBA yield data is published in this form at the time of this decision. For example, where the yield is published as '2.0', this is equivalent to 2 per cent or 0.02. However, it is necessary to convert from the published yield to either alternative to calculate the effective annual rate. If the spread was published as 2 per cent, this term would be 'published spread/2'.

[2278] Subject to the availability of the Bloomberg BVAL curve. For other contingencies, see section I.2.4.

[2279] If only the 5 year BVAL curve is available, adjust necessary steps to perform the same process using the margin between the adjusted 5 and 10 year RBA yields.

effective annual rate = $((1 + \text{yield} / 200)^2 - 1)*100$

4. Average the extrapolated daily estimates of the BVAL 10 year yield over all business days in the service provider's averaging period. This is our adjusted BVAL estimate.

Final estimate

Take the simple average of the adjusted RBA estimate (from step 11 in the RBA data section) and the adjusted BVAL estimate (from step 4 in the BVAL data section). This is the annual estimate of the return on debt.

I.2.4 Choice of data series—Contingencies

Our decision is to largely maintain the set of contingencies as set out in our recent decisions.

We have made our decision based on the information and third party data that is currently available.[2280] Nonetheless, in our experience it is common that the availability of third party data changes. Our decision is to annually update the trailing average portfolio return on debt. Under the rules, the change in revenue resulting from the annual update must occur by automatic application of a formula that is specified in the decision.[2281] This means that our decision on how to apply these third party data sources must be fully specified upfront in the determination, and must be capable of application over the regulatory control period without the use of subsequent judgement or discretion. For this reason, we have set out a series of contingencies in Table 3-33, below. These describe how we propose to estimate the annual return on debt in the event of revisions in the RBA's or Bloomberg's methodologies or other changes to data availability.

Table 3-74 Contingency approaches to choice of data series

Event	Changes to approach
Either the RBA or Bloomberg ceases publication of Australian yield curves that reflect a broad BBB rating.	We will estimate the annual return on debt using the remaining curve.
A different third party commences publication of a 10 year yield estimate.	We will not apply estimates from a third party data provider that we have not evaluated and included in our final decision approach. We will consider any new data sources in future determinations.
Either Bloomberg or RBA substitutes its current methodology for a revised or updated methodology.	We will adopt the revised or updated methodology. Then, at the next regulatory determination, we will review this updated methodology. As noted above, we would also review any new data sources. However, if Bloomberg or the RBA backcasts or replaces data using a revised or

[2280] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate.

[2281] NER cl. 6.5.2(l) and cl. 6A.6.2(l), NGR, r.87(12).

Event	Changes to approach
	updated methodology we will not use the backcasted data to re-estimate our estimates of the prevailing return on debt for previous years. This would be impractical and would create regulatory uncertainty over whether the allowed return on debt would at some point in the future be re-opened. Instead, we will continue to use the Bloomberg or RBA data that we downloaded at the time of estimating the prevailing return on debt for that point in time.[2282]
Bloomberg reduces the maximum published BVAL term from 10 years	If Bloomberg still publishes the BVAL curve to 5 or more years, we will extrapolate the BVAL curve from the longest published term using the 5 to 10 year yield margin from the RBA curve. If Bloomberg no longer publishes the BVAL curve to 5 years, we will rely entirely on the RBA curve.
The RBA ceases publication of a 10 year yield estimate.	If the RBA ceases publication of a 10 year yield estimate, we will extrapolate the RBA estimate to 10 years using: • if available, the margin between spreads in the Bloomberg curve,[2283] from the RBA's longest published target term to 10 years • otherwise, the actual CGS margin from the RBA's longest published estimate to 10 years, plus the average DRP spread for the same term margin over the last month prior to the end of its publication.
The RBA commences publication of daily estimates.	We will cease interpolating the RBA monthly yields. Instead, we will estimate both the RBA yield and the RBA year extrapolation margin (used with the BVAL curve) using these daily estimates.
Either Bloomberg or the RBA publishes a BBB+ or utilities specific yield curve.	We will adopt the BBB+ or utilities curve in place of the provider's existing curve, on the basis that it is a closer fit to our benchmark efficient entity.

Source: AER analysis

In general, we have decided on these contingencies based on a series of guiding principles. These are that the contingency must:

- Be practically implementable—the rules require the automatic application of a formula to update the trailing average portfolio return on debt. As a result, we will be unable to analyse changes to the approaches or new approaches during the

[2282] For example, for the current decisions we downloaded the RBA monthly data observation for August 2015 shortly after it was published (in September), and incorporated this data point into our prevailing return on debt estimates. After the RBA published its monthly observation for September (in October), we downloaded this data point too. This final data point is only relevant for estimation of AusNet's placeholder averaging period. In doing so, we noticed that it appears the RBA has revised its methodology (though does not appear to have explained this change), and has backcast its monthly observations for the entire data series which starts in January 2005. However, we have not incorporated this backcasted RBA data into our return on debt estimates. Instead, we have continued to use the data we downloaded at the time of estimation. We note that if we had incorporated the backdated RBA data this would have decreased the allowed return on debt for the Queensland, SA and Victorian electricity distributors by between approximately 1-2 basis points. Accordingly, in this instance, our approach of not using the backdated data is in this group of service providers' interests. Our approach will be symmetrical and consistent over time, so we will not use backcast data that results from a change in the RBA or Bloomberg's methodology regardless of whether it is in or against the interests of particular groups of service providers or particular groups of consumers.

[2283] Specifically, the spread to CGS.

regulatory control period. Therefore, it is important that any contingency be practical and easily implementable.

- Use the curve in a form as close as possible to its published form—for example, in April 2015 Bloomberg commenced publication of a 10 year BVAL curve. Accordingly, for averaging periods where the 10 year estimate is available, we will adopt this estimate rather than the 7 year BVAL curve extrapolated with RBA data.
- Where necessary, rely on the independent expert judgement of the RBA and Bloomberg—In particular, where the RBA or Bloomberg makes changes to its methodology, we would prefer to evaluate these changes before concluding we are satisfied the curve still meets the criteria set out in the Guideline.[2284] However, this is not possible during the regulatory control period. In these circumstances, we therefore are faced with the two alternatives of ceasing to rely on the updated curve, or temporarily relying on the updated curve on the basis that we have assessed the data provider as credible. As we are satisfied that both the RBA and Bloomberg are credible and independent, but not that either curve is clearly superior, we consider it is preferable that we adopt the updated curve to limit stakeholders' exposure to the distinct characteristics of a single curve. This is consistent with our position of placing weight on both curves to minimise the mean squared error.

I.2.5 Timing of annual updates

Our decision is that an averaging period should occur within a timeframe of 10 business days to 12 months. This is consistent with the position we proposed in the Guideline.[2285] We have considered how the process to annually update the return on debt would align with the publication of distribution prices.[2286] The timing of publishing distribution prices affects how late an averaging period can end and still be implemented in practice.

Table I-75 outlines the general process we propose to adopt for the annual debt update for distribution network service providers (distributors). Our assessment of the proposed averaging periods for distributors with current regulatory proposals or revised proposals has taken this process into account. We also propose to adopt this process for assessing the proposed averaging periods of other distributors in the future. We encourage submissions from stakeholders on this process, including from distributors with future regulatory determinations.

2284 AER, *Explanatory statement–Rate of return guideline*, December 2013, pp. 23–24.

2285 AER, *Better regulation—Rate of return guideline*, December 2013, p.21.

2286 The electricity distribution service providers are required to submit to the AER a pricing proposal for each regulatory year of the regulatory control period. The gas distribution and transmission service providers are also required to submit to us an annual reference tariff variation proposal to meet the requirements of their specific access arrangements. As we are proposing to update service providers' allowed return on debt estimates on an annual basis, the updated annual return on debt estimates should be submitted and approved by us in advance of a service providers' annual pricing/tariff proposals. See: AER, *Explanatory statement to the draft rate of return guideline*, August 2013, p.103.

Table I-75 Annual distribution debt update process

Step	Timing	Description of step	Reasons for timing
1	25 business days before a distributor submits its pricing proposal to us.	Averaging period ends on or before this date.	We determine the maximum practical end date of the averaging period from the timing of steps 2 and 3.
2	10 business days before a distributor submits its pricing proposal to us.	So the distributor can factor this into its annual pricing proposal, we inform it of updates on the return on debt, annual building block revenue requirement and X factor that incorporates the updated return on debt.	15 business days between steps 1 and 2 provides sufficient time for us to calculate (and provide quality assurance checks on the updated return on debt, revenue and X factor.
3	A distributor submits its pricing proposal to us on the date determined by the rules.	The distributor submits its pricing proposal to us for the relevant year.	10 business days between steps 2 and 3 is based on a service provider's advice regarding the minimum period it would require to factor the updated information into its prices. We are open to individual distributors requiring a longer period (or requesting a shorter period) to accommodate their internal processes. [2287]

Source: AER analysis.

On the basis of the process outlined in Table I-75, we consider an averaging period for estimating the return on debt for regulatory year t should fall within the following timeframe:

- end no later than 25 business days before a distributor submits its annual pricing proposal for year t to the AER
- commence no earlier than 12 months plus 25 business days before a distributor submits its annual pricing proposal for year t to the AER.[2288]

However, as set out in Table I-75, we are open to individual distributors requiring a longer period (or requesting a shorter period) between steps 2 and 3 to accommodate their internal processes. We note that a longer (or shorter) time period would move back (or forward) the maximum practical end date of the averaging period by the same

2287 We note that a longer (or shorter) time period would move back (or forward) the maximum practical end date of the averaging period by the same timeframe.

2288 A further possible constraint on the start date is, as set out in the previous section, one of our conditions is at the time it is nominated all dates in the averaging period must take place in the future.

timeframe. For example, if a service provider requested 15 business days (instead of 10) for its internal processes, then its averaging period would need to end 30 business days (instead of 25) before the date the distributor must submit its annual pricing proposal to us.

The process outlined in Table I-75 does not apply to the first regulatory year in the regulatory control period. This is because the distribution determination will include the X factor for the first year, which will already incorporate the first year return on debt. Therefore, this process will generally apply to the subsequent years of a regulatory control period.

In Table I-75, we propose calculating the return on debt, annual building block revenue requirement, and X factor in accordance with the formula in the distribution determination. And we propose informing the distributor of our calculations before it submits its annual pricing proposal. We consider this preferable to the alternative approach, where we would assess updates the distributor calculated itself and submitted with its annual pricing proposal. This alternative approach could significantly complicate the annual pricing approval process if we identify calculation errors and require the distributor to revise all its proposed prices. On the other hand, our approach focusses the annual pricing approval process on how the distributor has incorporated the revised X factor into its prices, rather than also assessing the revised X factor itself.

The above process factors in the date that the rules require distributors to submit their annual pricing proposals to us.[2289] In November 2014, the AEMC made a rule determination that affected this date.[2290] The AEMC determined that:

- From 2017—distributors will be required to submit their annual pricing proposal to us by:[2291]
    - 31 March each year (non-Victorian distributors)
    - 30 September each year (Victorian distributors).
- Before 2017—transitional arrangements will maintain the current date by which distributors must submit their annual pricing proposals.[2292] This is by 1 May each year (non-Victorian distributors).[2293] For Victorian distributors, the new rules apply

[2289] Clause 6.18.2(a)(2) of the NER requires electricity distributors to submit their annual pricing proposals to us at least 2 months before the commencement of the second and each subsequent regulatory year of the regulatory control period. For the Victorian distributors, each regulatory year commences at the start of the calendar year (1 January). For non-Victorian distributors, each regulatory year commences at the start of the financial year (1 July).

[2290] AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014.

[2291] See AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014, pp. 57, 95, 103. Victorian distributors will be required to submit their annual pricing proposals to us no later than 30 September. This is because the pricing process in Victoria operates on calendar years, rather than financial years.

[2292] AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014, p. 103.

[2293] AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014, pp. 103, 110–112 (transitional arrangements for Victorian distributors), 112–113 (transitional arrangements for non-Victorian distributors).

from the second regulatory year (2017) of the 2016–2020 regulatory control period, accordingly there are no transitional arrangements that effect the timing of the annual debt update process.[2294]

[2294] NER, transitional clause 11.76.1(c).

J Equity and debt raising costs

In addition to compensating for the required rate of return on debt and equity, we provide an allowance for the transaction costs associated with raising debt and equity.

We include debt raising costs within the opex forecast because these are regular and ongoing costs which are likely to be incurred each time service providers refinance their debt. On the other hand, we include equity raising costs within the capex forecast because these costs are only incurred once and would be associated with funding the particular capital investments included within our capex forecast.

In the opex attachment we included our final decision forecast for debt raising costs, and in the capex attachment we included our final decision forecast for equity raising costs. In this appendix, we set out our assessment approach and the reasons for those forecasts.

J.1 Equity raising costs

Equity raising costs are transaction costs incurred when a service provider raises new equity from outside its business. Our equity raising cost benchmark approach provides an allowance for the costs of two means by which a service provider could raise equity from outside its business—dividend reinvestment plans and seasoned equity offerings. Equity raising costs are an unavoidable aspect of raising equity that would be incurred by a prudent service provider acting efficiently. Accordingly, we provide an allowance to recover an efficient amount of equity raising costs. This is where a service provider's capex forecast is large enough to require an external equity injection to maintain the benchmark gearing of 60 per cent.

While the rate of return guideline does not set out an approach for estimating equity raising costs, we have previously applied an established method for estimating these costs. We initially based our method for determining benchmark equity raising costs on advice in 2007 from Allen Consulting Group (ACG).[2295] We amended this method in our 2009 decisions for the ACT, NSW and Tasmanian electricity service providers.[2296] We further refined this approach, as discussed and applied in the 2012 Powerlink decision.[2297]

J.1.1 Final decision

[2295] ACG, *Estimation of Powerlink's SEO transaction cost allowance-Memorandum*, 5 February 2007.

[2296] AER, *Final decision, ACT distribution determination 2009–10 to 2013–14*, April 2009, appendix H; AER, *Final decision, NSW distribution determination 2009–10 to 2013–14*, April 2009, appendix N; AER, *Final decision, TransGrid transmission determination 2009–10 to 2013–14*, April 2009, appendix E; AER, *Final decision, Transend transmission determination 2009–10 to 2013–14*, April 2009, appendix E.

[2297] AER, *Final decision, Powerlink Transmission determination 2012-13 to 2016-17*, April 2012, pp. 151-152.

Our decision is to maintain the approach set out in the preliminary decision.[2298] SA Power Networks' calculations for the proposed equity raising costs are consistent with our approach. However, we have updated the capex allowance in this final decision. This has changed the value of SA Power Network's regulatory asset base (RAB), which is an input for calculating equity raising costs. Following these updates, we now provide $13.4 million (real 2014–15) of equity raising costs in the 2015–20 regulatory control period. The AER PTRM sets out our calculation of equity raising costs.

SA Power Networks' revised proposal included equity raising costs of $12.42 million (real 2014–15).[2299] In the preliminary decision we determined an allowance for benchmark equity raising costs of $11.34 million (real 2014–15). The difference between SA Power Networks' revised proposal and the preliminary decision is due to SA Power Networks not accepting some elements of our preliminary capex decision—which is an input to the equity raising cost calculation.[2300]

J.2 Debt raising costs

Debt raising costs are transaction costs incurred each time debt is raised or refinanced. These costs may include arrangement fees, legal fees, company credit rating fees and other transaction costs. Debt raising costs are an unavoidable aspect of raising debt that would be incurred by a prudent service provider, and data exists such that we can estimate these costs. Accordingly, we provide an allowance to recover an efficient amount of debt raising costs.

J.2.1 Final decision

Our decision for debt raising costs is to maintain the approach set out in our preliminary decision. In its revised proposal, SA power Networks adopted our preliminary decision on debt raising costs.[2301] We have therefore only updated our estimate of debt raising costs to reflect the rate of return and the projected RAB in this decision.

In total, we accept debt raising costs of $10.2 million ($ 2014–15) over the 2015–20 period, as set out in Table 3-76. We are satisfied this estimate contributes towards a total opex forecast that reasonably reflects the opex criteria.

Table 3-76 AER's final decision on debt raising costs (million, $ 2014–15)

2015-16	2016-17	2017-18	2018-19	2019-20	Total
1.9	2.0	2.1	2.1	2.1	10.2

[2298] AER, *Preliminary decision SA power networks distribution determination–Attachment 3 rate of return*, April 2015, pp.3-512–513.

[2299] SA Power Networks, *Revised post tax revenue model (SCS)*, July 2015.

[2300] SA Power Networks, *Revised regulatory proposal 2015-2020*, p.59.

[2301] SA Power Networks, *Revised regulatory proposal 2015-2020*, p.194.

Source: AER analysis.

Note: Columns may not add to total due to rounding for presentation in table.

K Equity and debt averaging periods (Confidential)

L Information from broker reports (Confidential)