FINAL DECISION
Essential Energy distribution determination
2015−16 to 2018−19

Attachment 3 – Rate of return

April 2015

Note

This attachment forms part of the AER's final decision on Essential Energy's revenue proposal 2015–19. It should be read with 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

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Attachment 18 - Connection policy

Attachment 19 - Analysis of financial viability

Contents

Shortened forms

Shortened form	Extended form
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
capex	capital expenditure
CAPM	capital asset pricing model
CCP	Consumer Challenge Panel
CGS	Commonwealth government securities
CPI	consumer price index
DGM	dividend growth model
DRP	debt risk premium
distributor	distribution network service provider
ERP	equity risk premium
FFM	Fama and French three-factor model
gamma	the value of dividend imputation credits
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
RAB	regulatory asset base
RBA	Reserve Bank of Australia
RPP	revenue pricing principles
SLCAPM	Sharpe-Lintner capital asset pricing model
theta	the utilisation rate of dividend imputation credits
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. 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 we have determined achieves the allowed rate of return objective.[1] That is, we are satisfied that the 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 Essential Energy in providing standard control services.[2]

The rate of return we apply to Essential Energy differs for each year the 2014–19 period. This is because we update the return on debt component of the rate of return each year to partially reflect prevailing interest rates in each year. As a result, for 2014–15, the rate of return is 6.74 per cent (nominal vanilla). For 2015–16 it is 6.68 per cent (nominal vanilla). For each year of the 2016–19 period the rate of return will become known closer to the commencement of those years.

Also, we will use the rate of return we have determined for 2014–15 (6.74 per cent) to in calculating notional revenue for the transitional regulatory control period (2014–15) for the purposes of the true up.[3]

We are satisfied that this allowed rate of return reflects the overall efficient financing costs of a benchmark efficient entity with a similar degree of risk as Essential Energy for the reasons discussed in this attachment.

We are not satisfied that Essential Energy's proposed (indicative) 8.85 per cent rate of return for the 2015–19 regulatory period has been determined such that it achieves the allowed rate of return objective.[4] We are also not satisfied that Essential Energy's proposed (indicative) 8.85 per cent rate of return achieves the rate of return objective for the 2014–15 transitional regulatory period for the purposes of the true up.

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 the estimate of the imputation credits.[5] Also, in arriving at our decision we have taken into account the

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

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

[3]   NER, cl. 11.56.4(c).

[4]   Essential Energy, Revised *regulatory proposal, January 2015,* pp. 215–242.

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

revenue and pricing principles and are also satisfied that our decision will or is likely to contribute to the achievement of the National Electricity Objective (NEO).[6]

Our return on equity estimate is 7.1 per cent. This rate will apply to ActewAGL in each regulatory year. Our return on debt estimate for the 2014–15 regulatory year is 6.51 per cent. This estimate will change each year as we partially update the return on debt each year for prevailing debt market conditions. Our return on debt estimate for the 2015–16 regulatory year is 6.40 per cent. 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 Essential Energy's revenue will also be updated.

We agree with the following aspects of Essential Energy's 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

- forecast inflation based on an average of the RBA's short term inflation forecasts and the mid-point of the RBA's inflation targeting band.[7]

However, we disagree with Essential Energy on a number of other components of the rate of return.

Our return on equity estimate is 7.1 per cent.[8] We derived this estimate by applying the Rate of Return guideline (the Guideline) approach referred to as the foundation model approach.[9] This is the same approach we applied for the draft decision. 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 Table 3-1. Essential Energy 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. We do not agree with Essential Energy that our draft decision did not have regard to all relevant evidence when estimating the benchmark efficient return on equity.[10] Our return on equity draft decision and the final decision is largely consistent with the views in the Guideline.

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

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6   NEL, s.16.

7   Essential Energy, *Regulatory proposal*, May 2014, pp.88–115.

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

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

10   Essential Energy, *Revised Regulatory Proposal*, January 2015, p.232.

- estimate an on-the-day rate (that is, based on prevailing market conditions) in the first regulatory year (2014-15) of the 2014–19 period, and

- gradually transition this rate into a trailing average approach (that is, a moving historical average) over 10 years.

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 draft decision. We do not accept Essential Energy's proposal to adopt a backwards looking trailing average approach with no transition.

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

- 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

- 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.[11]

In the Guideline, we proposed to use one or more third party data series to estimate the return on debt.[12] 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 the draft decision, we formed a view on this issue and adopted a simple average of the RBA and Bloomberg data series. We maintain our draft decision position in this final decision.

In their initial proposals, all service providers with current reset determinations proposed only the RBA be used to estimate the return on debt. In the revised proposals, ActewAGL, Directlink, TasNetworks and TransGrid largely accepted our approach of adopting a simple average of the RBA and Bloomberg curves. Ausgrid, Endeavour Energy and Essential energy maintained their initial proposal to adopt the RBA only. And the Consumer Challenge Panel (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.

Our formula for automatically updating the trailing average portfolio return on debt annually is set out in appendix I.[13]

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

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

[13] NER, cl. 6.5.2(l).

Our final decision individual WACC parameters are set out in Table 3-1.

Table 3-1 AER's final decision on Essential Energy's rate of return (nominal)

	AER decision 2009–14	AER transitional decision 2014–15	Essential Energy's revised proposal	AER final decision 2014–15	AER final decision 2015–16	AER final decision 2016–19
Nominal risk free rate (return on equity)[a]	5.82%	4.30%	4.77%	2.55%	2.55%	2.55%
Equity risk premium	6.00%	4.55%	5.38%	4.55%	4.55%	4.55%
MRP	6.00%	6.50%	6.56	6.50%	6.50%	6.50%
Equity beta	1.0	0.7	0.82	0.7	0.7	0.7
Nominal post–tax return on equity	11.82%	8.90%	10.15%	7.1%	7.1%	7.1%
Nominal pre–tax return on debt	8.82%	7.50%	7.98%	6.51%	6.40%	Updated annually[b]
Gearing	60%	60%	60%	60%	60%	60%
Nominal vanilla WACC	10.02%	8.06%	8.85%	6.74%[c]	6.68%	Updated annually[b]
Forecast inflation	2.47%	2.50%	2.50%	2.38%	2.38%	2.38%

Source: AER analysis; Essential Energy, *Revised regulatory proposal*, 20 January 2015; AER, *Essential Energy Transitional Distribution Determination 2014–15*, April 2014; AER, *Statement on updates to NSW distribution determinations following Australian Competition Tribunal decision*, November 2009.

(a) Essential Energy's risk free rate estimate was calculated using a long-run historical averaging period of 1883 to 2013. AER final decision risk free rate estimate is based on a 20 business day averaging period from 9 February to 6 March 2015.

(b) The allowed return on debt is to be updated annually and the nominal vanilla WACC will be updated annually to reflect the allowed return on debt. The allowed return on debt for 2015–16 has already been estimated. Return on debt allowances for subsequent years will be estimated based on the formula set out in appendix I.

(c) This rate of return estimate will be used to update the revenues we previously determined for the 2014–15 (transitional) regulatory year.

3.2 Essential Energy's revised proposal

Return on equity

Essential Energy proposed a return on equity estimate of 10.15 per cent. Essential Energy stated that it adopted a point within the reasonable range developed having regard to a

range of relevant estimation methods, models, financial market data and other evidence. Essential Energy also stated that at the time of its initial proposal the estimated range was 10.1 per cent to 11.5 per cent, and having incorporated updated data the range remains the same at the time of the revised proposal. The top of the proposed range is based on an estimate developed by SFG Consulting using the Fama French 3 Factor Model and the bottom of the range in the revised proposal is based on the return on equity derived by CEG's application of the SLCAPM.[14]

The material submitted by Essential Energy with its revised regulatory proposal is listed in Appendix F.[15]

Return on debt

In its revised proposal, Essential Energy proposed a return on debt estimate of 7.98 per cent. It based this on a backwards looking 10 year trailing average approach. That is, it did not propose a transition in moving from the on-the-day approach to the trailing average approach.[16] To implement this approach, Essential Energy proposed:

- Using a BBB benchmark credit rating. This is different to the BBB+ benchmark credit rating we proposed in the Guideline.

- Only using the RBA data series for estimating the return on debt where it is available. This is different to our draft decision to estimate the return on debt using a simple average of the RBA and BVAL data series.[17]

To support its revised proposal, Essential Energy submitted the following consultant reports:

- CEG, *Efficiency debt financing costs*, January 2015.

- Frontier Economics, *Cost of debt transition for NSW distribution networks: Report prepared for Ashurst*, January 2015.

- CEG, *Efficiency debt financing costs*, January 2015

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

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[14] Essential Energy, *Revised Regulatory Proposal*, January 2015, p.231.
[15] In support of its initial proposal, Essential Energy submitted recent expert reports from: SFG Consulting—*Cost of equity in the Black capital asset pricing model: Report for Jemena Gas Networkd, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks,* 22 May 2014; *Alternative versions of the dividend discount models and the implied cost of equity: Report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, Transend and TransGrid*, 15 May 2015; *Equity beta: Report for Jemena Gas Networks, ActewAGL and Networks NSW*, 12 May 2014;   CEG—*WACC estimates: A report for NSW DNSPs*, May 2014. Essential Energy also submitted 14 expert reports from SFG, CEG and NERA that were submitted during the Guideline process.
[16] Essential Energy, *Revised regulatory proposal*, January 2015, p. 215.
[17] AER, *Draft decision: Essential Energy distribution determination, Attachment 3*, November 2014, p. 10.

achieves the allowed rate of return objective.[18] Prior to the submission of this regulatory proposal, as required by the rate of return framework, we published the Guideline.

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.[19] The AEMC specifically did not include in the new rules any preferred methods for determining the rate of return.[20] Instead it provided for us to exercise judgement as to what we are satisfied is the best approach.[21]

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.[22] During the development of the Guideline, a group of investors and ENA again raised the importance of certainty.[23] 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.[24] We have provided this certainty and predictability 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 determination because any decision to depart from the Guideline must be a reasoned decision.[25] 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

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

[19] 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).

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

[21] 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*.

[22] AEMC, *Final rule determination*, 29 November 2012, p. 50.

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

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

[25] NER, cl. 6.2.8(c).

expected to follow the guidelines unless there had been some genuine change in the evidence."[26] In its Rule determination, in relation to the Guideline the AEMC stated, "…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."[27]

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.[28] This enables us to determine the estimate of the required rate of return at the time of each regulatory determination commensurate with prevailing conditions in the market for funds at that time.[29] The rate of return framework incorporates a greater degree of regulatory judgement than did the previous framework.[30] 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 overall allowed rate of return objective.[31]

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 making regulatory determinations. The process included effective and inclusive consumer participation which we consider an important feature of our approach.

Essential Energy submitted a large volume of material in support of its rate of return proposal and revised proposal. We have turned our mind to all of this material to consider its implications for addressing the allowed rate of return objective and whether we should depart from the Guideline. We have also referred this material to our consultants for their consideration prior to making our draft and final decisions. Much of the material submitted by Essential Energy is not new to us. Much of it was considered directly during the development of the Guideline and readdresses issues that were before us at the time. Nevertheless, we reviewed the material in making our draft decision and again for this final decision. Our considerations are throughout this rate of return attachment and relevant appendices.

Although this decision relates to only Essential Energy, we are simultaneously considering a number of rate of return proposals and revised proposals from different NSPs.[32] TasNetworks' original proposal did not propose any departures from the Guideline and applied it to determine its rate of return. TasNetworks and Directlink have accepted our

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[26] 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.

[27] AEMC, *Final rule determination*, 29 November 2012, p. 71.

[28] NER, cll. 6.5.2(e) & (k).

[29] NER, cl. 6.5.2(g).

[30] NER, cll. 6.5.2(b) & (c).

[31] NER, cll. 6.5.2(b) & (c).

[32] Revised proposals from Ausgrid, Endeavour Energy, Essential Energy, TasNetworks (accepted the Guideline), TransGrid, Directlink and Jemena Gas Networks (NSW) and initial proposals from Energex, Ergon Energy and SA Power Networks.

return on equity draft decision. The other NSPs proposed varying reasons, material and propositions to justify their proposed departures from the Guideline and not adopting our draft decision. We have 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 appendices.

We note that Essential Energy has challenged aspects of the Guideline approach (and methods) to estimating the return on equity and debt and also did not adopt our draft decision. We have engaged with the material submitted since our draft decision, considered the reasons for the proposed departures from the Guideline and taken into account stakeholder submissions on our draft decision. 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.

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 control period 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). [33] The WACC formulae is:

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

where:

- $E(k_e)$ is the expected required return on equity

- $E(k_d)$ is the expected required return on debt

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[33]   NER, cl. 6.5.2(d).

- $\frac{E}{V}$ 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:[34]

- 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 that we determine is to be determined such that achieves the allowed rate of return objective. The objective is[35]

> …that the rate of return for a [regulated network] 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].

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.[36] 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.

In addition, we take into account the revenue and pricing principles when exercising discretion in making our decision relating to direct control network services.[37] In the context of the rate of return decision, we take particular account of the following revenue and pricing principles:

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[34] NER, cl. 6.5.2(e).
[35] NER, cl. 6.5.2(c).
[36] NEL, s. 16(1)(a).
[37] NEL, s. 16(2).

- 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.[38]

- 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.[39]

- A price or charge should allow for a return that matches the regulatory and commercial risks from providing the regulated service that charge relates.[40]

- 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.[41]

- 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.[42]

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.[43]

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.[44]

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.[45]

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

- 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

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[38]   NEL, s. 7A(2).
[39]   NEL, s. 7A(3).
[40]   NEL, s. 7A(5).
[41]   NEL, s. 7A(6).
[42]   NEL, s. 7A(7).
[43]   NER, cll 6.5.2(f) and (g).
[44]   NER, cl. 6.5.2 (h).
[45]   NER, cl. 6.5.2 (i).

- 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.[46]

Make and publish the rate of return guideline

On 17 December 2013,[47] as required under the rules, we published the Guideline which is available on our website.[48] Within it we specified:[49]

- 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.[50] Network businesses must provide reasons in their revenue proposals for any proposed departures from the Guideline.[51] Should we decide to depart from the Guideline in a distribution determination then we must provide reasons for any such departures.[52]

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.[53] Where we have received proposals/submission to depart and/or departed from 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.

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[46] NER, cl. 6.5.2 (k).
[47] http://www.aer.gov.au/node/18859
[48] NER, cl. 6.5.2(m).
[49] NER, cl. 6.5.2 (n).
[50] NER, cl. 6..5.2 (n) (2).
[51] NER, cl. S6.1.3(9),(9A),(9B).
[52] NER, cl. 6.2.8(c).
[53] 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 .

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:[54]

- 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.

- 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

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

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.[55]

- 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 find 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.[56]

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[55] See AER, *Better regulation: Explanatory statement rate of return guideline, Appendices,* December 2013, Table I.4, pp. 185–186.
[56] 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.[57]

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 achieve 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

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[57] 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 proposed definition of a benchmark efficient entity is to:

- adopt a single benchmark across gas, 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.[58] Our benchmark efficient entity includes the following sub components as defined below:[59]

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

[59] 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.[60]

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.[61]

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[60]   See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, Appendix F.
[61]   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

1. Identify relevant material
Identify relevant methods, models, data and evidence.

2. Determine role
Assess relevant material against criteria, and use this assessment to determine how to best employ relevant material.

Use as foundation model? — YES →

3. Implement foundation model
Determine a range and point estimate for the foundation model, based on the information from step two.

NO ↓

Use to inform foundation model? — YES →

NO ↓

Use to inform overall ROE? — YES →

4. Other information
Estimate ranges and/or directional information for material used to inform the overall ROE.

5. Evaluate information set
Evaluate outputs from steps three and four, identifying patterns and investigating conflicting information.

NO ↓

This method, model, data or evidence is not used to estimate the ROE.

6. Distil ROE point estimate
Use the foundation model point estimate informatively to determine starting point. Based on the information from steps four and five, select final ROE value as the foundation model point estimate, or a multiple of 25 basis points (from within the foundation model range).

Return on debt

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 (2014-15) of the 2014–19 period, and

- gradually transition this rate into a trailing average approach (that is, a moving historical average) over 10 years.

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 draft 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

- 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

- 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.[62]

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.[63] 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.[64] We recently published amendments to the transmission and distribution post tax revenue model (PTRM) to enable the application of the guideline changes.[65]

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

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

[63] NER, cl. 6.5.2(i).

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

[65] Available at http://www.aer.gov.au/node/27616 .

based on its specific circumstances.[66] 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 the efficient costs.[67] The NSP's 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 NSPs to retain (fund) any additional income (costs) by outperforming (underperforming) the efficient benchmark.[68]

We are mindful that 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.[69] These interrelationships between the types of risk and the required compensation via the rate of return are an important factor.[70] 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)

- 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.

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[66]   See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.3.
[67]   NEL, s. 7A(2).
[68]   NEL, s. 7A(3).
[69]   See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, p.33.
[70]   See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.3.3

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. 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.[71]

Term of the rate of return

We adopt a 10 year term for our overall rate of return.[72] 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.

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 draft and final decisions:

- Professor Michael McKenzie, University of Liverpool.[73]

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

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

- Associate professor Graham Partington, University of Sydney.[74]

- Associate professor John Handley, University of Melbourne.[75]

- Dr Martin Lally, Capital Financial Consultants.[76]

- Chairmont, a financial market practitioner[77]

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.[78] We also received advice on return on debt estimation from the ACCC Regulatory Economic Unit (REU).[79] 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 draft and final decisions.[80]

Stakeholder submissions

We received a large number of submissions on the original proposals, draft decision and revised rate of return proposals in the current regulatory determinations[81] including Essential Energy.[82] Most of these submissions 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 (i.e. a vanilla WACC). It has been estimated consistently with the estimation of the value of imputation credits.[83] In deriving the WACC, and the estimated efficient debt and equity financing costs, we have applied the benchmark efficient entity

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[73] 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 and Graham Partington, *Report to the AER: Return on equity (Updated) April 2015*.

[74] 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 and Graham Partington, *Report to the AER: Return on equity (Updated) April 2015*.

[75] 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 a*dvice on return on equity, April* 2015

[76] 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

[77] Chairmont, Cost of debt: Transitional analysis, April 2015

[78] Olan Henry, *Estimating β: An update*, April 2014.

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

[80] The full list of expert reports are listed and available at http://www.aer.gov.au/node/18859

[81] Current regulatory determinations are for the following eleven NSPs: final decisions for ActewAGL, Ausgrid, DirectLink (accepted our draft decision on return on equity), Endeavour Energy, Essential Energy, Jemena Gas Networks, TasNetworks (accepted our draft decision on return on equity), TransGrid; and preliminary decisions for Ergon Energy, Energex and SA Power Networks.

[82] Submissions received on the original rate of return proposal are listed in the draft decision overview attachment appendix.

[83] NER, cl. 6.5.2(d).

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.[84]

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 sets out the gearing ratio and our expected inflation rate for the 2014–19 period.

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 more than 5000 pages of material submitted by service providers with their original proposals.[85] Additional material was submitted with the revised proposals which we have considered.[86] 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 do 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 draft decision on a particular issue, our considerations in the guideline and draft decision are relevant to this final decision.[87]

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 the 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

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

[85]   Rate of return draft decision, Appendix F, Relevant material – return on equity appendix sets out more details about the volume of information.

[86]   Appendix F, Return on equity material

[87]   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 .

parameters or as other information — other than as the foundation model, to inform our return on equity estimate.[88]

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 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 contributes to the achievement of the allowed rate of return objective.[89] 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 regulated network services and achieving the allowed rate of return objective.[90]

We use the theory behind the Black CAPM for informing the equity beta to be used in the foundation model and the dividend growth model (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 Fama French three factor model (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

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

[89] 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.

[90] John C Handley, *Advice on return on equity, Report prepared for the AER*, 16 October 2014, p. 5.

regard to prevailing conditions in the market for equity funds and contributes to the achievement of the allowed rate of return objective.[91] 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 the best estimate of the MRP.[92] Estimates of the MRP are diverse and can vary over time.[93]

We have estimated the equity beta for our benchmark efficient 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 conceptual analysis of a benchmark efficient entity's systematic risks relative to the market average. We have also considered international empirical estimates and the theory of the Black CAPM but consider that 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 SLCPAM 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 have used a risk free rate of 2.55 per cent in this final decision. This risk free rate is based on a 20 business day averaging period, from 9 February 2015 to 6 March 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. 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.[94] As such, this risk free rate also has regard to the prevailing conditions in the market for equity funds, as the rules require.

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

[92] 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'.

[93] 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.

[94] AER, *Explanatory statement rate of return guideline*, 17 December 2013, p. 74.

MRP

Our point estimate of the MRP for this final decision is 6.5 per cent. We consider a range of 5.1 to 8.6 per cent for the MRP under current market conditions, based on the material before us to inform our decision. 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.[95] Therefore, our lower bound is above this range. The highest estimate of the MRP is 8.6 per cent.[96] 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 increased by 80 basis points since the draft decision. This increase is wholly the result of increased DGM estimates of the MRP.

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 5.1 to 6.5 per cent.

- DGM estimates indicate an MRP estimate above this baseline with a range of 7.4 to 8.6 per cent.

- Survey evidence and conditioning variables 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 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.[97] 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. While DGM estimates of the MRP have increased since the draft decision, other information before us is indicating either no change or an easing in the MRP. We have carefully reviewed this conflicting evidence in the context of achieving the allowed rate of return objective and the prevailing conditions in the market for equity funds. We are satisfied that an MRP of 6.5 per cent is reflective of prevailing conditions in the market for equity funds.[98] We maintain our view that, at this time, evidence from DGM estimates warrant 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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[95] AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 83; AER, *Draft decision: SPI Networks access arrangement*, September 2012, Appendix B.2.1.

[96] The averaging period for this estimate is January–February 2015.

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

[98] This view is reinforced by the analysis of other information under step 5 our foundation model approach.

The squares represent point estimates, the vertical lines represent ranges and the red horizontal line represents our point estimate of 6.5 per cent.[99]

Figure 3.2 Empirical estimates of the MRP (per cent)
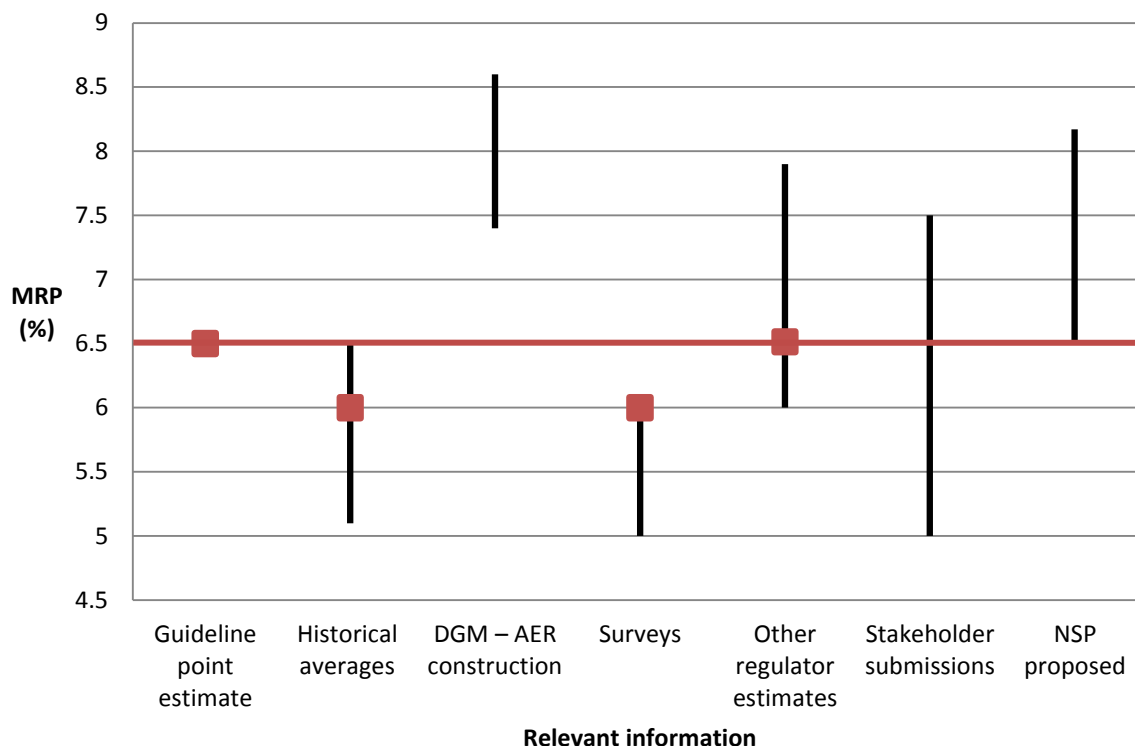
Source: AER analysis

Note: The average of each state regulator's most recent decision/update on the MRP forms the point estimate (6.5 per cent) for other regulator estimates. In November 2014, the ERA released a revised draft decision of the WACC for regulated rail networks, which adopted an MRP of 7.9 per cent.[100] This forms the top of the other regulator estimates range. The bottom of this range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC and TER.[101] The stakeholder 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.[102] The bottom of the NSP range comes from TasNetworks and Directlink's revised proposals

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[99]   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.

[100]   ERA, *Review of the method for estimating the weighted average cost of capital for the regulated railway networks— Revised draft decision*, 28 November 2014, p. 98.

[101]   ESCV, *Proposed approach to Melbourne Water's 2016 water price review—Consultation paper*, February 2015, p. 39; TER *Draft report: 2015 price determination investigation—Regulated water and sewerage services*, January 2015, p. 41; NTUC, *Network price determination, Part A—Statement of reasons*, April 2014, p. 125; ESCOSA, *SA Water's water and sewerage revenues 2013/14–2015/16: Final determination—Statement of reasons*, May 2013, p. 136.

[102]   The CCP 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. CCP, *Response to AER draft determination for TasNetworks and TasNetworks' revised revenue proposal*, 18 February 2015, p. 4; CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, 16 February 2015, p. 7; CCP, *Submission: AER draft TransGrid determination*

which accept the Guideline approach and our draft decisions.[103] The top of the NSP range comes from Jemena Gas Networks' (JGNs') revised proposal, which applies an MRP of 8.17 per cent.[104]

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.[105] 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 our previous regulatory determinations.[106] 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. 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.[107] Figure 3.3 shows our equity beta point estimate and range for the benchmark efficient entity compared to other submissions.

TransGrid revised revenue proposal, 6 February 2015, p. 13; CCP, *Response to AER draft determination for re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 24; CCP, *Submission to AER: Responding to NSW draft determinations and revised proposals from electricity distribution networks*, 2 January 2015, p. 46; CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16; CCIQ, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 20.

[103] TasNetworks, *Revised revenue proposal*, January 2015, p. 5. Directlink, *Revised revenue proposal*, January 2015, p. 11.

[104] JGN, *Revised access arrangement proposal*, February 2015, pp. 30–31.

[105] 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.

[106] Since 2010, all our regulatory determinations have applied an equity beta of 0.8. See: AER, *Final decision: Review of the WACC parameters*, May 2009, p. v.

[107] See discussion under step three in this section.

Figure 3.3   Submissions on the value of the equity beta
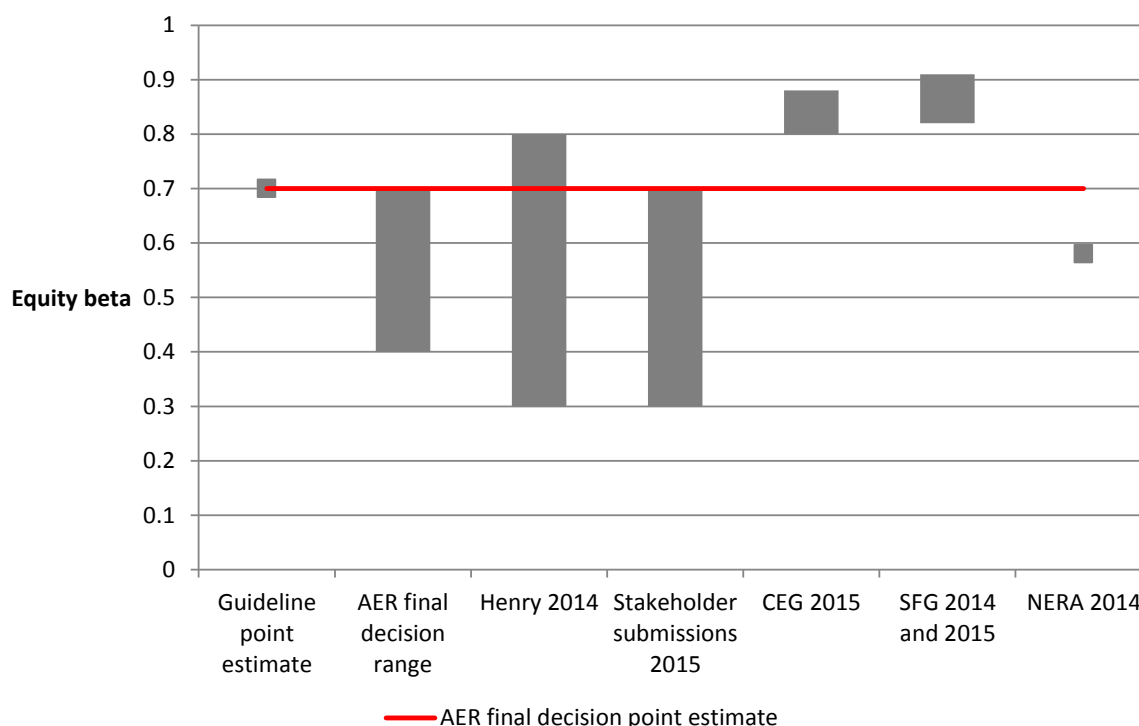
Source: AER analysis[108]

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 Alliance of Electricity Consumers' submission and the upper bound is based on Origin's submissions. 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). The NERA 2014 point estimate is based on an equity beta of 0.58, which NERA used for its preferred specification of the SLCAPM (although NERA uses multiple models to estimate the return on equity).

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[108]   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; Alliance of Electricity Consumers, *Submission to Ergon Energy's 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; Origin, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 13; Origin, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 15; NERA, *Return on capital of a regulated electricity network*, May 2014, p. 79; 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*, 13 February 2015, p. 20; SFG, *The required return on equity for the benchmark efficient entity*, 12 March 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.[109] 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 3.0 to 7.1 per cent. This equates to a return on equity range of 5.5 to 9.7 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 2.6 to 12.3 per cent. This equates to a return on equity range of 6.9 to 15.6 per cent with the prevailing risk free rate.

- Our foundation model return on equity estimate is about 260 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 190 basis points.[110]

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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[109] 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).

[110] 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 February 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.[111]

The service provider proposals range is based on the proposals from businesses for which we are making final or preliminary decisions in April–May 2015.[112] 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 April–May 2015. The lower bound is based on the Energy Users Association of Australia

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[111] Grant Samuel, *Envestra: Financial services guide and independent expert's report*, March 2014, Appendix 3.
[112] ActewAGL, Ausgrid, Directlink, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Jemena Gas Networks, SA Power Networks, TasNetworks, and TransGrid.

submission on NSW distributors' revised proposals. The upper bound is based on Origin's submission on ActewAGL's proposal.[113]

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

- The other information we examined does not support the view that risk premiums have increased since our November 2014 draft decisions and we do not consider that there is sufficient evidence to cause us to 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 our November draft decisions or 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.[114]

- Our foundation model return on equity estimate is about 260 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 Essential Energy, we would not expect the return on equity to be a large margin above the prevailing return on debt because of the low risk profile of the benchmark efficient entity.[115] 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 NSPs we regulate have been able to raise capital to undertake extensive investment programs.[116] 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, albeit lower. 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 Essential Energy with a reasonable opportunity to recover at least efficient costs.[117]

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[113] Energy Users Association of Australia, *Submission to NSW DNSP Revised Revenue Proposal to AER Draft Determination (2014 to 2019)*, February 2015, pp. 15–16; Origin Energy, *Submission to ActewAGL's regulatory proposal for 2014–19*, August 2014, p. 4.

[114] See Section 3.4.1–Step Five for more detail.

[115] 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.

[116] 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.

[117] Our previous decision for Essential Energy in April 2009 adopted an equity risk premium of 6.0 per cent [AER, *Final Decision: New South Wales distribution determination 2009–10 to 2013–14*, 28 April 2009]. 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 most recent final decisions (excluding transitional decisions) for any electricity or gas service provider 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–*

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 7.1 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.

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.]. This final decision adopts 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) 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 3-2). As such, we consider this information produces an estimate of the risk free rate that will contribute to the achievement of the allowed rate of return objective.

Table 3-2   Assessment of Commonwealth government securities against criteria

Criteria[118]	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.[119]
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).[120]
Implemented in accordance with good practice: Supported by robust, transparent and replicable analysis that is derived from available, credible datasets.	Yields on CGS are robust. The RBA, Commonwealth Treasury and Australian Office of Financial Management advised the CGS market is liquid and functioning well.

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

[119] 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.

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

Criteria[118]	Commonwealth Government securities
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.

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.[121] The material we reviewed includes:

- historical excess returns

- our preferred construction of the DGM[122]

- 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 3-3 summarises our assessment of information we use to estimate the MRP. In Table 3-10, Table 3-16, Table 3-35, Table 3-47 we assess the information before us that we do not rely on to inform the MRP.

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[121] NER, cl. 6.5.2(g); NER, cl. 6A.6.2(g); NGR, r. 87(7).
[122] We use a DGM that is adjusted for the value of imputation credits to inform the MRP.

Table 3-3   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.[123] 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.[124]	Academic literature offers some conceptual basis for conditioning variables informing excess returns.[125] Some empirical evidence supports this too.[126] 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.

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

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

[125] 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.

[126] 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
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 approaches where appropriate.	Fit for purpose because this is considered the benchmark method for estimating the MRP in Australia.[127] Historical excess returns can estimate a forward looking MRP on the view that investors base their forward looking expectations on past experience.[128]	While DGMs are used 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.[129] DGMs can be simple or complex, depending on how they are constructed. Our DGM is relatively simple.	The MRP is a metric of investor expectations. Therefore, it is fit for purpose to estimate the MRP by asking investors what they expect.	There is a body of work which casts doubt on the accuracy of dividend yields as a predictor of excess returns, suggesting this is not fit for purpose.[130] Implied volatility may not provide any new information to what is already contained in DGM estimates.[131]	Derived for similar 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

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

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

[129] See Table 3-9.

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

[131] 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. [132] 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. [133] However, these limitations can be mitigated through the triangulation of survey evidence. [134]	robust for informing the MRP. [135] It is difficult to convert dividend yields and credit spread into an MRP estimate. [136] It is also difficult to apply implied volatility. [137]	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. [138] Results are also sensitive to	Not applicable.	Not applicable.	Not applicable

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

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

[134] 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.

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

[136] 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.

[137] 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.

[138] This includes assumptions about the long term dividend growth rate 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.[139]			
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.[140]	Uses market data that are timely, well sourced and verifiable. However, evidence suggests analyst forecasts are sluggish and overly optimistic.[141]	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.

[139] 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.

[140] 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.[142] DGMs can also generate volatile and conflicting results.[143]	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.

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[141] 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.

[142] 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.

[143] 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 have regard to prevailing conditions in the market for equity funds by considering a range of relevant material.[144] 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 3-4 summarises our assessment of conceptual analysis, Australian empirical estimates, international empirical estimates and evidence from the Black CAPM. Table 3-7 and Table 3-35 set out our assessment of the FFM and SFG's DGM construction, respectively.

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

Table 3-4   Assessment of information on the equity beta against criteria

Criterion	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.[145] 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

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

Criterion	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.[146]
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.

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[146] 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.

Criterion	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).

(a)   See Table 3-8 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 NSPs' financial statements.[147] We have had regard to the following other information:

- return on debt relative to the return on equity

- return on equity estimates from:
    o independent valuation (expert) reports
    o broker reports
    o other regulators' decisions

- realised return on equity estimates calculated from:
    o asset sales (transaction multiples)
    o NSP financial statements.

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

Step two: determine role

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

- equity models

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[147] 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.

- 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 SFG, 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'.[148] SFG's claim, as submitted by ActewAGL is based on its 'default starting point'.[149] That is, an assumption that combined evidence of all models is superior. SFG submitted that it is impossible to identify one superior model.[150] 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 is the clearly superior model for estimating return on equity. We do not consider that using the other models submitted by the service providers should be relied upon to directly estimate a return on equity (independently or as part of a multi-model approach) that best contributes to the achievement of the rate of return objective.

Several service providers, including Essential Energy, submitted reports by SFG that commented on how the foundation model binds the effects that other evidence can have. For instance, in its report for Energex, SFG submitted that:[151]

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[148] 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.

[149] ActewAGL, *Revised revenue proposal*, January 2015, p. 434.

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

[151] 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.

> 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, nor does it bound 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.[152] We also received advice from our consultants on the roles for the various models.[153] Table 3-5 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

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[152] 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.

[153] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 201; 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*, 2015.

model, to inform our final return on equity point estimate, or not relied upon to estimate return on equity. The models we considered included the SLCAPM, Black CAPM, DGM and FFM.[154] 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 its revised regulatory proposal, Essential Energy submitted similar positions to those contained in its initial regulatory proposal and responded to the positions in our draft decision.

Essential Energy also submitted the following material:

- A report by CEG.[155]

- A report by SFG.[156]

- A letter from Professor Bruce Grundy on the FFM.[157]

In submissions responding to the use of return on equity models in our draft decision and in Essential Energy's revised regulatory proposal, we received the following:

- Submissions from service providers and associated industry groups. Several service providers individually lodged a submission containing the same material in relation to return on equity models.[158] Other service providers and industry groups lodged different submissions — although, in essence, these supported similar positions.[159]

- Consultant reports submitted by several service providers. These included reports by SFG Consulting on the FFM, Black CAPM, DGM and required return on equity.[160] These also included a report from NERA on the empirical performance of the SLCAPM and Black CAPM.[161]

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[154] AER, *Rate of return guideline*, December 2013, p. 13.

[155] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015.

[156] SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015.

[157] Grundy, *Letter to Mr De Lorenzo*, 9 January 2015.

[158] 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.

[159] ActewAGL, *Submission on the AER's draft decision: ActewAGL distribution determination*, 13 February 2015 (Public version); ENA, *AER draft decisions for NSW and ACT electricity distributors*, 13 February 2015; Ergon Energy, *Submission on the draft decisions: NSW and ACT distribution determinations 2015–16 to 2018–19*, 13 February 2015; Spark Infrastructure, *Submission on the AER's draft decision for NSW electricity distributors*, 13 February 2015.

[160] 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.

[161] NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

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

Table 3-5 sets out the role we have assigned to each of the return on equity models and our reasons for assigning these roles.

Table 3-5   Role assigned to equity models in estimating the return on equity

Equity model	Role	Reason for chosen role[162]
Sharpe Linter 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 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 Essential Energy.
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 Essential Energy. (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.[163]	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

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[162]   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.

[163]   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[162]
	No role in directly estimating the return on equity of the benchmark efficient entity.	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	A limited role in potentially 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 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 December 2013 and in our draft decision, we consider this model best meets our assessment criteria.[164] At present, we consider it is superior to all other models that

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[164]   AER, *Explanatory Statement rate of return guideline*, 17 December 2013, p. 64; AER, *Draft decision Essential Energy distribution determination, Attachment 3*, November 2014, pp. 164–194.

service providers suggested for estimating the expected return on equity by reference to the benchmark efficient entity.[165]

The new material submitted, that was not available at the time of the Guideline, has not changed our view on this. Our draft decision had regard to material in Essential Energy's regulatory proposal and this analysis still holds for our final decision.[166] We consider Essential Energy's revised proposal contains similar material to that already submitted. Nevertheless, we have 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:

- It is widely used for estimating the expected return on equity for regulated companies. This includes use by academics, market practitioners and other regulators.[167]

- 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.[168] 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.[169]

- 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.

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[165] That is, the FFM, Black CAPM and SFG's construction of the DGM.

[166] AER, *Draft decision Essential Energy distribution determination, Attachment 3: Rate of return*, November 2014.

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

[168] 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.

[169] 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, S*ubmission 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.

- 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.[170]

We assessed the SLCAPM against the Guideline assessment criteria in Table 3-6. Following this assessment, we are satisfied that it is the most suitable model to use as the foundation model.

Table 3-6 Summary of our assessment of the SLCAPM against criteria

Criteria	Sharpe–Linter 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 and informed by sound empirical analysis and robust data	The model reflects economic and finance principles. It is a theoretically based equilibrium asset pricing model. It transparently represents a core paradigm of 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.[171] 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.[172]
Implemented in accordance with good practice. That is, supported by robust, transparent and replicable analysis that is derived from available credible	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

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[171] 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.

[172] 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.

Criteria	Sharpe–Linter CAPM assessment against criteria
datasets	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 - 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.	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. - 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 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.[173] 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.[174]

The reports from both McKenzie and Partington and Handley supported our use of the SLCAPM as the foundation model.[175] 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.[176] Partington restated this position in his subsequent report.[177]

McKenzie and Partington indicated with respect to the SLCAPM:[178]

> 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:[179]

> 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

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

[174] 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.

[175] 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.

[176] 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.

[177] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 33.

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

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

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:[180]

> [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 draft decision, we considered and responded to service provider submissions on the SLCAPM.[181] 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.[182] 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:

    o 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.[183]

    o 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.[184]

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[180]   Handley, *Advice on the return on equity*, 16 October 2014, p. 4.

[181]   AER, *Draft decision Essential Energy distribution determination, Attachment 3*, November 2014, pp. 165–173.

[182]   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.

[183]   See step three of the reasons for our return on equity decision.

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

- o 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.[185]

- o Our use of the SLCAPM and input parameters are consistent with the approaches employed by investors.[186]

- 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.[187] They stated:[188]

> 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:[189]

> [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:[190]

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185 See step three of the reasons for our return on equity decision and in the equity beta appendix.
186 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 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.
187 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.
188 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 14.
189 Handley, *Advice on the return on equity*, 16 October 2014, p. 5.
190 Handley, *Report prepared for the AER: Further advice on the return on equity*, April 2015, pp. 5–6.

(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,

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).

Since receiving the revised proposals and submissions, Partington 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.[191]

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'.[192] However, they also expressed reservations about the implementations of the alternative models as the service providers proposed.[193] 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.[194] 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.[195]

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[191] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12. Reference to McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014.

[192] 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.

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

[194] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 15.

[195] McKenzie, *Report to the AER: Return on equity (updated), April 2015*, p. 14.

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 estimates provide no compelling evidence that our return on equity would undercompensate a benchmark entity facing a similar degree of risk as Essential Energy 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.[196] Having considered the FFM, the Black CAPM, and the DGM put forward by the service providers to estimate the return on equity, Handley stated:[197]

> 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.[198]

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.

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[196] 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.

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

[198] 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.

- 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.

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.[199] 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.[200] Table 3-7 sets out our assessment of the FFM against our assessment criteria.

Table 3-7   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.

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[199]   ActewAGL, AGN, Ausnet Services, CitiPower/Powercor, Energex, Ergon Energy, JEN, 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.

[200]   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.[201] Australian firms do not broadly use the FFM when valuing equity.[202] |
| Where models of the return on equity and debt are used these are: – based on quantitative modelling that is sufficiently robust as to not | 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).[203] This creates significant concerns for its use in setting |

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[201] 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.

[202] 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.

[203] 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.

Criteria	FFM assessment against criteria
be unduly sensitive to errors in inputs estimation	regulated returns (even if all the other issues with the model could be overcome).
– based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale	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.[204] 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 draft decision, we considered and responded to service providers' submissions on the FFM.[205] We consider service providers submitted similar information to support similar positions in their revised proposals.[206] As such, our reasoning and the position

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204   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.

205   AER, *Draft decision Essential Energy distribution determination, Attachment 3: Rate of return*, November 2014, pp. 174–182. These submissions included 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, pp. 79–85; Endeavour Energy, *Regulatory proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 119–127; Energex, *2015–20 regulatory proposal*, October 2014, pp. 164–165; Ergon Energy, *Regulatory proposal, appendix C: Rate of return*, October r2014, pp. 128–129 Essential Energy, *Regulatory proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 104–113; 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, pp. 313–319; TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, pp. 12–13, 188–191.

206   Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 176; ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, p. 468; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 216; JGN, *2015–20 access*

we formed in our draft decision still holds for this final decision. Similarly, 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'.[207]

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.[208] 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:[209]

> 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:[210]

- 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.[211]

Handley also reviewed the service providers' proposals and some relevant consultant reports.[212] He also supported our decision to not depart from the foundation model framework in light of these submissions.[213] Handley noted with respect to the FFM:[214]

arrangement: Response to the AER's draft decision and revised proposal, Appendix 7.1 — Return on equity response, February 2015, p. 38; TransGrid, *Revised revenue proposal*, January 2015, pp. 113.

[207] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

[208] 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.

[209] 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.

[210] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 15–19.

[211] Partington also expressed this concern in Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 38.

[212] 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

- 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.[215] 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:[216]

  > 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 for this 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 3-8 below).

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.[217]

2014; SFG, *The required return on equity for regulated gas and electricity network businesses: Report for JGN, ActewAGL, Ergon, Transend and SAPN*, June 2014.

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

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

[215] Handley, *Report prepared for the AER: Further advice on the return on equity*, April 2015, pp. 3–4.

[216] Handley, *Advice on the return on equity*, 16 October 2014, p. 8.

[217] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 44; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 20–24.

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.[218] This is for the following key reasons:

- The model is not empirically reliable.[219] This is also supported by Partington.[220]

- To our knowledge, the model is not widely used to estimate the return on equity by equity investors, academics or regulators.[221]

These views are consistent with the Guideline.[222] Table 3-8 shows the model does not meet our assessment criteria well.

Table 3-8 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 and informed by sound empirical analysis and robust data	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
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 CPAM 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

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[218] 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.

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

[220] 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.

[221] 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.

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

Criteria	Black CAPM assessment against criteria
	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 regulatory outcomes, as appropriate.	We consider the model is sufficiently flexible to allow for changing market conditions through adjusting input parameters. However, this is more problematic than the 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 draft decision, we considered and responded to service provider submissions on the Black CAPM.[223] Our reasoning and the position we formed still holds for this final decision. We still 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.[224] 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'.[225] Handley also considered the Black CAPM in his report prior to our draft decision, which supported our decision to not use empirical estimates from the model.[226] 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.[227] Partington later emphasised that, given this, '[a]ny attempt to compare the Black CAPM and S-L CAPM must be done with great care'.[228]

- 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.[229]

- 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.[230]

- The model (of itself) does not justify any uplift to the equity beta.[231]

- 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.[232]

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[223] AER, *Draft decision Essential Energy distribution determination, Attachment 3*, November 2014.

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

[225] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

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

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

[228] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 17. He demonstrated why this was the case in pp. 17–23.

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

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

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

[232] Handley, *Advice on the return on equity*, 16 October 2014, p. 12.

- 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.[233]

- It is unclear whether low beta bias is a priced risk not already captured by the SLCAPM.[234]

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.[235]

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 entity.[236] 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 of this attachment.

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 service providers.[237] There are difficulties with constructing credible datasets for implementing industry specific DGMs.[238] Also, there are too few Australian comparator businesses to run DGMs on individual businesses.[239] Partington advised that while there is risk of substantial error in

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[233]   Handley, *Advice on the return on equity*, 16 October 2014, p. 10.

[234]   Handley, *Advice on the return on equity*, 16 October 2014, p. 11.

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

[236]   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.

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

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

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

DGM estimates for individual firms, averaging over many firms across the market helps reduce the impact of error.[240]

- There are developed methods for estimating the growth rate of dividends in the Australian market.[241] 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.[242]

- 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.[243] 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. We consider this result is implausible because evidence before us indicates that the systematic risk of network businesses is less than the overall market.[244]

- McKenzie and Partington supported our decision not to use DGMs to directly estimate the return on equity.[245] 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.[246]

- We consider SFG overstated the ability of its DGM to produce reasonably robust return on equity estimates at the industry level.[247] For instance, SFG only used its DGM to indirectly estimate the return on equity for the benchmark efficient entity. 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 analyst forecast. It then determined the risk premium ratios by dividing each equity risk premium by the relevant MRP from the DGM.[248] It then took a simple average of these risk

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

[241] 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.

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

[243] See Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 59.

[244] 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.

[245] McKenzie, Partington, *Report to the AER Part A: Return on Equity*, October 2014, pp. 39–40.

[246] McKenzie, Partington, *Report to the AER Part A: Return on Equity*, October 2014, pp. 26–41.

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

[248] 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

premium ratios to derive an average risk premium of 0.94, which it used as an equity beta in the SLCAPM.[249] 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.[250]

Table 3-9 shows our assessment of using the DGM at the overall return on equity level against our assessment criteria.

Table 3-9   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. [251]
Implemented in accordance with good practice. That is, supported by robust,	The simplicity of most DGMs enable a given model specification to be estimated in a robust,

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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).

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

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

[251] 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 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
transparent and replicable analysis that is derived from available credible datasets	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 rationale.	DGMs are highly sensitive to assumptions regarding the short term and long term dividend growth rates. This makes DGMs highly sensitive to potential errors.
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.[252] DGMs can also generate volatile and conflicting results.[253]

Source: AER analysis.

The majority of service providers submitted we should use empirical estimates from a DGM to estimate the return on equity.[254] These service providers submitted a

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

[253] 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.

[254] 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

construction of a DGM proposed by SFG.[255] In our draft decision, we considered and responded to these submissions.[256] We remain satisfied with our position, after having regard to the information presented in Essential Energy's revised proposal and submissions on our draft decisions.[257]

For the draft decision, 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.[258] 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.[259] They also indicated that they considered SFG's model could generate virtually any return on equity desired.[260] 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 over-estimate 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.[261] 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.[262] He also stated regarding DGMs more generally:[263]

> 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

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.

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

[256] AER, *Draft decision Essential Energy distribution determination, Attachment 3: Rate of return*, November 2014, pp. 187–190, 215–234.

[257] Essential Energy submitted CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 19–22 and SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015, pp. 23–24. 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.

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

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

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

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

[262] Handley, *Advice on the return on equity*, 16 October 2014, p. 15.

[263] Handley, *Advice on the return on equity*, 16 October 2014, pp. 13–14.

simply equalled the expected dividend yield next period plus the growth rate.[264] 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.[265]

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 CAPM 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.[266] This is for the same reasons stated in the appendices to the Guideline's explanatory statement and in our draft decision.[267]We do not agree with the form of the Wright and historically-based CAPMs. The SLCAPM is a forward looking asset pricing model.[268] 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.[269]

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[264] Handley, *Advice on the return on equity*, 16 October 2014, p. 14.

[265] Handley, *Advice on the return on equity*, 16 October 2014, p. 15.

[266] 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.

[267] AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 24–28; AER, *Draft decision Essential Energy distribution determination, Attachment 3: Rate of return*, November 2014, pp. 190–194.

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

[269] 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 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 CAPM 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.[270]

- 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.[271]

- 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 3-10 shows we consider these models do not meet our selection criteria particularly well.

Table 3-10 Summary of our assessment of the alternative CAPMs 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	The long term average specification assumes the return on equity is very stable through time. This is not supported by well accepted	The Wright specification appears to either assume that the standard approach to estimating the risk free rate and MRP is inconsistent; or

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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.

[270] 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.

[271] 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.

Criteria	Long term 'average' specification	Wright specification
are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data	economic and finance principles. The empirical analysis does not clearly support the model specification.	the real market return on equity is constant and therefore the risk free rate and the MRP are perfectly negatively correlated.[272] The first assumption would be incorrect. The second assumption is not clearly theoretically supported and the empirical evidence is not compelling.[273]
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.[274] We accept that historical data (such as historical excess 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.	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.[275] We accept that historical data (such as historical excess 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,	The long term specification is transparent and easy to	The Wright specification is

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[272] John C. Handley, *Advice on the Return on Equity*, 16 October 2014, pp. 7, 17; 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.

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

[274] 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.

[275] 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
transparent and replicable analysis that is derived from available credible datasets	replicate.	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 3-6, the SLCAPM performs well against this criterion.	The Wright specification is an application of the SLCAPM. As outlined in Table 3-6, 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.[276] We largely consider this material in step four in relation to the Wright approach.[277] While

[276] SFG supported relying on the Wright CAPM to estimate the MRP. The majority of service providers submitted this material in SFG, *The required return for the benchmark efficient entity*, 13 February 2015, pp. 28–33. 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

we have used the range from the Wright CAPM, we note that Handley questioned the theoretical and empirical support of the model.[278] Accordingly, we have placed little reliance on this information.

Handley considered the Wright CAPM in his report and stated:[279]

> 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.[280] 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.[281]
>
> 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. 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' CAPM specification proposed by a number of service providers.

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

[277] For the NSW distributors, we also discuss their positions on their version of the CAPM that uses long term historical parameters in relation to the risk free rate under step three of the foundation model approach.

[278] Handley, *Advice on the return on equity*, 16 October 2014, p. 18.

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

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

[281] 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.

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 CAPM against our criteria.

Risk free rate

Table 3-11 shows we estimate the risk free rate using yields on CGS with a 10 year term. Based on our assessment of this information, Table 3-11 sets out the role we have determined.

Table 3-11 Role of relevant material in determining the risk free rate

Source of information	Use for informing the risk free rate	Reasons for use
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. [282] This source of information is robust, credible and reflects prevailing market conditions.

MRP

Our assessment in step one has helped us consider the relative strengths and limitations of different sources of information. Table 3-3 sets this out. This has helped us determine the role we give this information in estimating the MRP, as shown in Table 3-12.

Table 3-12 Role assigned to each source of relevant material in determining the MRP

Source of information	Use for informing the MRP	Reasons for use
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 models (AER's construction)	Given the second most reliance	Meets most of the criteria. The main limitation is its sensitivity to assumptions, which is significant. It is also likely to produce upward biased estimates.[283] Since it can readily reflect changes in market conditions, it complements our use of historical excess returns. However, its

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

[283] 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.

Source of information	Use for informing the MRP	Reasons for use
		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 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 DGM appendix B–DGM)
Imputation credit adjustment (AER, Brailsford et al)	Adjust 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 estimate	This applies a formula (from Officer) differently to how we apply the Officer framework in the PTRM. Applying the formula, as SFG proposed 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

Source of information	Use for informing the MRP	Reasons for use
		information at the return on equity level and does not use a direct estimate of the MRP.

In its revised proposal, Essential Energy applied an MRP estimate based on historical excess returns alone, averaged over the period from 1883 to 2013.[284] It based this on reports from CEG and NERA.[285] We agree historical excess returns are useful for informing the MRP. However, 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.[286] This reflects differences in opinion regarding the relative strengths and 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 of information against the criteria set out in the Guideline (see Table 3-3).[287]

- 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.[288] 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.

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[284] Essential Energy, *Revised regulatory proposal*, January 2015, pp. 231, 234.

[285] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 5. This is attachment 8.2 to Essential Energy's revised proposal. NERA, *Historical estimates of the market risk premium*, February 2015, p. 42. Essential Energy submitted this report during the period for submissions on the AER's draft decision and Essential Energy's revised proposal. However, Essential Energy also submitted reports from SFG that estimate the MRP in a manner inconsistent with its revised proposal. See: SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 43 (attachment 8.4 to Essential Energy's revised proposal). Essential Energy's revised proposal approach to estimating the MRP is the same as that applied in Essential Energy's proposal (but with updated estimates). See Essential Energy, *Regulatory proposal*, May 2014, p. 106.

[286] 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'.

[287] AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 90–91.

[288] 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.

- 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.[289]

- Considering a range of information is consistent with the approach used by finance market practitioners.[290]

In particular, we consider our DGM construction, market surveys and conditioning variables should also inform the estimate of the MRP. It is also useful to consider other Australian regulatory decisions.

Equity beta

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

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

Relevant material	Role	Key Reasons
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

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[289] 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'.

[290] 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.

Relevant material	Role	Key Reasons
		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 3-8). 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.
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 3-7).

In its revised proposal, Essential Energy submitted that we should give international (primarily US) empirical estimates a determinative role in estimating equity beta for a benchmark efficient entity.[291] 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.

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[291] Essential Energy, *Revised regulatory proposal*, January 2015, pp. 231, 236–238. Essential Energy's consultants, SFG and CEG, submitted that a sample of 56 US firms should be included in our comparator set for empirical analysis. They also submitted that the international empirical estimates we consider indicate an extension of our range. We consider these submissions demonstrate SFG and CEG's (and Essential Energy's) consideration that we should give international empirical estimates a determinative role in estimating equity beta. See: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–38, 54–58 (attachment 8.2 to Essential Energy's revised proposal); SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, pp. 38–39 (attachment 8.4 to Essential Energy's revised proposal); SFG, *The required return on equity for the benchmark efficient entity*, 12 March 2015, pp. 18–21; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 4, 27–28, 31, 35. Essential Energy submitted these reports during the period for submissions on the AER's draft decision and Essential Energy's revised regulatory proposal. Essential Energy also submitted this view in its initial proposal. See: Essential Energy, *Regulatory proposal*, May 2014, p. 107.

- 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.

Essential Energy also submitted a consultant report by SFG. In this report, SFG submitted that, under our foundational model approach, we should give empirical evidence from the Black CAPM a determinative role in estimating equity beta for a benchmark efficient entity.[292] Namely, that we should use the return on equity estimate from the Black CAPM to reverse engineer an equity beta estimate for the SLCAPM. However, it is unclear whether Essential Energy supports SFG's submission as this matter has not been referred to in its revised 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 produces reliable estimates of the return on equity (see Table 3-8 and appendix A–equity models), which in turn, would not produce reliable estimates of the equity beta.

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 3-14 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 3-14 Role assigned to relevant information in informing the overall return on equity estimate

Relevant material	Role of information	Reasons for role

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[292] SFG estimated the return on equity using the Black CAPM and used this to generate an implied equity beta estimate for the SLCAPM, such that both models produce the same return on equity estimate. SFG submitted that 'if it is determined that the Sharpe–Lintner CAPM must be parameterised in a way that reflects evidence from the Black CAPM, an equity beta of 0.91 should be used'. We consider this demonstrates SFG's consideration that we should give empirical evidence from the Black CAPM a determinative role in estimating the equity beta (under our foundation model approach). See: SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 32–33, 35.

Relevant material	Role of information	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' decisions	Directional role to inform movements in overall return on equity	
Transaction multiples, trading multiple	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 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.

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 that the return on equity should exceed the return on debt.

For our benchmark efficient entity with a similar degree of risk as Essential Energy, 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:

  o the form of control (such as a revenue cap or average revenue cap) can reduce revenue risk from unexpected changes in demand

  o a revenue control mechanism limits the interest rate risk facing the firm

  o the RAB is indexed to the outturn Consumer Price Index limiting risk from unexpected changes in inflation

  o 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.[293] Origin Energy, in its August 2014 submission on the NSW distribution NSPs' regulatory proposals, also noted the low risk of these businesses. 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 cap, and pass through provisions, stating:[294]

> 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

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[293] Origin, *Submission to the NSW electricity distributors' regulatory proposals for 2014–19*, August 2014, p. 7. EUAA, *submission on Ergon Energy regulatory proposal*, 30 January 2015, page 13. EUAA, *submission on Energex regulatory proposal*, 30 January 2015, page 13. Lower Namoi Cotton Growers' Association Inc., *RE: Essential Energy Distribution Determination (2015–16 to 2018–19)*, January 2015, p. 3. Ethnic Communities Council of NSW Inc., *Submission concerning the NSW distribution networks revised revenue proposal 2014-19 submission to AER*, 11 February 2015, p. 2. Energy Markets Reform Forum, *NSW Electricity Distribution Revenue Reset: AER draft decision and revised proposals from Ausgrid, Endeavour Energy and Essential Energy, A response by the Energy Markets Reform Forum*, February 2015, pp. 27, 37. Public Interest Advocacy Centre Ltd, *A missed opportunity? Submission to the Australian Energy Regulator's draft determination for Ausgrid, Endeavour Energy, and Essential Energy*, February 2015, pp. 33, 36, 42. Major Energy Users Inc., *Tasmanian electricity transmission revenue reset: AER draft decision and TasNetworks' revised proposal: a response by The Major Energy Users Inc*, February 2015, p. 52. 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, *Submisson 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.

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

internationally in several fuels, in a competitive environment, across an integrated supply chain.

Similarly, Queensland Council of Social Services stated:[295]

> 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)

- measured debt yields are typically promised yields as opposed to the expected return on equity estimated for setting regulatory allowances.[296]

Notably, no academic consensus currently exists on the size and strength of any relationship between debt and equity premiums.[297] 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.

In a concurrent price review, TransGrid proposed using comparison of return on equity estimates to observed bond yields as a reasonableness check on the overall return on equity estimate.[298] This approach broadly aligns with our proposed role for this information.

Table 3-15 below outlines our assessment of this information against our criteria.

Table 3-15 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	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

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[295] 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.

[296] 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.

[297] 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.

[298] TransGrid, *Revenue proposal*, May 2014, p. 188; NERA, *Return on capital of a regulated electricity network*, May 2014, pp. 114–118.

Criteria	Assessment of relevant material against criteria
principles and informed by sound empirical analysis and robust data	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 is 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 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	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.

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 Essential Energy. 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, ASX listing rules and 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,[299] brokers and independent experts providing valuation reports are subject to financial services regulation and regulatory oversight by ASIC.[300] 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.

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[299] Incenta Economic Consulting, *Update of evidence on the required return on equity from independent expert reports*, May 2014, p. 6. Incenta Economic Consulting, *Further update on the required return on equity from independent expert reports*, Report prepared for Jemena Gas Networks Jemena Electricity Networks, ActewAGL, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Powercor, SA Power Networks, United Energy, February 2015, p. .

[300] 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.

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[301] 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:

- 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.

In its 2014 report 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.[302]

In a concurrent transmission determination process, TransGrid proposed using Grant Samuel's independent valuation of Envestra to directly inform the return on equity range.[303] We do not consider that TransGrid's proposed role of valuation reports would contribute to the achievement of the allowed rate of return objective given the limitations mentioned above. ActewAGL and Jemena Gas Networks proposed using broker and valuation reports to inform estimates of the MRP.[304] 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 these NSPs' MRP proposals are also in appendix C–MRP.

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[301] 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.

[302] 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.

[303] TransGrid, *Revenue Proposal*, 2014/15–2018/19, p. 189.

[304] Jemena Gas Networks, *2015-20 access arrangement information*, attachment 9.03, 5 June 2014, p. 17. In support of its proposal ActewAGL referred to a report prepared by SFG Consulting [ActewAGL, *Regulatory proposal*, (resubmitted 10 July 2014), p. 252]. For details, see: SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 5–8, 74–79.

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

Table 3-16   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, 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	There is 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.
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.

Criteria	Assessment of relevant material against criteria
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.

Realised returns

A number of stakeholders submitted that we should consider material on realised returns to equity from transaction multiples and NSPs' financial statements.[305] 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

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[305] 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.

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.

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

Table 3-17   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	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

Criteria	Assessment of relevant material against criteria
robust data	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 of that purpose	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.
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).

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 SL CAPM as our foundation model. The input parameters, namely, the risk free rate, MRP and equity beta point estimates that we adopt and the reasons are discussed under this sub section.

Risk free rate

Most approaches to estimating the return on equity require a risk free rate component.[306] 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.[307] For the benchmark efficient entity, we estimate this period of time to be 10 years.[308] 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.[309] The three major credit rating agencies issued their highest possible ratings to the Australian Government.[310] There is broad consensus with this position. For instance, market practitioners widely use CGS yields to proxy the risk free rate.[311] Stakeholders also widely supported using

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[306] 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.

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

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

[309] 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, p. 10-12.

[310] 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

[311] 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, L*etter regarding the CGS market*, July 2012; Treasury and AOFM, *Letter regarding the CGS Market*, July 2012.

CGS yields as a proxy during the Guideline development process.[312] We use 10 year CGS yields because we adopt a 10 year term. A 10 year term emphasises the long term nature of cash flows in equity investments and the long lived nature the benchmark efficient entity's assets.[313]

We use a risk free rate of 2.55 per cent in this final decision. This risk free rate is based on a 20 business day averaging period, from 9 February 2015 to 6 March 2015. We use this to inform our decision on the return on equity for the regulatory control period (2015–19). For that purpose, it is also used to calculate notional revenue for the transitional year (2014–15) for the purposes of the true up. This approach is consistent with our letter to Essential Energy on 14 April 2014.[314]

This differs from Essential Energy's preferred averaging period. In its initial and revised regulatory proposals, Essential Energy proposed estimating the risk free rate using a long term historical averaging period commencing in 1883.[315] Essential Energy recently submitted that if it was necessary to specify a short term averaging period for the return on equity, we should use the period 28 February 2014 to 30 June 2014.[316]

In contrast, we consider an averaging period of 9 February 2015 to 6 March 2015 provides for the best estimate of the return on equity to contribute to achievement of the rate of return objective and have regard to the prevailing conditions in the market for equity funds.[317] This is because:

- It is an unbiased estimate. The averaging period was chosen both in advance of it occurring and in advance of either regulatory control period (transitional and subsequent) commencing. As a result, at the time of selecting the period, the chances of it over or underestimating the risk free rate were equal. As a result, it was unbiased.[318]

- 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. Further, apart from Ausgrid, Endeavour Energy

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[312] 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.

[313] 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.

[314] General Manager– AER Networks, *Letter: Return on equity risk free rate averaging period for 2014–19*, 14 April 2014 (Confidential).

[315] Essential Energy, *Revised regulatory proposal*, January 2015, p.232. Essential Energy proposed an averaging period of 1883 to 2011 in Essential Energy, *Regulatory proposal*, May 2014, p. 106.

[316] Essential Energy, *Revised regulatory proposal*, January 2015, p. 232.

[317] NER cl. 6.5.2(f).

[318] 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.

and Essential Energy, all other service providers accepted our general approach to selecting a risk free rate averaging period for informing the return on equity.[319]

- The risk free rate is based on a short term (20 consecutive business days) averaging period close to the time at which we make our decision.[320] Therefore, it provides for an estimate that is commensurate with the prevailing market conditions at the time the allowed revenues and expenditure requirements are determined. Through this, and through other evidence we rely on in our foundation model approach, our decision on the return on equity estimate has regard to the prevailing conditions in the market for equity funds, as the NER require.[321]

- While it currently produces a lower estimate of the return on equity than in the past regulatory control period, we are satisfied this is nevertheless commensurate with the returns that equity investors require in the current market.[322] We are not satisfied with Essential Energy's position that the current lower risk free rate environment necessarily equates to a perception of a higher required equity risk premium by investors and that we should adopt an approach that targets a stable return on equity.[323]

- It is consistent with our estimate of the MRP because both are 10 year forwarding looking estimates.[324]

In contrast, we do not expect Essential Energy's preferred averaging period to produce an unbiased estimate of the risk free rate. In its initial and revised regulatory proposals,

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[319] ActewAGL, *Regulatory proposal (resubmitted)*, 10 July 2014, pp. 276–77.stated, 'if the AER accepts ActewAGL Distribution's method of estimating the return on equity (as set out in this chapter), ActewAGL Distribution does not take issue with the AER's proposed averaging period'. Directlink did not object to our proposed averaging period in Directlink, *Attachment 1.3: Confidential information effective July 2015 to June 2020*, May 2014, p. 2 (confidential). However, Directlink, *Revenue proposal*, May 2014, pp. 36–37 also stated, ' Directlink reserves the right to nominate an alternative period within a reasonable timeframe, in the event that market conditions within the proposed averaging period appear abnormal'. Directlink did not take the opportunity to provide us with further reasoning to support this position in response to our letter AER GM Network Regulation, *Confidential letter to APA Group: Return on equity risk free rate averaging period for Directlink*, 27 June 2013. JGN's proposed period was short and only slightly earlier than the period we proposed to it. See JGN, *2015–20 Access arrangement information, Appendix 9.2 averaging period proposal*, 30 June 2014, p. 1 (confidential). TasNetworks implicitly agreed to our proposed period by choosing not to respond after we expressed our intention to apply it in absence of a response in our letters: General Manager– AER Networks, *Return on equity risk free rate averaging period for 2014–19*, 14 April 2014 (Confidential). TransGrid accepted this averaging period in Executive General Manager (TransGrid), *Confidential: Return on equity risk free rate averaging period for 2014–19*, 19 June 2013 (Confidential).

[320] For clarity, service providers can select longer periods for estimating the return on debt.

[321] NER cl. 6.5.2(g).

[322] Prevailing market evidence appear consistent with a lower estimate of the required return on equity than in the last regulatory control period. See our analysis on conditioning variables in appendix C—MRP and the return on debt under step four of the foundation model approach. This position is also supported in SACES, *Independent estimate of the WACC for SAPN: Report commissioned by SACOSS*, January 2015, pp. 7–8; Partington, *Report to the AER: Return on equity (updated)*, April 2015, pp. 72–75.

[323] For example, see Essential Energy, *Revised regulatory proposal*, January 2015, pp.232–236.

[324] 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.

Essential Energy proposed estimating the risk free rate using a long term historical averaging period commencing in 1883.[325] We previously noted that if a service provider can select an averaging period by looking at historical yields, its knowledge about the outcome of those averaging periods enables the service provide to select a period that involves upward bias.[326]

Similarly, we do not expect Essential Energy's alternative averaging period proposed in its revised regulatory proposal would produce an unbiased estimate of the risk free rate. Essential Energy recently submitted that if it was necessary to specify a short term averaging period for the return on equity, we should use the period 28 February 2014 to 30 June 2014.[327] We do not accept this averaging period because we consider it is a biased estimate. It was proposed after the period occurred, enabling Essential Energy to select an advantageous period.

We elaborate further on why we consider using an averaging period of 9 February 2015 to 6 March 2015 produces our best estimate in the following sections.

An unbiased estimate

We expect the averaging period of 9 February 2015 to 6 March 2015 to produce an unbiased estimate of the risk free rate because it was chosen in advance. We consider that obtaining an unbiased estimate is important in reflecting the concept of efficiency and the actions of the benchmark efficient entity, that are integral to the allowed rate of return objective.

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 we consider that choosing the averaging period in advance is important for obtaining an unbiased estimate. If an averaging period is chosen after the nominated period has occurred, the knowledge of the risk free rate at any past point of time influences 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. The inherent bias would affect the overall rate of return. We made this clear in the explanatory statement to the Guideline when we specified the importance of determining an averaging period in advance.[328] 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.[329]

We consider the use of an unbiased estimate is of significant importance in achieving the allowed rate of return objective. That is, it is more likely to contribute to the achievement of the allowed rate of return objective than a biased estimate. This

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[325] Essential Energy, *Revised regulatory proposal*, January 2015, p.232. Essential Energy proposed an averaging period of 1883 to 2011 in Essential Energy, *Regulatory proposal*, May 2014, p. 106.

[326] Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

[327] Essential Energy, *Revised regulatory proposal*, January 2015, p. 232.

[328] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 79–80.

[329] Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9-10.

provides for the rate of return to be commensurate with the efficient financing costs of a benchmark efficient entity. However, estimating 'efficient' financing costs by reference to a 'benchmark' efficient entity requires an unbiased methodology. 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 and the revenue and pricing principles.

We consider that an unbiased rate of return allowance is important for incentivising efficient investment in the long term interest of consumers. This is because regulated service providers are to use the forward looking allowed rate of return to value their investment decisions. This was agreed upon by Lally and Houston in their joint report for the Federal Court of Australia, where they stated:[330]

> Economic theory says that the required rate of return to be used in valuating an investment decision is the forward looking rate estimated as at the date of that decision.

As such, we do not expect Essential Energy's preferred averaging period of 1883 to 2013 would produce an unbiased estimate of the risk free rate.[331] The averaging period is selected by looking at historical yields, which we consider is likely to introduce an upward bias.[332]

Similarly, we do not expect Essential Energy's alternative averaging period of 28 February 2014 to 30 June 2014, proposed in its revised regulatory proposal, would produce an unbiased estimate of the risk free rate.[333] Essential Energy submitted that a relevant averaging period should be prior to the 'investment period' of 2014–2019. We do not find this difference in opinion convincing for the following reasons:

- Essential Energy did not put this interpretation to us in advance of the proposed averaging period occurring, even though it has known our proposed approach since 14 April 2014.[334] Therefore, we consider this proposed period carries an inherent bias.

- No service provider (other than the NSW distributors) suggested using an averaging period prior to the commencement of the previous transitional regulatory

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[330] 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.

[331] Essential Energy, *Revised regulatory proposal*, January 2015, p.232. Essential Energy proposed an averaging period of 1883 to 2011 in Essential Energy, *Regulatory proposal*, May 2014, p. 106.

[332] Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

[333] Essential Energy, *Revised regulatory proposal*, January 2015, p. 232.

[334] In our letter to Essential Energy, we proposed to use an averaging period from 9 February 2015 to 6 March 2015 to inform our decision on the return on equity for the regulatory control period (2015–19) and to calculate notional revenue for the transitional year (2014–15) for the true up. See General Manager– AER Networks, *Letter: Return on equity risk free rate averaging period for 2014–19*, 14 April 2014 (Confidential).

control period. Service providers generally agreed with using one averaging period near the commencement of the subsequent regulatory control period.[335]

Unlike Essential Energy's proposed averaging periods, an averaging period of 9 February 2015 to 6 March 2015 was chosen and known in advance of it occurring and in advance of either regulatory control period commencing. We proposed to apply this period as a default option in a letter to Essential Energy on 14 April 2014.[336] In this letter, we gave Essential Energy the opportunity to nominate an alternative averaging period that satisfied the Guideline. If we ultimately decided to use a short term averaging period in estimating a return on equity, we expressed our intention to use this proposed averaging period in absence of a response by 31 May 2014.[337] Essential Energy did not take the option to propose an alternative short term averaging period that satisfied the Guideline. Rather, it proposed an averaging period of 1883 to 2011, which was not consistent with the approach set out in the Guideline. After considering the proposed long term averaging period would not best achieve the rate of return objective, we stated we would use the averaging period we had nominated in our draft decision published November 2014.[338]

A fair estimate of prevailing conditions

Similarly, we are satisfied that it is a fair reflection of prevailing conditions to apply our averaging period of 9 February 2015 to 6 March 2015 to inform Essential Energy's required return on equity.

We consider that in forming our decision to use this averaging period, we followed a fair and due process. For instance:

- We offered service providers the opportunity to propose their own averaging period in accordance with the Guideline. This facilitated service providers in organising

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[335] ActewAGL, *Regulatory proposal (resubmitted)*, 10 July 2014, pp. 276–77.stated, 'if the AER accepts ActewAGL Distribution's method of estimating the return on equity (as set out in this chapter), ActewAGL Distribution does not take issue with the AER's proposed averaging period'. Directlink did not object to our proposed averaging period in Directlink, *Attachment 1.3: Confidential information effective July 2015 to June 2020*, May 2014, p. 2 (confidential). However, Directlink, *Revenue proposal*, May 2014, pp. 36–37 also stated, ' Directlink reserves the right to nominate an alternative period within a reasonable timeframe, in the event that market conditions within the proposed averaging period appear abnormal'. Directlink did not take the opportunity to provide us with further reasoning to support this position in response to our letter AER GM Network Regulation, *Confidential letter to APA Group: Return on equity risk free rate averaging period for Directlink*, 27 June 2013. While JGN proposed an alternative period, this was short and near the commencement of the subsequent regulatory control period. See JGN, *2015–20 Access arrangement information, Appendix 9.2 averaging period proposal*, 30 June 2014, p. 1 (confidential). TasNetworks implicitly agreed to our proposed period by choosing not to respond after we expressed our intention to apply it in absence of a response in our letters: General Manager– AER Networks, *Return on equity risk free rate averaging period for 2014–19*, 14 April 2014 (Confidential). TransGrid accepted this averaging period in Executive General Manager (TransGrid), *Confidential: Return on equity risk free rate averaging period for 2014–19*, 19 June 2013 (Confidential).

[336] General Manager– AER Networks, *Letter: Return on equity risk free rate averaging period for 2014–19*, 14 April 2014 (Confidential).

[337] General Manager– AER Networks, *Return on equity risk free rate averaging period for 2014–19*, 14 April 2014 (Confidential).

[338] AER, *Draft decision Ausgrid distribution determination — Confidential appendix I*, November 2014.

their financial arrangements according to their needs in advance, if required. This also gave them appropriate notice of the potential effects of our decision on their financing costs.[339] This also gave service providers the opportunity to raise any concerns they had with our proposed averaging period (in the absence of nominating their own period) and how we may use it to estimate the return on equity. Service providers could have raised such concerns in response to our letter dated 14 April 2014 or in their initial regulatory proposals.

- We notified service providers (including Essential Energy) of the averaging period we intended to use before the start of the regulatory control period. This gave service providers the opportunity to submit an averaging period that suited their own financial arrangements.

- Based on confidential information submitted by Networks NSW, we are aware that Networks NSW's management and Board had considered the potential course of interest rates over the 2014-15 financial year. Based on that consideration, Networks NSW had the opportunity to propose alternative approaches in the event that it was concerned with our proposed approach. It did not do so.[340]

We consider a fair estimate is essential in achieving the allowed rate of return objective and the NEO. The NEO and the revenue and pricing principles seek to promote decisions that are in the long term interests of consumers through the promotion of efficient investment and the use of effective incentives and appropriate regard to risks. These considerations seek to balance the competing interests of many stakeholders. We ensure that service providers have notice of the methods we propose using in setting the rate of return because we consider this:

- Provides an opportunity to nominate their own averaging periods that comply with these methods.

- Gives them notice of potential periods that we may use in default of a nomination.

- Allows businesses to take appropriate steps to adapt and protect their financing arrangements in the event that we ultimately use that method.

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.

Should we use a short term averaging period?

We consider our averaging period of 9 February 2015 to 6 March 2015 provides for a return on equity estimate that has regard to the prevailing conditions in the market for equity funds, as the NER require.[341] Our return on equity estimate is informed by other prevailing market information over short term periods close to the commencement of the regulatory control period, like the MRP, DGMs and conditioning variables.

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[339] See AER, *Explanatory statement rate of return guideline,* 17 December 2013, p. 76.
[340] Networks NSW, *Board paper, Item 3.2: FY15 debt funding strategy*, 28 May 2014, p. 4 (CONFIDENTIAL).
[341] NER cl. 6.5.2(g).

Our consideration of prevailing conditions in the market is made in the context of an overall decision about required revenues and expenditure allowances. This inherently links the concept of prevailing conditions to the timing of our decision. Accordingly, we consider our averaging period of 9 February to 6 March 2015 suitable for the purpose of estimating a return on equity for both regulatory control periods and that it contributes to the achievement of the allowed rate of return objective. This is for the following reasons:

- At any point in time, the prevailing risk free rate is the benchmark that returns on risky investments must outperform.[342] 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.[343] We use a short term averaging period as a pragmatic alternative to using a rate based on any single day.[344] This is because we consider this provides a reasonable estimate of the prevailing rate while not exposing service providers to unnecessary volatility.[345]

- It reflects up to date market information at the time of making our determination. This satisfies the NER requirement to have regard to prevailing equity market conditions.[346] As any consideration of efficient financing costs requires a knowledge of permitted revenues as well as expenditure allowances, we consider there are strong grounds for a prevailing rate that is close in time to our revenue determination for the regulatory control period.

- No other service provider has suggested the merits of using an averaging period prior to the commencement of the previous transitional regulatory control period for the purposes of this determination. Rather, service providers generally agreed with using one averaging period near the commencement of the subsequent regulatory control period.[347]

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[342] 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.

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

[344] Lally, *The present value principle*, March 2013, p. 5.

[345] Lally, *Risk free rate and present value*, August 2012, p. 7.

[346] NER cl. 6.5.2(g).

[347] ActewAGL, *Regulatory proposal (resubmitted)*, 10 July 2014, pp. 276–77.stated, 'if the AER accepts ActewAGL Distribution's method of estimating the return on equity (as set out in this chapter), ActewAGL Distribution does not take issue with the AER's proposed averaging period'. Directlink did not object to our proposed averaging period in Directlink, *Attachment 1.3: Confidential information effective July 2015 to June 2020*, May 2014, p. 2 (confidential). However, Directlink, *Revenue proposal*, May 2014, pp. 36–37 also stated, ' Directlink reserves the right to nominate an alternative period within a reasonable timeframe, in the event that market conditions within the proposed averaging period appear abnormal'. Directlink did not take the opportunity to provide us with further reasoning to support this position in response to our letter AER GM Network Regulation, *Confidential letter to APA Group: Return on equity risk free rate averaging period for Directlink*, 27 June 2013. While JGN proposed an alternative period, this was short and near the commencement of the subsequent regulatory control period. See JGN, *2015–20 Access arrangement information, Appendix 9.2 averaging period proposal*, 30 June 2014, p. 1 (confidential). TasNetworks implicitly agreed to our proposed period by choosing not to respond after we expressed our intention to apply it in absence of a response in our letters: General Manager– AER Networks, *Return on equity risk free rate averaging period for 2014–19*, 14 April 2014 (Confidential). TransGrid accepted this

We recognise that the averaging period used in the draft decision provides for a lower estimate of the risk free rate than an averaging period in 2014.[348] However, we recognise this was always a possibility because CGS yields vary across time. In any given regulatory year, it is normal to expect interest rates to deviate from those implied by our return on equity allowance. Similarly, averaging periods that do not align perfectly with the commencement of a regulatory control period will always be too high or too low with the benefit of hindsight.[349] This is a function of how markets and the regulatory regime interact. This does not mean our return on equity will be more or less likely to contribute to the achievement of the allowed rate of return objective. For the reasons we have outlined, we are satisfied that our decision better contributes to the achievement of the allowed rate of return objective. Because investors rely on expectations, the critical consideration for efficient investment is whether the averaging period for informing the return on equity was fair (and consequently, unbiased) when it was set.[350]

In contrast, we do not consider the long term averaging period that Essential Energy proposed (1883 to 2013) reflects prevailing conditions in the market for equity funds.[351] Essential Energy submitted that its approach will contribute to the achievement of the allowed rate of return objective because:[352]

> Clauses 6.5.2(e)(3) and 6.5.2(g) of the rules require an estimate of the benchmark efficient return on equity that has regard to prevailing market conditions, not simply a risk free rate that has regard to the prevailing conditions in the market for funds.

We are satisfied that our return on equity estimate has regard to prevailing conditions in the market for equity funds, both at the parameter level and at the overall return on equity level. When forming this estimate, we had regard to a range of prevailing market information. This included but was not limited to CGS yields, comparisons with the

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averaging period in Executive General Manager (TransGrid), *Confidential: Return on equity risk free rate averaging period for 2014–19*, 19 June 2014 (Confidential).

[348] For clarity, the averaging period used in the draft decision did not reflect the indicative risk free rate applied in the draft decision. This is because, at the time of the draft decision, this averaging period had not occurred and was kept confidential.

[349] While the SLCAPM theoretically requires the risk free rate to be the first market price on the first day of the regulatory control period, we recognise there are practical issues with using this rate. As such, we use a pragmatic alternative averaging period of 20 consecutive businesses days as close as practical to the commencement of the regulatory control period—which only violates the theoretical requirements of the SLCAPM to a small extent. For further explanation, see AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 77–78; Lally, *Risk free rate and present value*, August 2012, pp. 5–7.

[350] McKenzie and Partington described that, 'Investors willingly accept risk in the expectation of achieving a higher return than would otherwise be the case. Yet, not all risk is rewarded.' The Federal Court recognised an unbiased rate of return involved, 'making a prediction about interest rates which although too high or too low at any particular point in time, is on average correct'. See McKenzie and Partington, *Report to the AER: Risk, asset pricing models and WACC*, June 2013, p. 4; Federal Court of Australia, *ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639*, 8 June 2011, para 39.

[351] Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

[352] Essential Energy, *Revised regulatory proposal*, January 2015, p. 233.

prevailing return on debt and a range of information to inform our MRP estimate, including DGM estimates and conditioning variables. 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.[353] Under step four 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.[354]

We recognise that the NER do not require us to have regard to prevailing market conditions through the risk free rate specifically. However, given CGS yields are the most observable component of the return on equity; we consider it reasonable to have regard to movements in prevailing risk free rates. The risk free rate indicates the rate that other investments (with risk) must beat. It is therefore a suitable starting point for estimating the required return on equity. It is therefore unsurprising that most approaches to estimating the return on equity require a risk free rate component.[355]

Consistent with our position, consumer submissions addressing this topic also recommended averaging the risk free rate over a short time period.[356] For instance, the CCP supported applying the Guideline when setting the risk free rate and submitted that the NSW distributors' position of using a long term historical average risk free rate was not defensible.[357] Furthermore, the majority of service providers (other than the NSW distributors) accepted our use of a short term averaging period for estimating the risk free rate.

Commensurate with required returns in the current market

We are satisfied that it is reasonable to use our proxy (CGS yields with a 10 year term) in the current market. While this currently leads to a lower required return on equity estimate than in the last regulatory control period, we consider evidence indicates this is commensurate with the cost of capital in Australian debt and equity markets.

A lower estimate of the required return on equity than in the last regulatory control period appears consistent with the current expectations of investors. We have had regard to prevailing market evidence, which we consider supports this. For further discussion on this issue (and in particular, conditioning variables), see appendix C—MRP. Also see our discussion of the return on debt under step four of the foundation model approach.

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[353] Lally, *Review of the AER's methodology for the risk free rate and the MRP*, March 2013, p. 6.
[354] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 23
[355] 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.
[356] See, for example: CCP, *Jam tomorrow? Submission to the AER regarding NSW DNSP regulatory proposals 2014-19*, August 2014; PIAC, Mov*ing to a new paradigm: submission to the AER's NSW electricity distribution network price determination*, 8 August 2014.
[357] AER, *Rate of return guideline*, 17 December 2013, p. 15; CCP, *Jam tomorrow? Submission to the AER regarding NSW DNSP regulatory proposals 2014-19*, August 2014, p. 15.

Further, 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 Partington's advice that, '[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'.[358] This is consistent with our position formed during the last Victorian Gas Access Arrangement Review (VicGAAR) in 2012 when service providers raised concerns that CGS yields were lower than in recent decades.[359] 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.[360] 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.[361]

Consistent with our position, other stakeholders supported using short term CGS yields as the risk free rate proxy. In its report for SA Centre of Social Services (SACOSS), the SA Centre for Economic Studies (SACES) did not find any robust evidence to suggest that the market for Australian CGSs was distorted. SACES advised:[362]

> 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.

Similarly, Partington advised, '[t]he low bond rates tell us that the required return for low risk assets is low'.[363] 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 inferences based on singular instances, he observed this appeared in line with a fall in required returns. Specifically, he considered:[364]

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

[359] 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.

[360] 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.

[361] RBA, *Letter to the ACCC: The CGS Market*, 16 July 2012.

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

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

[364] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 73.

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 due to lower interest rates seems the more plausible explanation.

Should there be a stable return on equity?

In the explanatory statement to the Guideline, we discussed the benefits of stable allowed returns. However, we also recognised there was evidence to suggest the return on equity is not stable over time.[365] When developing the Guideline, we found that while consumer groups supported more stable returns, they did no not support stable prices that did not reflect efficient financing costs, which is an important aspect of the allowed rate of return objective.[366] Consequently, we developed an approach that, 'appropriately balances the theoretical and empirical evidence with the characteristics of regulated infrastructure'.[367]

While long term averaging, as proposed by Essential Energy will deliver more stable return on equity allowances by definition, this will not necessarily produce the best outcome in terms of contributing to the achievement of the allowed rate of return objective.[368] This is because, to the extent that required returns vary, we would not expect a stable return on equity to contribute to a rate of return that is commensurate with the efficient financing costs of the benchmark efficient entity. Further, it is unlikely to reflect prevailing conditions in the market for equity funds. In practice, the most observable component of the return on equity is the risk free rate. Therefore, we consider it reasonable to have regard to movements in prevailing risk free rates.

It appears that Essential Energy considered its overall return on equity estimate was more stable than ours because of its view that its approach was internally consistent and was underscored by considering evidence from all relevant financial models.[369] We do not agree with Essential Energy's submission for the following reasons:

- Our approach is internally consistent — we are estimating a prevailing, 10 year forward looking required return on equity.[370] See the proceeding section for why we consider our approach is internally consistent.

- It is logical that short term estimates will vary more than long term, historical estimates — we do not consider this is a reflection on whether or not an approach

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[365] See, for example: AER, *Access arrangement final decision Envestra Ltd 2013-17, part 3,* March 2013, pp. 30–31.

[366] COSBOA, *Comments‑draft guideline*, October 2013, p. 4; Public Advocacy Centre Ltd, *Submission to the AER's rate of return guidelines consultation paper*, 21 June 2013, p. 9; Major Energy Users, *Response to the AER's rate of return guidelines consultation paper*, June 2013, p. 8.

[367] AER, *Explanatory statement rate of return guideline*, December 2013, p. 66.

[368] Essential Energy, *Revised regulatory proposal*, January 2015, p.232. Essential Energy proposed an averaging period of 1883 to 2011 Essential Energy, *Regulatory proposal*, May 2014, p. 106.

[369] Essential Energy, Revised regulatory proposal, January 2015, p. 236.

[370] We discuss this in detail in previous decisions. See for example, AER, *Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013–17, Part 3: Appendices,* March 2013, pp. 29–37.

is internally consistent. This appears to be informed by a belief that when interest rates fall, investors demand compensation by increasing their risk premium. Regarding this belief, Partington advised:[371]

> We have previously analysed this argument and found little support for it. 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. This directly contradicts the Wright proposition that a fall in interest rates is offset by a rise in the required risk premium (and vice versa) in order to hold the real required return constant. If this were the case, then other things equal, reductions in interest rates would not be associated with rising share prices (and vice versa), since the benefit of the interest rate reduction would be offset by the rise in the risk premium.

- We are not satisfied that considering more information will necessarily result in more stability. Rather, if the information indicated there were changes in market conditions, there would be no reason to expect stability would result. Further, we are satisfied with how we have used information from return on equity models in our foundation model approach. For a detailed explanation of how we do this, see appendix A—Equity models.

Consistent with the market risk premium

We estimate the risk free rate and MRP consistently. We parameterise the SLCAPM with 10 year forward looking estimates of the MRP and risk free rate.

We are satisfied that our estimates of the risk free rate and MRP are internally consistent for the following reasons:

- Essential Energy has mischaracterised our approach. Our approach to estimating the MRP and risk free rate is internally consistent. We use historical excess returns in estimating a prevailing 10 year forward looking MRP, not a historical MRP. We also consider other sources of forward looking evidence, including DGMs, market surveys and conditioning variables.

- 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:[372]

> 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.

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[371] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 73.
[372] Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8*, 18 September 2013, Para 308.

- During the Victorian Gas Access Arrangement Review (VicGAAR), Lally assessed our approach and advised that we applied consistent value of the risk free rate in both parts of the SLCAPM equation. He advised:[373]

  > 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.

  As such, Lally advised our approach was internally consistent.[374] Specifically, 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. Given this, we do not consider Essential Energy has put any new or persuasive material before us, which is similar to the opinions we consider under the VicGAAR.[375]

We do not agree with Essential Energy's opinion that our parameterisation of the SLCAPM is based on two inconsistent methods.[376] For the reasons set out above, we consider this opinion is based on a mischaracterisation of our approach.

Further, PIAC 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.[377]

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

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

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

[375] CEG, *WACC estimates: a report for NSW DNSPs*, May 2014 only raises points previously put before us. We considered similar material in AER, *Draft decision: APA GasNet, September 2012, Part 2*, p. 84, Part 3, pp. 12–15; AER, *Final decision: APA GasNet, Part 3*, March 2013, pp. 25-28, 43, 72–73.

[376] Essential Energy, *Revised regulatory proposal*, January 2015, p.233.

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

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.[378]

We adopt a point estimate of 6.5 per cent for the MRP for this final decision. This is from a range of 5.1 to 8.6 per cent. 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.[379] 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.[380]

Based on the evidence before us, we consider a range of 5.1 to 8.6 per cent 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'.[381] Therefore, while we have regard to geometric averages, we consider a reasonable estimate of the lower bound will be above the geometric average.[382] Therefore, we apply a lower bound estimate of 5.1 per cent.[383]

- 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.[384] 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.[385] The upper bound of the MRP range has increased by 80 basis points since the draft decision. This increase is wholly the result of increased DGM estimates of the MRP.

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

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[378] 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'.

[379] AER, *Rate of return guideline*, 17 December 2013, p. 16.

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

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

[382] 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.

[383] 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.

[384] As such, this is a conservatively high estimate using our construction of the DGM. This estimate is for the two months ending February 2015.

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

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 5.1 to 6.5 per cent a reasonable range and 6.0 per cent a reasonable point estimate based on this source of evidence.[386]

- DGMs—these estimates, from two applications of the DGM and a range of inputs, suggest a range of 7.4 to 8.6 per cent for the two months to end February 2015.[387]

- Survey evidence—surveys of market practitioners indicate that MRPs applied in Australia cluster around 6.0 per cent.[388] 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. This is because:[389]

  o Dividend yields are close to their historical averages. These have been relatively steady for over the last 12 months.

  o Australian corporate bond credit spreads have been relatively steady over the past 12 months and now appear to be increasing slightly. The corporate bond spreads are above their pre-2007 levels but the swap spread is below its pre-2007 levels. State government bond spreads appear to have increased slightly over the past 6 months but remain close to their pre-2007 levels.

  o Implied volatility suggests the MRP is currently below its historical average level.

- 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

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[386] In the worked example in the Guideline, we considered a reasonable MRP range based on historical excess returns evidence was 5.0 to 6.5 per cent, based on geometric mean estimates of 3.6 to 4.8 per cent and arithmetic mean estimates of 5.7 to 6.4 per cent. By setting the upper bound of the historical excess returns range at 6.5 per cent, we fully cover the historical excess returns estimates using arithmetic averages (the highest estimate using arithmetic averages is 6.41 per cent).

[387] This end date is as close as practical to the publication of this decision. This is also close to the end of the averaging period used for the risk free rate (6 March 2015).

[388] 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 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.

[389] See section C.4 of appendix C–MRP for more information on, and charts of, the conditioning variables. This information is as at 6 March 2015 (except for Australian corporate bond credit spreads, which is as at February 2015).

decision or update is 6.0 to 7.9 per cent. The average of these decisions is 6.5 per cent.[390]

We have also considered:

- Tribunal decisions—the Tribunal upheld our approach to estimating the MRP when APA GasNet appealed our decision in 2013.[391] The MRP approach brought before the Tribunal was similar to that applied in this decision.[392]

- 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.

- 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]

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[390] In November 2014, the ERA released a revised draft decision of the WACC for regulated rail networks, which adopted an MRP of 7.9 per cent. This forms the top of the range, though we note that the ERA's estimate is based on the Wright approach, which is adopted after consideration of the annuity pricing approach used by the ERA in its rail access regime and which may not be applicable in our case (ERA, *Review of the method for estimating the weighted average cost of capital for the regulated railway networks—Revised draft decision*, 28 November 2014, p. 89). The bottom of the range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC and TER. See: ERA, *Review of the method for estimating the weighted average cost of capital for the regulated railway networks—Revised draft decision*, 28 November 2014, p. 98; ESCV, *Proposed approach to Melbourne Water's 2016 water price review—Consultation paper*, February 2015, p. 39; TER *Draft report: 2015 price determination investigation—Regulated water and sewerage services*, January 2015, p. 41; NTUC, *Network price determination, Part A—Statement of reasons*, April 2014, p. 125; ESCOSA, *SA Water's water and sewerage revenues 2013/14–2015/16: Final determination—Statement of reasons*, May 2013, p. 136.

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

[392] The most notable change to our approach is that we now place more reliance on DGMs than using them as a cross check.

[393] See discussion under 'Views of service providers and other stakeholders' in section C.8.2 of appendix C–MRP for more information and full reference list.

[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.

Figure 3.5   Empirical estimates of the MRP against our point estimate of 6.5 (per cent)
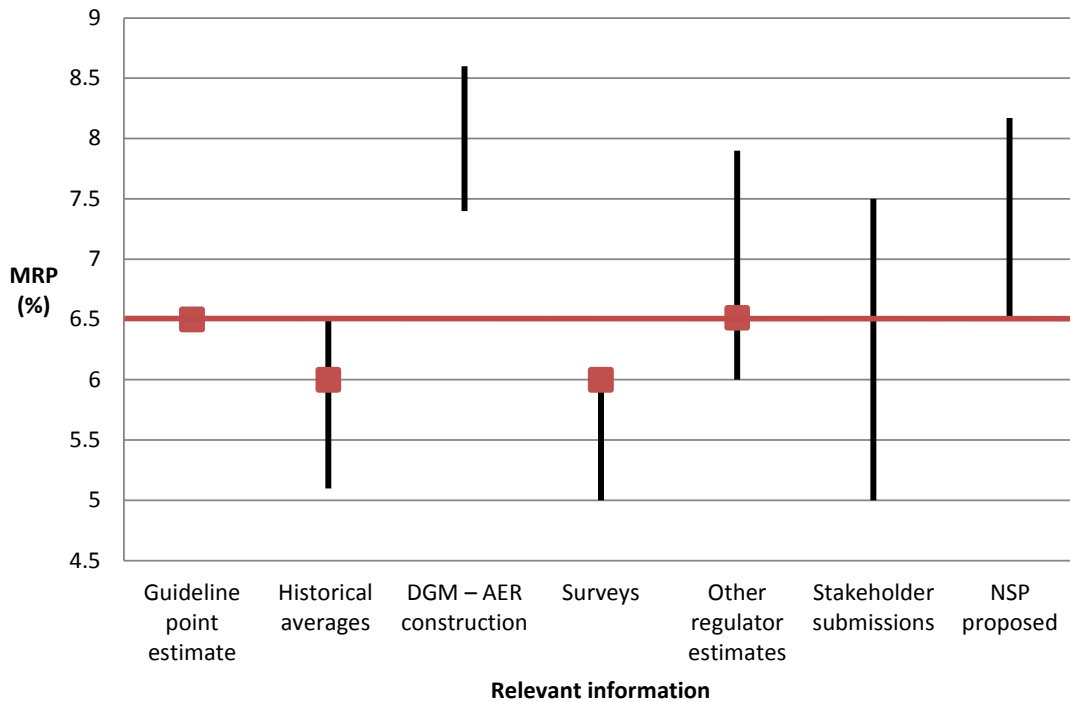
Source: AER analysis

Note: The average of each state regulator's most recent decision/update on the MRP forms the point estimate (6.5 per cent) for other regulator estimates. In November 2014, the ERA released a revised draft decision of the WACC for regulated rail networks, which adopted an MRP of 7.9 per cent.[395] This forms the top of the other regulator estimates range. The bottom of this range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC and TER.[396] The stakeholder 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.[397] The bottom of the NSP range

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[395]   ERA, *Review of the method for estimating the weighted average cost of capital for the regulated railway networks—Revised draft decision*, 28 November 2014, pp. 89, 98. We note that the ERA's estimate is based on the Wright approach, which is adopted after consideration of the annuity pricing approach used by the ERA in its rail access regime and which may not be applicable in our case.

[396]   ESCV, *Proposed approach to Melbourne Water's 2016 water price review—Consultation paper*, February 2015, p. 39; TER *Draft report: 2015 price determination investigation—Regulated water and sewerage services*, January 2015, p. 41; NTUC, *Network price determination, Part A—Statement of reasons*, April 2014, p. 125; ESCOSA, *SA Water's water and sewerage revenues 2013/14–2015/16: Final determination—Statement of reasons*, May 2013, p. 136.

[397]   The CCP 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. CCP, *Response to AER draft determination for TasNetworks and TasNetworks' revised revenue proposal*, 18 February 2015, p. 4; CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, 16 February 2015, p. 7; CCP, *Submission: AER draft TransGrid determination TransGrid revised revenue proposal*, 6 February 2015, p. 13; CCP, *Response to AER draft determination for re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 24; CCP, *Submission to*

comes from TasNetworks and Directlink's revised proposals which accept the Guideline approach and our draft decisions.[398] The top of the NSP range comes from Jemena Gas Networks' (JGNs') revised proposal, which applies an MRP of 8.17 per cent.[399]

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.[400]

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 February 2015) range from 7.4 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 consistent with the baseline estimate of 6.0 per cent.

AER: Responding to NSW draft determinations and revised proposals from electricity distribution networks, 2 January 2015, p. 46; CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16; CCIQ, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 20.

[398] TasNetworks, *Revised revenue proposal*, January 2015, p. 5. Directlink, *Revised revenue proposal*, January 2015, p. 11.

[399] JGN, *Revised access arrangement proposal*, February 2015, pp. 30–31.

[400] 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 appendix C–MRP).

- Since our draft decision in November 2014, 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. 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:

    o We use conditioning variables as a directional indicator for the MRP because of their potential to detect changing market conditions. These indicate either no change or an easing in the MRP which is a different outcome to our DGM estimates of the MRP. We also consider survey evidence provides forward looking estimates of the MRP based on investor expectations.

    o 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.[401] We also consider our, and other, DGMs may not accurately track changes in the return on equity for the market.[402] See section B.5 of appendix B–DGM for a more detailed discussion of sources of potential upward bias in our, and other, DGMs.

    o 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 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'.[403] 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 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.[404] It also provides a balance between the views of services providers and other stakeholders. We provide detailed analysis of technical issues and responses to Essential Energy's revised proposal in appendix C–MRP.

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[401] 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.

[402] 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.

[403] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 71–74.

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

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:[405]

- Dividend yields have been close to their long term average since approximately April 2013, with no discernible trend (see Figure 3.6).

- Australian corporate bond credit spreads have been relatively steady over the last 12 months and now appear to be increasing slightly. 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 appear to have increased slightly over the past 6 months but remain close to their pre-2007 levels (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).

Figure 3.6   Dividend yields
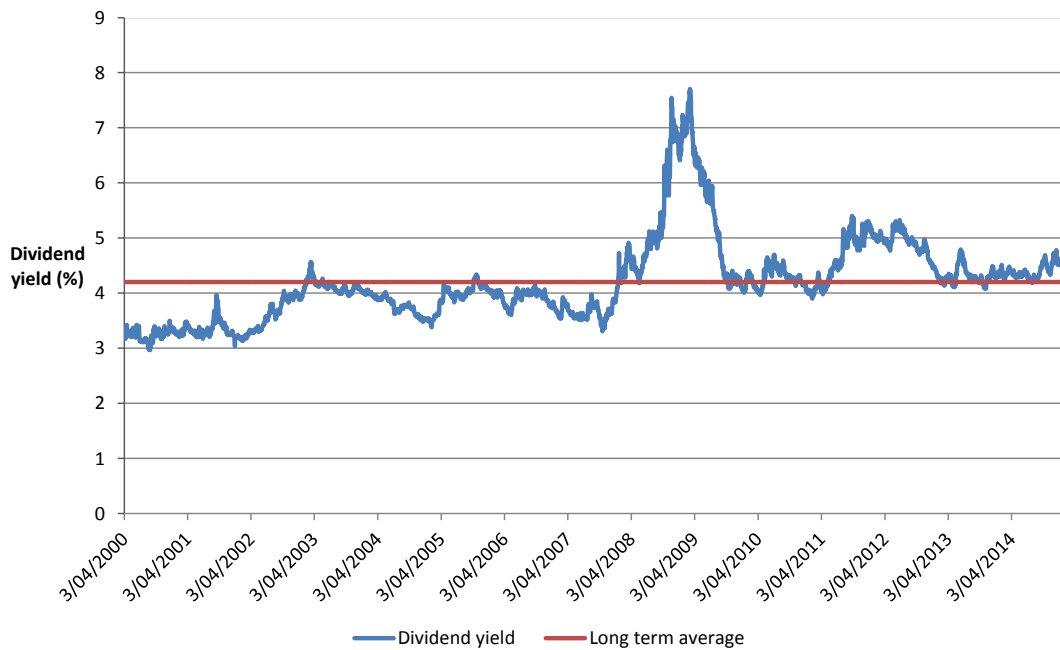
Source: Bloomberg; AER analysis.

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[405]   This information is as at 6 March 2015 (except for Australian corporate bond credit spreads, which is as at February 2015).

Figure 3.7 Australian bond spreads over government yields

Australian Bond Spreads*
Spread over government yields

* Swap spreads are for 3-year maturity. Corporate bond spreads are a weighted average of senior bonds with remaining maturities of 1 to 5 years; they include financial and non-financial corporates.

Sources: Bloomberg; RBA; UBS AG, Australia Branch
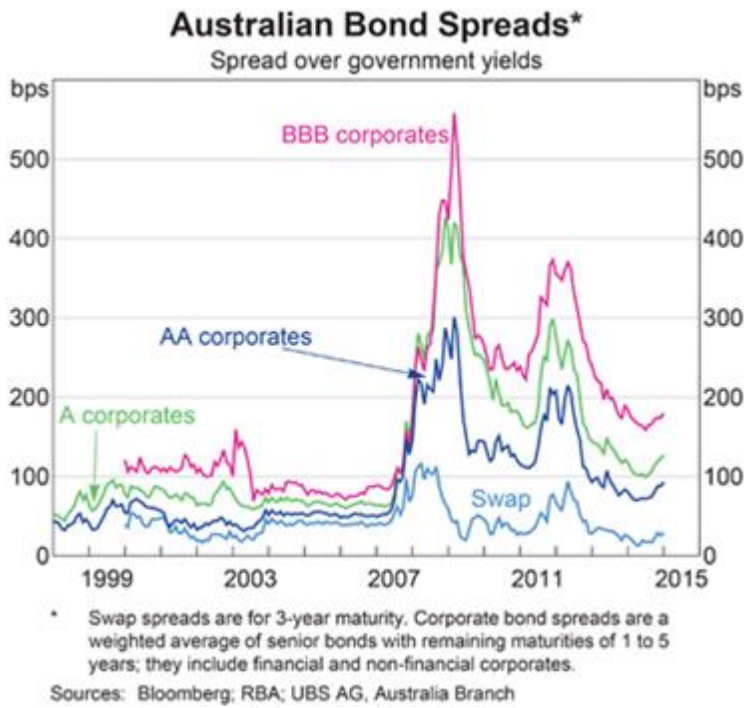
Source: RBA chart pack, February 2015.

Figure 3.8 State government bond spreads over government yields
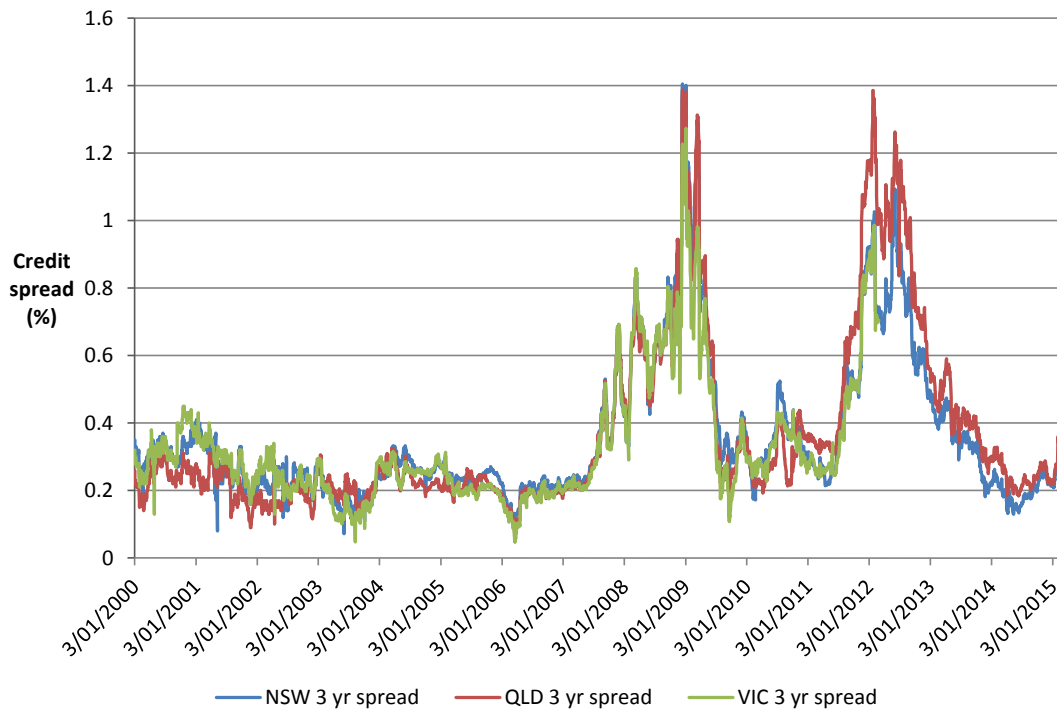
Source: RBA; AER analysis.

Figure 3.9 Implied volatility (VIX)
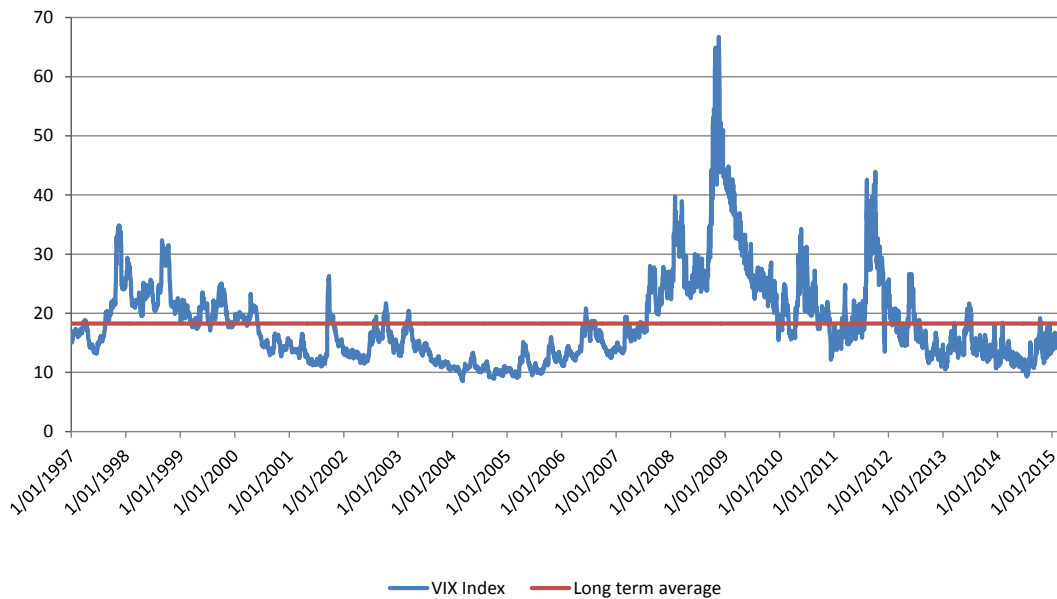
Source: ASX200 VIX volatility index, sourced by Bloomberg cost AS51VIX.

We note similar patterns in other forward looking financial market indicators. For example:[406]

- Figure 3.10 shows that Australian corporate bond yields have decreased significantly since about 2011, moving closely with CGS yields.

- Figure 3.11 shows Australian forward price-earnings ratios since 2003. The RBA, in its statement of monetary policy stated 'valuations of Australian equities, as measured by forward price-earnings ratios, have increased since the previous Statement to be above their decade averages for all sectors'.[407] The RBA also noted that Australian equity prices have increased by 7 per cent since the start of 2015.

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[406]   This information is as at February 2015.
[407]   RBA, *Statement of monetary policy*, February 2015, p. 59.

Figure 3.10 Australian corporate bond yields and spreads

Australian Corporate Bond Pricing
1–5 year residual maturity; Australian dollar bonds

Yields | Spread to CGS

BBB rated corporations

CGS

A rated corporations

Sources: RBA; UBS AG, Australia Branch
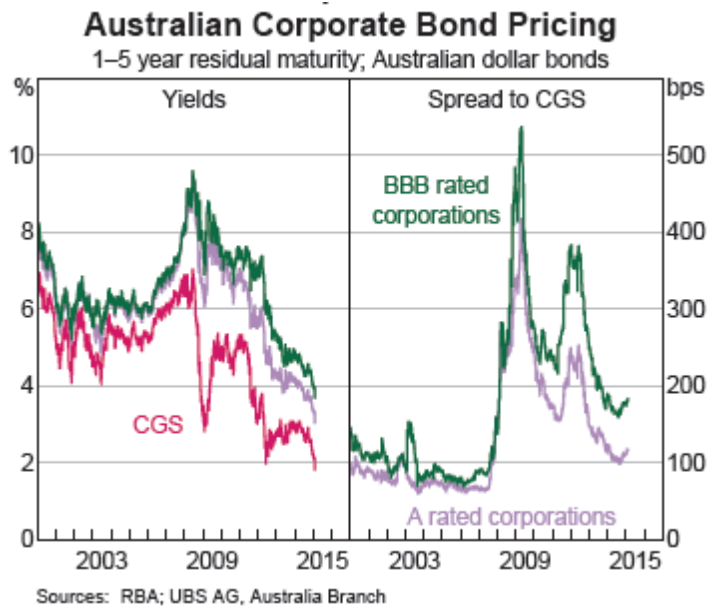
Source: RBA, *Statement of monetary policy*, February 2015, p. 56.

Figure 3.11 Australian forward price-earnings ratios
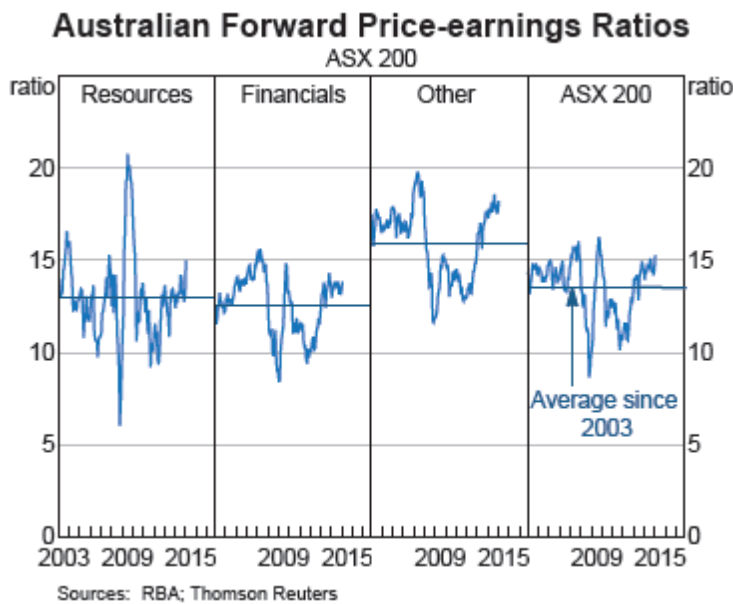
Australian Forward Price-earnings Ratios
ASX 200

Resources | Financials | Other | ASX 200

Average since 2003

Sources: RBA; Thomson Reuters

Source: RBA, *Statement of monetary policy*, February 2015, p. 59.

In steps one and two of our foundation model approach, we note DGM estimates can reflect changes in market conditions. We also note conditioning variables have the potential to indicate changes in market conditions, even though it is difficult to derive a specific MRP estimate from this information. These two sources of evidence are not in line with each other.

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 (2014) survey does not indicate an increasing MRP expectation (see appendix C–MRP).

Together, the other information we rely on in estimating the MRP is consistent with our baseline estimate of the MRP 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:

- Analyst forecasts are well understood to be upward biased.[411]

- DGMs use dividends as a proxy for free cash flow to equity, which is the share of the operating cash flow available for owners.[412] However, there are a number of problems with this approach:

  o 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

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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.

[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] 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.

[412] 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.

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.[413]

o 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 consider there is likely to be an asymmetry in the effects because of the greater reluctance to cut dividends than increase dividends.[414]

- 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.[415] 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 are mindful 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.[416] 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).[417] Lally stated that:[418]

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[413] 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.

[414] 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.

[415] 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.

[416] 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.

[417] Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013, pp. 11–12.

[418] Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013, pp. 11–12.

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'.[419] 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 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 (see section C.7 of appendix C–MRP for a more detailed discussion). In his 2015 report, Partington supported our view.[420]

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.[421] 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 note that a common view among service providers is that periods of low interest rates are a result of a 'flight to quality' by investors. This 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'.[422] He stated:[423]

> 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

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[419] 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.

[420] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 71–74.

[421] McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, pp. 6, 24.

[422] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

[423] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

higher yields investors are more willing to take on riskier investments. In other words, they are accepting a lower risk premium.

Moreover, current market evidence does not appear to be consistent with the view that there 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[424]

- sharp increases in conditioning variables; dividend yields, credit spreads and implied volatility (see Figure 3.6 to Figure 3.9).

However, over the past 12 months, we have seen a:

- decrease in CGS yields[425]

- limited movement in conditioning variables, which have remained fairly steady and close to their long term averages (see Figure 3.6 to Figure 3.9).

Partington considered that 'that the general and very substantial decline in credit spreads since the GFC seems inconsistent with increasing risk aversion'.[426] Partington also noted that we should be cautious in using this evidence to infer a decrease in the MRP.[427] This is because movements in the credit spread may not necessarily have direct parallels in movements of the equity risk premium.

We are not satisfied that there is a clear relationship (positive or negative) between the risk free rate and MRP. We are not satisfied that there is evidence of a widespread 'flight to quality' among investors in current market conditions. In fact, there is evidence to suggest investors may also be engaging in a 'search for yield', which is not consistent with an increase in the 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'.[428] 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).[429] Because the SLCAPM works on

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[424] See CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 23 (figure 5).

[425] See CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 23 (figure 5).

[426] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 73.

[427] 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.

[428] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

[429] 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.

the basis that investors can diversify away business–specific risk, only systematic (non-diversifiable) risk is relevant for determining the equity beta.[430]

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.[431]

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.[432] 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 3-18 at the end of this section.[433]

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.[434]

We consider the evidence in Henry's 2014 report suggests a best empirical estimate for the equity beta of approximately 0.5.[435] 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:

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[430] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp. 21–22;

[431] NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR, r. 87(3).

[432] 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.

[433] 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.

[434] 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.

[435] 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.

- Empirical estimates of international energy networks—the recent international empirical estimates we consider range from 0.3 to 1.0.[436] 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.[437] 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.[438] The theory underlying the Black 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 are mindful of 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.[439] The final Guideline expanded on

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[436] 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).

[437] However, the Black CAPM replaces this assumption with an allowance for unlimited short selling of stocks.

[438] 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.

[439] 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.

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.[440]

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 our previous regulatory determinations.[441] 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.[442] For example, UnitingCare Australia submitted that:[443]

> As with MRP, we believe that the range in values for β lie on a continuum between low figures that serve the best interests of consumers, and higher figures that will serve the best interests of investors and owners, but that will come at the expense of affordability. Again, we recommend the AER act in the best interests of consumers and select at the lower end of the range. Such a choice would be consistent with relatively low risk businesses in a relatively benign capital market, which is the current situation.

Conversely, Essential Energy submitted that our equity beta point estimate of 0.7 is too low.[444] Essential Energy proposed an equity beta point estimate of 0.82. Its revised proposal is based on reports by SFG and CEG. SFG submitted a regression–based equity beta estimate of 0.82 from a comparator set of Australian and US energy firms. It also submitted that, under our foundation model approach, the equity beta should be

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[440] AER, *Explanatory statement: Rate of return guideline*, December 2013, p. 51.

[441] Since 2010, 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.

[442] CCP, *Response to AER draft determination for TasNetworks and TasNetworks' revised revenue proposal*, 18 February 2015, p. 4; CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, 16 February 2015, p. 7; CCP, *Submission: AER draft TransGrid determination TransGrid revised revenue proposal*, 6 February 2015, p. 13; CCP, *Response to AER draft determination for re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 24; CCP, *Submission to AER: Responding to NSW draft determinations and revised proposals from electricity distribution networks*, 2 January 2015, p. 46. Refer to section D.5.2 of appendix D for a full list of stakeholder submissions supporting an equity beta lower than 0.7 for the benchmark efficient entity. While some of these are not submissions to Essential Energy's revised proposal, we have a common framework for estimating the return on equity for a benchmark efficient entity. Therefore, we consider all stakeholder submissions when determining the equity beta estimate for each service provider.

[443] UnitingCare, *Submission to SA Power Networks' regulatory proposal for 2015–20*, February 2015, p. 33.

[444] Essential Energy, *Revised regulatory proposal*, January 2015, pp. 236–238.

adjusted to 0.91 to reflect empirical evidence from the Black CAPM.[445] CEG submitted that the equity beta is above 0.8, based on evidence from a comparator set of Australian and US energy firms and considerations regarding a mining boom period in Australia.[446]

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.[447] 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 and RPP.[448] We provide a detailed analysis of technical issues and responses to Essential Energy's revised proposal in appendix D–equity beta.

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[445] SFG, *The required return on equity for the benchmark efficient entity*, 12 March 2015, pp. 18–21; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 32–33, 35. Essential Energy submitted these reports during the period for submissions on the AER's draft decision and Essential Energy's revised regulatory proposal.

[446] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 54–58 (attachment 8.2 to Essential Energy's revised proposal).

[447] 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. We also do not apply an adjustment to the equity beta to account for any mining boom period in Australia (see section D.2.2 of appendix D for our reasoning).

[448] 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
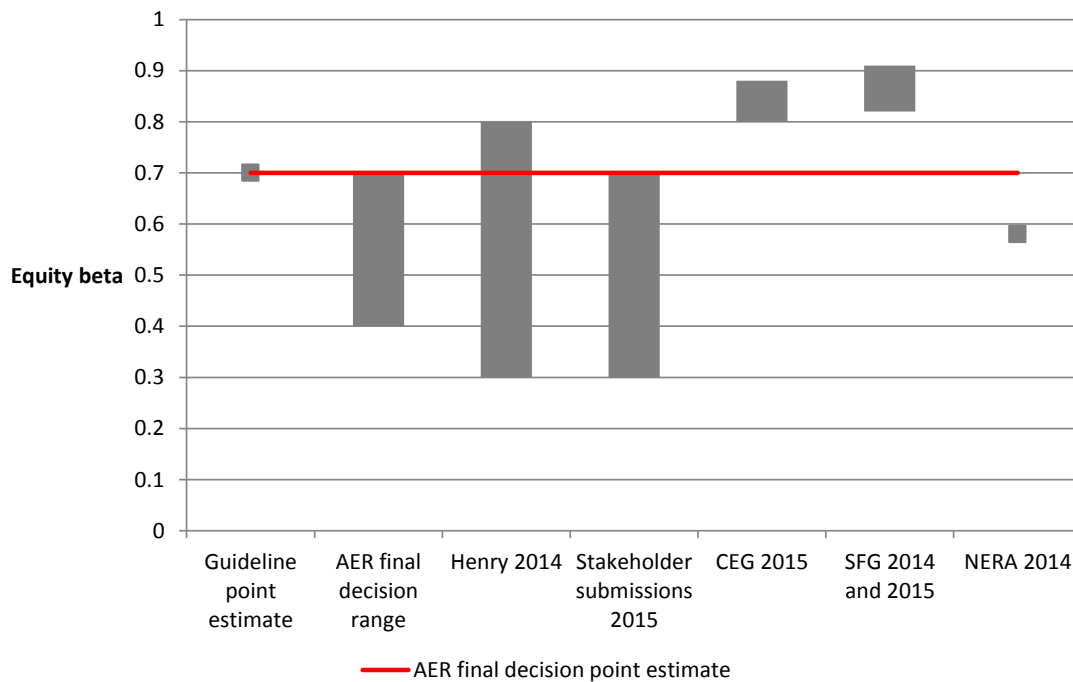
Source: AER analysis[449]

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 Alliance of Electricity Consumers' submission and the upper bound is based on Origin's submissions. 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). The NERA 2014 point estimate is

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[449]   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; Alliance of Electricity Consumers, *Submission to Ergon Energy's 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; Origin, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 13; Origin, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 15; NERA, *Return on capital of a regulated electricity network*, May 2014, p. 79; 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*, 13 February 2015, p. 20; SFG, *The required return on equity for the benchmark efficient entity*, 12 March 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.

based on an equity beta of 0.58, which NERA used for its preferred specification of the SLCAPM (although NERA uses multiple models to estimate the return on equity).

Table 3-18   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

Source	Time period	Individual firm averages	Fixed portfolios	Varying portfolios[a]	Summary of regression permutations
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.[450]

(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.

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[450]   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.

Step four: other information

In this section, we discuss the estimates of the return on equity we derive from the other information.

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 (2.6 to 6.0 per cent), and other regulators (3.3 to 12.3 per cent).

Table 3-19   Range of estimates from other information

	Return on equity		Equity risk premium	
	Minimum	Maximum	Minimum	Maximum
AER foundation model	4.6	8.6	2.0	6.1
Wright approach CAPM	5.5	9.7	3.0	7.1
Independent valuation reports	7.5	14.7	3.3	11.7
Broker reports	6.9	12.0	2.6	6.0
Other regulators' decisions	6.5	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.[451] 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 7.8 to 9.7 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.[452] 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.

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

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[451]   AER, *Explanatory statement: Rate of return guideline (appendices)*, December 2013, pp. 26–27.

[452]   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 Appendix E.5 for more detail.

rate of return objective. The upper bound shown in Table 3-19 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 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.[453]

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 1.9 per cent.[454] 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 260 basis points between the equity risk premium allowed in our final decision and current debt risk premiums[455] 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 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.[456]

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[453] 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].

[454] Based on the RBA's monthly data (statistical table F3) for the 28 February 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.

[455] 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.

[456] 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
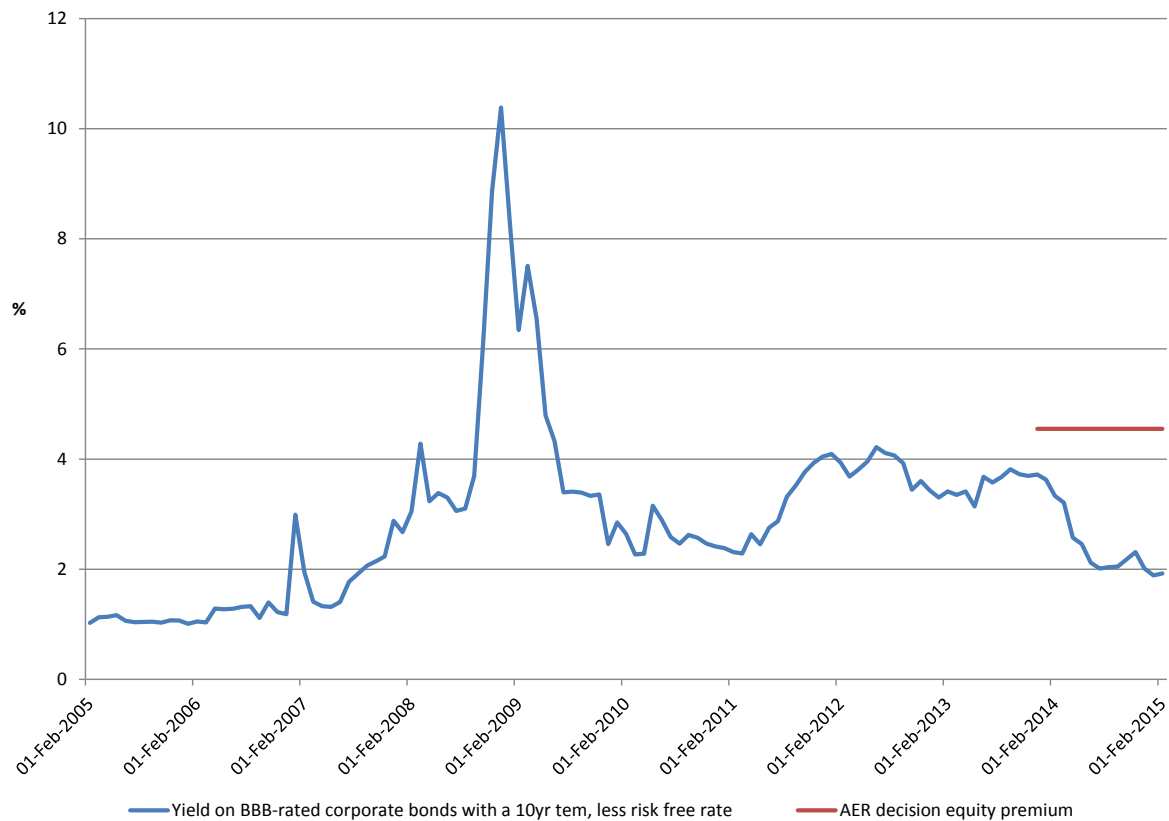
Source: AER analysis, RBA F3 and F16 interest rates statistics

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 NSPs' 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. [457] We are not (in principle) averse to a multi model approach where the models are equally valid for the intended objective.[458] 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

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[457]   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].

[458]   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.

with the NSPs that to have regard to other models means they must be applied. Given the limitations (as outlined in step two) of the other equity models proposed by the NSPs, 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).[459]

- 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 NSPs' 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 7.1 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.[460] The estimate is calculated as follows:

$$7.1\% = 2.55\% + 0.7 * 6.5\%$$

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 NSPs we regulate have been able to raise capital to undertake extensive investment programs.[461] This suggests the allowances set in the past using the SLCAPM were at least adequate to recover efficient costs.[462] This provides confidence that our estimate for this final decision, while taking account of the downward trends in equity beta and current

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[459] We note that our specification of these models (particularly the DGM) may differ from that proposed by the NSPs.
[460] For more information on how we came to these estimates, see step three.
[461] 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 estimate that does not include the gas networks that we regulate.
[462] This position was supported in submissions (on a concurrent determination process) from EMRF and PIAC – see: 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. 27–28; 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. 39.

market conditions (for the risk free rate and MRP), is likely to provide Essential Energy with a reasonable opportunity to recover at least efficient costs.[463]

- Our foundation model return on equity estimate is approximately 260 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 Essential Energy, we would not expect the return on equity to be a long way above the prevailing return on debt.[464] 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 5.5 to 9.7 per cent. This results in an equity risk premium range of 3.0 to 7.1 per cent. Using only the beta point estimate from the top of the range, return on equity estimates range from 7.8 to 9.7 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.[465]

- 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 (2.6 to 6.0 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.[466]

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

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[463] Our previous decision for Essential Energy in April 2009 adopted an equity risk premium of 6.0 per cent [AER, *Final Decision: New South Wales distribution determination 2009–10 to 2013–14*, 28 April 2009]. 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 most recent final decisions (excluding transitional decisions) for any electricity and gas service provider 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.]. This final decision adopts an equity risk premium of 4.55 per cent, which is consistent with our 2013 Rate of Return Guideline.

[464] 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.

[465] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 26–27.

[466] See Appendix E.6. 'Return on equity estimates from other practitioners' for more detail.

of a benchmark efficient entity with a similar degree of risk as that which applies to Essential Energy in respect of the provision of standard control services.[467] 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.

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

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[467] 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.

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.[468]

The service provider proposals range is based on the proposals from businesses for which we are making final or preliminary decisions in April–May 2015.[469] 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 April–May 2015. The lower bound is based on the Energy Users Association of Australia submission on NSW distributors revised proposals. The upper bound is based on Origin's submission on ActewAGL's proposal.[470]

A number of the equity risk premium ranges shown in Figure 3.14 have moved since our November 2014 draft decisions. We note that:

- The widening of our foundation model range is due to the increase in our DGM estimate of the MRP. The widening of the regulators range is in the first instance due to changes in the composition of the regulated businesses. Recent decisions for rail networks have increased the range, but rail networks are unlikely to be comparable to the benchmark efficient entity.[471] Excluding the rail decisions, the widening of the range is then due IPART's February 2015 biannual WACC update, which places significant reliance on DGM estimates of MRP. As discussed in step three, we place less reliance on the DGM estimates of MPR than estimates from historical excess returns.

- The increase in the service providers' proposed range is due to the lower risk free rate estimate 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 produce results that would contribute to the achievement of the allowed rate of return objective.

- The upwards shift in the range from the Wright approach is caused by the decline in the risk free rate from November 2014 to March 2015.[472] We note that there is no clear evidence of a relationship between risk free rate and equity risk premium.[473]

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

[469] ActewAGL, Ausgrid, Directlink, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Jemena Gas Networks, SA Power Networks, TasNetworks, and TransGrid.

[470] Energy Users Association of Australia, *Submission to NSW DNSP Revised Revenue Proposal to AER Draft Determination (2014 to 2019)*, February 2015, pp. 15–16; Origin Energy, *Submission to ActewAGL's regulatory proposal for 2014–19*, August 2014, p. 4.

[471] See Appendix E.5. for more detail.

[472] We updated our estimate of the historical market return to the 2014 calendar year end from the 2013 calendar year end used in our November 2014 draft decisions. 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. Therefore, the increase in the Wright approach range from our November 2014 draft decisions is wholly due to the decrease in the risk free rate over that time.

- The range of equity risk premium estimates from broker reports for listed service providers has widened asymmetrically, with the mid-point of the range declining.

- Debt risk premiums (spread between BBB+ rated corporate debt and the risk free rate) have not materially changed.

- 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. Movements in these conditioning variables since our November draft decisions have not been material.[475]

This information does not support the view that risk premiums have increased since our November 2014 draft decisions and we do not consider that there is sufficient evidence to cause us to 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 our November draft decisions or 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.[476]

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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[473] 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.

[474] See appendix C.4 for further discussion.

[475] Relative to long term trends.

[476] 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 7.1 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 final decision is to adopt a return on debt of 6.51 per cent, rather than the 7.98 per cent proposed by Essential Energy. This return on debt will apply to Essential Energy for 2014–15.[477] We will update 10 per cent of this return on debt each year over the 2014–19 period, based on the prevailing return on debt over Essential Energy's particular debt averaging period for each year. We have already completed the calculations to update the return on debt for 2015–16. This resulted in a return on debt of 6.40 per cent. This final decision sets out how we arrived at the rates for 2014–15 and 2015–16, and how we plan to update the return on debt in future 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 our draft decision.[478] Our

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[477] In the transitional distribution decision, we adopted a placeholder range of 6.7 to 7.5 per cent for Essential Energy's return on debt in 2014–15. Combined with our return on equity point estimate (8.9 per cent), this return on debt range created a range for the overall rate of return (7.6 to 8.1 per cent). We effectively adopted the top of the return on debt range (7.5 per cent) as we adopted an 8.1 per cent rate of return, which was the top of the rate of return range (AER, *Ausgrid, Endeavour Energy, Essential Energy, ActewAGL, Transitional distribution decision 2014–15*, April 2014, pp.34–38). Under the 'true-up' provisions in the NER, any over (under) recovery of revenue from the transitional regulatory control period (2014–15) is passed back (through) to customers over Essential Energy's subsequent regulatory control period (2015–19). In this final decision, we adopt a 6.51 per cent final return on debt for 2014–15. This is lower than the 7.5 per cent used in the transitional distribution decision. Accordingly, Essential Energy received an over-recovery of the return on debt in 2014–15 which will be passed back to consumers over the 2015–19 period.

[478] 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.

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).

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.[479] 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 final decision is to adopt Option 2. Applied to Essential Energy's distribution determination, 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 (2014-15) of the 2014–19 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.[480]

This means for the 2014–15 regulatory year, the return on debt is based on prevailing interest rates in 2014 (during Essential Energy's debt averaging period) before the start of the 2014–19 period. For subsequent regulatory years, the gradual transition will

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[479] The 'on-the-day' approach estimates the allowed return on debt based on prevailing interest rates at the start of the regulatory period. At the next regulatory determination, the allowed return on debt is reset based on prevailing interest rates at the start of the new regulatory period. 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.

[480] This final decision determines the return on debt methodology for the 2014–19 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.

occur through updating 10 per cent of the return on debt each year to reflect prevailing interest rates (during Essential Energy's debt averaging period) in each year.

In practical terms, our return on debt approach means that an on-the-day rate shortly before the start of the 2014–19 period is applied to:

- 100 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2014–15 regulatory year

- 90 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2015–16 regulatory year, with the remaining 10 per cent updated to reflect prevailing interest rates during Essential Energy's averaging period for 2015–16

- 80 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2016–17 regulatory year, with 10 per cent based on prevailing interest rates during Essential Energy's averaging period for 2015–16, and 10 per cent updated to reflect prevailing interest rates during Essential Energy's averaging period for 2016–17, 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 Essential Energy's averaging periods over the previous 10 years.

Consistent with the National Electricity Rules (NER) requirement, this annual update will be effected through the automatic application of the return on debt methodology we set out in this decision.[481]

This debt approach 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).[482] We refer to this as 'the QTC approach'.

Summary of stakeholders' views

In our current 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:

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[481] NER, cl. 6.5.2(l) and cl. 6A.6.2(l). The return on debt methodology for the purposes of the annual update is set out in appendix I.

[482] QTC, *Moving average approach–Detailed design issues*, 8 June 2012.

- TasNetworks, Queensland service providers (Energex and Ergon Energy), and AusNet Services Group service providers agreed with the QTC approach we adopted in the Guideline (Option 2).[483]

- CKI Group service providers (Citipower, Powercor and SAPN), Jemena Group service providers (JEN and JGN) and United Energy/Multinet also agreed on applying a transition. Initially, CKI and Jemena Group service providers agreed with the QTC approach we adopted in the Guideline.[484] Now, they and United Energy/Multinet have proposed a different form of transition (Option 3).[485]

- NSW service providers (TransGrid, Ausgrid, Endeavour Energy, Essential Energy), ActewAGL and Directlink disagreed with the QTC approach and proposed we use a backwards looking trailing average approach with no transition (Option 4).[486]

Generally, energy retailers, major energy users, small consumer representatives and the Consumer Challenge Panel (CCP) supported our approach of moving from the on-the-day approach to the trailing average approach (Option 2).[487]

Essential Energy's revised proposal

Essential Energy proposed that we move away from our previous on-the-day approach to setting the return on debt. It proposed that we determine the return on debt using a backwards looking trailing average without any transition to account for the impacts of changing methodologies (Option 4). Essential Energy's proposal is based on its submission that its existing debt financing practices are efficient and reflect those of a benchmark efficient entity.

We do not agree that Essential Energy's debt financing practices were efficient from the perspective of a benchmark efficient entity. Essential Energy did not take action to manage its interest rate risk arising from its regulatory determination process. We consider that the evidence before us indicates that a benchmark efficient entity would have taken action to manage its interest rate risk and this would have resulted in its actual return on debt being lower at present. If we were to apply Essential Energy's

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[483] TasNetworks, *Revised proposal*, January 2015, p.5; Energex, *Initial proposal*, October 2014, p.167; Ergon Energy, *Initial proposal*, October 2014, p.123; and AusNet Services, *Submission on draft rate of return guideline*, October 2013, p.3.

[484] SAPN, *Initial proposal*, October 2014, pp.338–339; JGN, *Initial proposal–Access arrangement information–Appendix 9.10*, June 2014, p.14;

[485] 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.

[486] TransGrid, *Revised proposal*, January 2015, pp.118–125; Ausgrid, *Revised proposal*, February 2015, pp.179–187; ActewAGL, *Revised proposal*, February 2015, p.427,473; and Directlink, *Revised proposal*, January 2015, pp.12–13.

[487] CCP, Advice to AER–Networks NSW distributors'' cost of debt proposals, October 2015; Origin Energy, *Submission on draft decisions for NSW electricity distributors*, February 2015, pp.13–19. The views of other consumer representatives are discussed in the explanatory statement to the final rate of return guideline.

proposed approach, consumers would fund an inefficient return on debt allowance. Essential Energy's practices may have been appropriate from the perspective of its particular circumstances. However, a key feature of those circumstances is its government ownership, which is not relevant to our task of determining the allowed rate of return of a benchmark efficient entity.[488]

We are not satisfied that Essential Energy's proposed approach contributes to the achievement of the NEO, the allowed rate of return objective or is consistent with the revenue and pricing principles. We detail the evidence and reasons for our position in this attachment, and in appendices G and L.

Our final 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 Essential Energy, using a backward looking return on debt as it has proposed would result in regulated revenues being approximately $290 million higher over 5 years than commencing the transition with an on-the-day rate as we proposed in the Guideline and have adopted in this decision. For the NSW service providers collectively, the impact on revenues is approximately $1.3 billion over their regulatory periods.

This reflects the fact that 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. The financial consequences that flow from the NSW service providers' strategy are not, in essence, caused by this determination. Rather, the financial consequences are the result of the financing strategy the NSW service providers adopted. These consequences arise because the NSW service providers decided not to actively manage interest rate risk.

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 NEO, 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

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[488] AEMC, *Economic regulation of network service providers and price and revenue regulation of gas services*, Final position paper, 29 November 2012, p.v; Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.45; Lally, *Review of submissions on the cost of debt,* April 2015, pp.15–16, 61.

- 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:

    o Promotes efficient investment, and

    o 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 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

- 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[489]

- 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.[490]

In the Guideline, we proposed to use one or more third party data series to estimate the return on debt.[491] 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 the draft decision, we formed a view on this issue and adopted a simple average of the RBA and Bloomberg data series. We maintain our draft decision position in this final decision.

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[489] 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, and to convert it to an effective annual rate. This extrapolation of the Bloomberg curve applies to the return on debt in 2014–15 and 2015–16. However, for subsequent years this extrapolation will not be necessary. This is because Bloomberg started publishing a 10 year estimate in April 2015,

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

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

In their initial proposals, most service providers with current determination processes proposed only the RBA data series be used to estimate the return on debt. In the revised proposals, ActewAGL, Directlink, TasNetworks and TransGrid largely accepted our approach of adopting a simple average of the RBA and Bloomberg curves. Ausgrid, Endeavour Energy and Essential energy maintained their initial proposal to adopt the RBA only. 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 Essential Energy, other service providers with current 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. In confidential appendix K we set out Essential Energy's averaging periods for the return on debt. In confidential appendix L, we assess issues arising from confidential evidence we received from Networks NSW.

For the reasons set out in this attachment, and the appendices noted above, we are satisfied our final 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 Essential Energy 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 Electricity Objective and the revenue and pricing principles, including providing Essential Energy 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 determination.[492]

Legislative framework for return on debt estimation

In section 3.3 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 NER require that we must have regard to the following factors in estimating the return on debt:[493]

- The desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity (as referred to in the allowed rate of

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[492]   NER,cl. 6.5.2(l) and cl. 6A.6.2(l).
[493]   NER, cl.6.5.2(k) and cl.6A.6.2(k).

return objective).[494] 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 actually incur (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.[495]

- 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.[496]

- Any impacts (including in relation to the costs of servicing debt across the 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.[497]

The last factor is particularly relevant to the current decisions because both our final decision method and the method proposed by Essential Energy are a change from the method used to estimate the return on debt in the previous regulatory control period.[498]

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 NER require us to do so. The NER refer to 'any' impacts on a benchmark efficient entity as a result of changing the return on debt methodology. The NER then give an example of one impact—the cost of servicing debt across regulatory periods. Accordingly, the NER indicates that it is appropriate to take a perspective across more than one regulatory 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

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[494] NER, cl.6.5.2(k)(1) and cl.6A.6.2(k)(1).
[495] NER, cl.6.5.2(k)(2) and cl.6A.6.2(k)(2).
[496] NER, cl.6.5.2(k)(3) and cl.6A.6.2(k)(3).
[497] NER, cl.6.5.2(k)(4) and cl.6A.6.2(k)(4).
[498] Our previous decisions covered the 2009–14 regulatory control period for Ausgrid, Essential Energy, Endeavour Energy, ActewAGL, TasNetworks and Transgrid, the 2006–15 regulatory control period for Directlink, and the 2010–15 regulatory control period for Energex, Ergon Energy and SAPN.

unexpected change in costs or prices that may have negative effects on confidence in the predictability of the regulatory arrangements.[499]

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.[500]

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.

This is important because the assets which provide regulated services tend to have long lives, well beyond a single regulatory period. It is also consistent with the NPV principle, which we discuss further 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 NER require that the resulting change to the service provider's regulated revenue must be effected through the automatic application of a formula that is specified in the determination.[501]

Approach to estimating the return on debt

Our final decision is to estimate an on-the-day rate in the first regulatory year of the 2014–19 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 Essential Energy's 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 Essential Energy's proposed approach

Essential Energy proposed we adopt a backwards looking trailing average approach to estimate its allowed return on debt. We are not satisfied that Essential Energy's proposed approach contributes to the achievement of the allowed rate of return objective.

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[499] AEMC, *Final rule change determination*, 29 November 2012, p. 85.
[500] AEMC, *Final rule change determination*, 29 November 2012, p. 85.
[501] NER, cl.6.5.2(l) and cl. 6A.6.2(l).

One of the key bases for Essential Energy's and the other NSW service providers' proposals in favour of a backwards looking trailing average relates to their actual financing practices. While Essential Energy managed its refinancing risk, it did not take steps to actively manage its interest rate risk. It submitted that this approach was efficient, both for it and for a benchmark efficient entity. We do not agree that the practices of the NSW service providers were efficient from the perspective of a benchmark efficient entity. The evidence before us indicates that the efficient practices of a benchmark efficient entity with similar characteristics to that of Essential Energy would have been to manage both refinancing risk and interest rate risk. This position is supported by:

- advice we received from an academic perspective (Dr Martin Lally)[502]

- advice we received from a financial market practitioner perspective (Chairmont)[503]

- the financing practices of privately owned regulated energy network service providers in Australia,[504] and

- confidential information we have received from the NSW service providers.[505]

There may be reasons why the practices employed by the NSW service providers were appropriate in their particular circumstances. But these reasons seem to arise from the service providers' operation under government ownership and their arrangements through TCorp as the central borrowing agency for the NSW government. These factors are not relevant to our consideration of the circumstances of a benchmark efficient entity.[506] As Ausgrid's, Endeavour Energy's and Essential Energy's consultant CEG has previously advised:

> …observed GBE (government business enterprises) debt strategies cannot be viewed as the outworking of capital (debt and equity) market forces.[507]

Managing both refinancing risk and interest rate risk under the on-the-day approach can be achieved by employing a staggered debt portfolio with interest rate swaps. We consider this was an efficient financing practice of a benchmark efficient entity under the on-the-day approach. This is the financing strategy generally adopted by most privately owned service providers under the on-the-day approach. This is reflected in:

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[502] Lally, *Transitional arrangements for the cost of debt*, November 2014; Lally, *Review of submissions on the cost of debt*, April 2015.

[503] Chairmont, *Cost of debt transitional analysis*, April 2015.

[504] 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.

[505] We discuss the content on this advice in confidential appendix L.

[506] AEMC, *Rule determination–Economic regulation of network service providers and price and revenue regulation of gas services*, November 2012, p.v; Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.45; Lally, *Review of submissions on the cost of debt,* April 2015, pp.15–16, 61.

[507] CEG, *Term of the risk free rate under the NER: A report for the Joint Industry Association*, January 2009, p.6.

- the statements of corporate treasurers to the AER during the 2009 WACC review,[508]

- the data on debt financing strategies of privately owned service providers we collected during the 2009 WACC review,[509]

- submissions from privately owned service providers to the AEMC during the 2012 network regulation rule change process,[510] and

- submissions to us during the 2013 rate of return guideline development process.[511]

Where privately owned service providers have explained the rationale for their debt financing strategy, this has been consistent with our assessment of how this strategy lowers refinancing risk, lowers interest rate risk and lowers the actual return on debt.

The NSW service providers submitted that the financing strategy adopted by privately owned service providers was not efficient for them because of their size, the concurrent nature of their regulatory determinations, and also because their last regulatory determination occurred during the global financial crisis. We commissioned Chairmont and Lally to critically review our position in the draft decision and the NSW service providers' submissions in their revised proposals. Both Chairmont and Lally support our assessment and disagree with the NSW service providers' assessment. Chairmont and Lally accept that managing interest rate risk may have been more challenging for a benchmark efficient entity in the circumstances of the NSW service providers. However, both experts agree that managing interest rate risk was efficient, and was significantly less risky than the NSW service providers' practices of not managing interest rate risk.[512]

Therefore, we are not satisfied that Essential Energy's proposed backwards looking trailing average (Option 4) would contribute to the achievement of the allowed rate of return objective. If we were to apply Essential Energy's proposed approach we would determine a return on debt that is founded on inefficient financing practices (from the perspective of a benchmark efficient entity). This would be inconsistent with the allowed rate of return objective which requires the return on debt 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. Consequently, we do not accept Essential Energy's proposed approach.

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[508] The Joint Industry Associations (JIA), *Submission on the explanatory statement: WACC review,* February 2009, Appendices, E, F, G, H and I.

[509] AER, *Final decision: review of electricity transmission and distribution WACC parameters*, May 2009, pp.150–154; AER, *Explanatory statement review of electricity transmission and distribution WACC parameters*, December 2008, pp.103–107.

[510] ETSA Utilities, CitiPower and Powercor Australia, Submission attachments: Joint response to AER and URCC rules change proposals, December 2011, pp.138–143; ENA, *Response to AEMC Directions Paper – Economic Regulation of Network Service Providers (AEMC rules change),* 20 April 2012, Attachment E, pp.3–5.

[511] Jemena, *Submission to the rate of return guideline consultation paper*, June 2013, p. 19.

[512] Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.5–11, 35–39, 44–45; Lally, *Review of submissions on the cost of debt*, April 2015, pp.10–12, 38–40, 71–74.

Summary of our assessment of other approaches

In previous decisions, we applied the on-the-day approach. This was the approach required by the NER at the time.[513] However, the current provisions of the NER permit either maintaining the on-the-day approach or changing to a different approach.[514] We have decided to change to a different approach, as we proposed in the Guideline and adopted in the draft decision.

We considered four broad options to estimate the return on debt. These options were:[515]

- 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 Essential Energy's proposed approach (Option 4) would contribute to the achievement of the allowed rate of return objective. We outlined our assessment of Essential Energy's proposed approach above. In this section, we summarise our considerations on the remaining three options.

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.

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[513] 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.

[514] NER, cl. 6.5.2(i)(1) and (j)(1) and 6A.6.2(i)(1) and (j)(1)

[515] 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 draft decision 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 for example, AER*, Draft decision–TransGrid–Transmission determination–Attachment 3*, November 2014, pp.107–111.

We then set out further details in support of our assessment of these three options and Essential Energy's proposed option in the sections that follow.

In the Guideline and the draft decision, we considered the merits of the on-the-day approach versus the trailing average approach. We also considered transitional arrangements in moving to the trailing average approach. However, these considerations were not independent.[516] Our position to move to the trailing average approach was tied to our position to adopt a gradual, forward looking transition. The joint nature of our considerations does not appear to have been well understood by some stakeholders.[517] In this final decision we have structured our analysis around the above four options that better reflect these joint considerations. The structure is different to the draft decision. However, the substance of our analysis is consistent with the draft decision.

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 NER no longer mandate we adopt this approach, it remains an approach available to us under the NER. 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 it:

- provides a benchmark efficient entity with a reasonable opportunity to recover its efficient financing costs over the life of its assets—it therefore mitigates any impact on a 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 we and our predecessor energy regulators applied in the past when service providers issued their existing debt—

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[516] In the draft decision, we stated "the trailing average and hybrid approaches would largely satisfy [the NPV principle] (*so long as moving to those approaches includes transitional arrangements*) [emphasis added]". See for example, AER*, Draft decision–TransGrid–Transmission determination–Attachment 3*, November 2014, p.108.

[517] For example, CEG refer to the efficient financing strategy under the trailing average approach as the "agreed long term benchmark efficient debt management strategy". CEG, *Efficient debt financing costs*, January 2015, p.51. This mischaracterises our view. There is no agreed "long term" efficient or inevitable financing strategy. Our position is that efficient financing practices depend on, and change with, the regulatory regime adopted.

continuing to apply that approach 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.[518]

- remains the standard approach adopted by several other Australian regulators[519] and is supported by advice from an academic perspective (Dr Martin Lally).[520]

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 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.

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[518] 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

[519] 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 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.

[520] 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 captial', 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.

At the same time, it approximately matches the allowed return on debt with a benchmark efficient entity's financing costs over the next regulatory control period as its transitions its financing practices to the trailing average approach.[521]

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 it:

- Reduces risk for service providers by providing a regulatory benchmark that they can more readily match in each regulatory control period,[522] and

- Reduces price volatility for consumers across regulatory control periods in the medium to long term.[523]

Gradually moving from the on-the-day to trailing average approach is supported by advice we have received from both a financial market practitioner (Chairmont) and a finance and regulatory economics academic (Dr Lally).[524] It is also supported by AusNet Services, Energex, Ergon Energy and TasNetworks.

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.

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

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[521] Specifically, it broadly matches (though over-compensates) a benchmark efficient entity for the base component of its cost of debt. Whether it matches, over- or under compensates a benchmark efficient entity for the DRP component depends on whether the prevailing and historical average DRP is higher, lower, or the same as each other.

[522] AER, *Explanatory statement to the final rate of return guideline*, December 2013, pp.108–110.

[523] 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.

[524] 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; Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.5–11.

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.

- A gradual transition to the trailing average approach (option 2) was the approach we proposed in the Guideline and service providers may have already commenced changing their financing practices in expectation that approach would be applied. Accordingly, we have not had a full opportunity to consult on this proposal, and as Chairmont advised, switching now to the hybrid transition may be disruptive to the industry.[525]

- 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).

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.[526]

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.[527]

- 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.

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[525] Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.11.

[526] NER, cl.6.5.2(c) and cl.6A.6.2(c).

[527] Based on Chairmont's advice, we have slightly refined our description of refinancing risk from the description we used in the draft decision. Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.30.

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 NSW service providers (Frontier).[528] 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.[529]

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 terms during a financial crisis), and transaction costs (for example, there are fixed costs associated with every debt issuance and with hedging activities).[530]

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.[531]

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)).[532]

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[528] 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. 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 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.

[529] Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.29.

[530] Frontier, *TransGrid cost of debt transition*, January 2015, p.7.

[531] McKenzie and Partington, *Report to the AER: The relationship between the cost of debt and the cost of equity*, March 2014, pp.20–21.

[532] 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.

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:[533]

> 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.

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 3-20 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

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[533] Chairmont, *Cost of debt: Transitional analysis*, April 2015, p.40.

Financial concept	Explanation
	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 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.[534]

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[534] 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.

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 control 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

- 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 NEL requires us to take into account that a regulated service provider should be provided with effective incentives to promote economic efficiency.[535] 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.[536] 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 wears the financial detriments that flow from its actions. An example of this would be

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[535] NEL, ss, 7A(3) and 16(2).

[536] AEMC Chair, 'Carrots, sticks and tightropes: The regulator's balancing act in incentivising efficient behaviour', speech, May 2012, p.8.

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 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 for us to provide effective incentives for efficient investment.[537]

The NSW service providers agree 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.[538]

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. This is also the case for the NSW service providers who have 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 the NSW service providers' previous regulatory determinations and the development of the current NER framework and our Guideline development process.

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[537] NEL, s. 7A(3)(a)

[538] Lally, *Transitional arrangements for the cost of debt*, November 2014, p.38; CEG, *Efficient debt financing costs*, January 2015, p.8.

Applying the on-the-day approach to a benchmark efficient entity's existing debt, as we do in this determination, means that it recovers its efficient costs and maintains the outcomes of its actions in line with the incentives outlined above. To do otherwise, would compromise this incentive framework.

The NSW service providers are either rewarded, penalised or are left in a neutral position based on the outcomes of their past financing decisions, consistent with the principles of incentive regulation.

Over the past 10 years, the NSW service providers have been subject to two full regulatory determinations by IPART or the ACCC in 2004 and by us in 2009.[539] In each determination the regulator adopted an on-the-day approach to the return on debt. This was also the approach we adopted in other past decisions for other service providers as it was the approach required by the NER.

When the NSW service providers previously issued their existing debt over the past 10 years, they would have expected us to apply the on-the-day approach to their existing debt in this determination. This is because it was only in 2011 that the trailing average approach emerged as a potential regulatory approach in Australia for future return on debt determinations. It began with a rule change proposal from consumer groups that proposed a trailing average approach be mandated by the NER.[540] The AEMC did not accept this position, but it did amend the NER in 2012 to enable the option of the trailing average approach to be adopted by us.[541] As part of our Better Regulation consultation program, we began to consult on various approaches to estimating the rate of return through the Guideline development process. In the draft and final Guideline, we proposed that in each service provider's next determination we would adopt an on-the-day estimate for the first regulatory year and gradually transition this rate into a trailing average approach over 10 years (Option 2). We published the final Guideline in December 2013.[542]

Accordingly, initially—and for a long period of time—service providers expected the on-the-day regime to apply in future determinations. Then there was a period of uncertainty as the NER framework was reviewed. Then finally, based on our Guideline, which we published in December 2013, service providers would have expected the return on debt in their next determination would start as an on-the-day rate and gradually transition into a trailing average approach.

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[539] In 2004, Ausgrid, Endeavour Energy and Essential Energy was regulated by IPART; TransGrid was regulated by the ACCC. IPART, *NSW electricity distribution pricing 2004-05 to 2008-09—Final report*, June 2004, pp.224–226; ACCC, *NSW and ACT transmission network revenue cap—TransGrid 2004-05 to 2008-09—Final decision*, April 2005, pp.139-143; AER, *TransGrid 2004-05 to 2008-09 revenue cap—Application by TransGrid for revocation and substitution*, February 2007.

[540] Energy users rule change committee*, Proposal to change the NER in respect of the calculation of the return on debt*, October 2011, p.43.

[541] AEMC, *Rule determination–Economic regulation of network service providers and price and revenue regulation of gas services*, November 2012.

[542] AER, *Better regulation–Rate of return guideline*, December 2013.

Given this history, at the time the NSW and other service providers adopted their debt financing strategies (that is, before the rule change process) the expectation was that the on-the-day rate approach would apply at this determination. Also, after the rule change and Guideline process, the expectation was an on-the-day rate would apply in the first year of the regulatory period covered by this determination and gradually transition into a trailing average approach over 10 years. Accordingly, at all times, the expectation would have been that the on-the-day approach would have applied in this determination to the service provider's existing debt.

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 return on debt, the principle of incentive regulation could be achieved through maintaining a consistent approach over time—that is, maintaining the on-the-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 draft decision.[543] This principle is also consistent with the AEMC's reasons in developing the current return on debt rule framework. The AEMC stated:

> …the return on debt estimate should reflect the efficient financing costs of a benchmark efficient service provider. It should try to create an incentive for service providers to adopt efficient financing practices and minimise the risk of creating distortions in the service provider's investment decisions. If a service provider is run inefficiently then its shareholders, and not its customers, should bear the financial consequences of inefficient financing practices.[544]

Under our approach, the allowed return on debt for debt that existed at the start of Endeavour Energy's 2014–19 period is set in a manner similar to the previous on-the-

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[543] For example, in our draft decision for TransGrid we stated "Under our transitional arrangements, the allowed return on debt for that debt that existed at the start of the 2014–18 period is set in a manner similar to the previous on-the-day approach… The chosen risk strategies that service providers adopted in the past in relation to their financing arrangements are therefore left to run to their natural conclusion and they will keep any benefits or wear any detriments that flow from those choices." AER, *Draft decision–TransGrid transmission determination–Attachment 3: Rate of return*, November 2014, p.14. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, Ausgrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

[544] AEMC, *Rule determination–National electricity amendment (Economic regulation of NSPs) Rule 2012–National gas amendment (Price and revenue regulation of gas services) rule 2012*, November 2012, p.73.

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.[545] Lally agreed with this position, and stated:

> …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.[546]

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. Most service providers actively managed this interest rate risk under the on-the-day approach. We agree this was efficient for them to do so. The NSW service providers chose a different strategy for their own reasons, which did not actively manage interest rate risk. We do not consider this was an efficient financing strategy for a benchmark efficient entity. We discuss this issue further later in this attachment and appendix G.[547]

The financial consequences that flow from the NSW service providers' strategy are not, in essence, caused by this determination. Rather, the financial consequences are the result of the financing strategy the NSW service providers adopted.

This is consistent with the views of Origin and advice from Dr Lally and Chairmont. Origin stated:[548]

> …if a business elects not to enter into risk mitigation measures, it is through their own choice that they are prevented from achieving the benchmark. It is a fundamental aspect of incentive regulation that firms should bear the risk and reward of the choices they make, not consumers.

Similarly, Dr Lally stated:[549]

> Furthermore, in respect of the firms that did not hedge, any adverse impact on them from the AER's transitional regime would not in principle be any different to an adverse impact that they might have suffered in the absence of any

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[545] NER, cl.6.5.2(k)(1) and cl.6A.6.2(k)(1).

[546] Lally, *Review of submissions on the cost of debt*, April 2015, p.16.

[547] In this section, we explain our reason that service providers should face the financial outcomes of their actions, whether positive or negative, consistent with the principles of incentive regulation. This reason supports applying our transitional approach regardless of our, the NSW service providers', or potentially the Tribunal's, conclusion on whether the NSW service providers' financial strategy reflects that of a benchmark efficient entity. That is, whether their financial strategy was efficient or inefficient, they should face the financial outcomes of that strategy.

[548] Origin, *Submission to AER TransGrid draft determination*, February 2015, p.7.

[549] Lally, *Transitional arrangements for the cost of debt*, November 2014, p.29.

change in regulatory regime; firms that do not hedge risks arising from regulatory policy are making a conscious choice to bear risk…"

Chairmont stated:[550]

> It is our understanding that there will be a severe impact on the profitability of NSW NSPs if either [option 2 or 3] is applied. This poses the question: Would the imposition of a significant loss on a large NSP be against the long term interests of consumers and should the AER take a different approach?
>
> [Option 2] puts the loss fairly back into the hands of the equity holder…

Chairmont advised that the NSW service providers' proposal for a backwards looking trailing average 'would mean that the avoidable losses would now be compensated by consumers, i.e. through higher prices' and an implication of this would be the 'setting of a poor precedent for dealing with these situations'.[551]

Our assessment of the four options against the considerations in this section are summarised in the following table.

Table 3-21 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

In the next 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.

Provides a benchmark efficient entity with a reasonable opportunity to recover efficient financing costs

The NEL requires us to take into account that a regulated service provider should be provided with a reasonable opportunity to recover at least its efficient costs.[552] Lally

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[550] Lally, *Review of submissions on the cost of debt*, April 2015,p.11.
[551] Chairmont, *Cost of debt transitional analysis*, April 2015, p.11.
[552] NEL s. 7A(2)

advised that this principle in the NEL is 'equivalent' to the net present value (NPV) principle.[553]

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.[554] 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 for its efficient costs. The building block model which the NER require us to use is based on this principle.[555]

Lally also advised that the NPV principle and the allowed rate of return objective are 'equivalent'. Lally stated:

> 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].[556]

Accordingly, there is a strong connection between the NPV principle, the allowed rate of return objective and the NEL 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.[557]

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[553] 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.

[554] 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.

[555] 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 NER, the building block model, and the present value principle in appendix G.

[556] Lally, *Review of submissions on the cost of debt*, April 2015, p.19.

[557] 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*

The NER 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.[558] 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.

A contentious issue in the current 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. Several service providers submit that the time horizon of our perspective must be confined to the 2014–18 period (for TransGrid) or the 2014–19 period (for ActewAGL, Ausgrid, Endeavour Energy and Essential Energy). Also, they submit that the approach to debt should not be determined by reference to the activities and investments of a benchmark efficient entity beyond the regulatory control period in question. We disagree.

The NER refer to 'any' impacts on a benchmark efficient entity as a result of changing the return on debt methodology. The NER then give an example of one impact—the cost of servicing debt across regulatory control periods. Accordingly, the NER specifically give an example where it is appropriate to take a perspective across more than one regulatory control period.

We consider another impact that is encompassed in the NER 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 consider the NER 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.[559] Changes in interest rates may create differences between the allowed and actual return on debt of the benchmark entity during a particular regulatory control 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.

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cost of debt, November 2014, pp. 22-25; and Lally, *Review of submissions on the cost of debt*, November 2014, pp.18-37.

[558] NER, cl.6.5.2(k)(4) and cl.6A.6.2(k)(4).

[559] Lally, *Review of submissions on the cost of debt*, April 2015, p.26.

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. This match arises because a benchmark efficient entity is and was able to undertake hedging arrangements under the on-the-day approach.[560]

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 regulatory control period. This is because the DRP component could not have been efficiently hedged to the allowed debt risk premium. So, in some regulatory control periods, the allowed debt risk premium would have exceeded the actual debt risk premium of a benchmark efficient entity. In other regulatory control periods, the allowed debt risk premium would have been less than the actual debt risk premium. Over a large number of periods, these differences in the DRP component would be expected to broadly cancel each other out.[561]

Further, interest rate risk is a component of systematic risk.[562] Accordingly, the difference between the allowed DRP and actual DRP of a benchmark efficient entity under the on-the-day approach in previous regulatory periods is a risk that the benchmark efficient entity was compensated for in previous regulatory 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.[563] This position is supported by Lally. Lally 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 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.[564]

Thus, under the on-the-day approach, service providers have been fairly compensated for their efficient financing costs in each and every regulatory control period, and when taking a life of the assets perspective.

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[560] 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.

[561] Lally, *Review of submissions on the cost of debt*, April 2015, pp.33–34.

[562] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp.16–17.

[563] 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.

[564] Lally, *Review of submissions on the cost of debt*, April 2015, p.25.

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. 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 large number of periods, these differences in the total return on debt would have broadly cancelled each other out. TransGrid's consultant NERA, agreed with this point. NERA stated:

> 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.[565]

TransGrid's consultant HoustonKemp also appeared to agree with this point. It advised that TransGrid's debt practices (of not hedging) under the on-the-day approach resulted in TransGrid having "a reasonable prospect of recovering its debt costs over the long term".[566] 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.

Further, 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.

Accordingly, regardless of whether a benchmark efficient entity would have hedged (as we consider) or not hedged (as the NSW service providers submitted), 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

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[565] NERA, *Return on capital of a regulated electricity network*, May 2014, p.32

[566] HoustonKemp, *Response to draft decision on the return on debt allowance*, January 2015, p.iii.

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 analysis, 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 helps achieve the allowed rate of return objective.

At present, prevailing interest rates are lower than the 10 year historical average of interest rates. The return on debt significantly increased during the global financial crisis, but has subsequently decreased. In these circumstances, Lally estimated the impact on a benchmark efficient entity with different regulatory control period cycles of continuing the on-the-day approach (Option 1), gradually transitioning from the on-the-day to trailing average approach (Option 2) or adopting a backwards looking trailing average approach (Option 4).

Lally found a similar outcome from continuing with the on-the-day approach (Option 1) and from gradually transitioning to the trailing average approach (Option 2).[567] These two scenarios result in an average 1.3 per cent estimated over recovery of the debt portfolio across all service providers, in present value terms. In contrast, adopting a backwards looking trailing average approach (Option 4) results in an average 3.4 per cent estimated over recovery of the debt portfolio across all service providers. Lally estimated this would result in approximately a $2.3 billion total of windfall gains across all service providers.[568]

Lally also advised that adopting a backwards looking trailing average (Option 4), instead of the gradual transition into the trailing average (Option 2) would involve 'double counting' the return on debt in previous years. Lally stated:

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[567] Lally, *Transitional arrangements for the cost of debt*, November 2014, pp.22–25.

[568] Lally, *Review of submissions on the cost of debt*, April 2015, p.37.

An equivalent way of viewing this matter arises from the fact that immediately switching to a trailing average regime implies that the DRP results for some years will be doubled counted, once in the course of applying the on-the-day regime and again in applying the trailing average regime. Furthermore, if the regime shift occurs in 2014, this double counting will be particularly beneficial to the [benchmark efficient entity] because it will lead to double counting the high DRP years.[569]

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 (Option 4) when it results in windfall gains to service providers, but gradually transitioning into the trailing average (Option 2) when Option 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 (Option 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.[570]

Our assessment of the four options against the considerations in this section are summarised in the following table.

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569 Lally, *Review of submissions on the cost of debt*, April 2015, p.32.
570 Lally, *Review of submissions on the cost of debt*, April 2015, pp.27–28.

Table 3-22   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 regulatory control 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 2014–19 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.[571] It was designed to match the allowed return on

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[571]   The on-the-day approach was our regulatory approach that we sought to implement in past regulatory decisions. It used an averaging period to estimate the return on debt as close as practically possible to the start of the regulatory control period. For the 2009–14 regulatory control period, we applied the on-the-day approach to the NSW service providers in a modified form, as a result of the Australian Competition Tribunal's decision in the EnergyAustralia matter. The Tribunal found the return on debt was estimated at a point in time (consistent with the on-the-day approach), but not as close as practically possible to the start of the regulatory control period. We comment on the Tribunal's decision in AER, *Access arrangement draft decision—APA GasNet (Operations) Pty Ltd—2013–17—Part 3 appendices*, September 2012, pp. 17–23.

debt to prevailing market conditions in the market for funds at the start of each regulatory control 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 the regulatory control periods) on a benchmark efficient entity that could arise as a result of changing the return on debt methodology from one regulatory control 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 as well as confidential information provided by the NSW service providers.[572]

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.[573]

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.[574]

All models are by definition a simplified version of reality.[575] 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,

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[572]   We review the confidential material submitted by the NSW service providers in confidential appendix L.

[573]   Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.22, 26.

[574]   Chairmont, *Cost of debt: Transitional analysis*, April 2015, p. 26.

[575]   IMF Institute (Sam Ouliaris), *Back to basis–What are economic models?–How economists try to simulate reality*, Finance and Development, June 2011, p.46.

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 regulatory control period (typically five years).[576]

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[577]

- was generally adopted by most privately owned service providers under the on-the-day approach.[578]

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

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[576] 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.

[577] Lally, *Transitional arrangement for the cost of debt*. November 2014, pp. 25–30

[578] 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.

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.[579]

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).[580]

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[581]

- the data on debt financing strategies of the privately owned service providers we collected during the 2009 WACC review,[582]

- submissions from privately owned service providers to the Australian Energy Market Commission (AEMC) during the 2012 network regulation rule change process[583]

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[579] Lally, *Transitional arrangement for the cost of debt*. November 2014, pp. 25–30.

[580] Lally, *Transitional arrangement for the cost of debt*. November 2014, pp. 8–10. Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.30–33.

[581] 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.

[582] 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.

[583] 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.

- submissions to our development of the 2013 rate of return guideline.[584]

When privately owned service providers explained the reasons for their debt financing strategy, it was consistent with our understanding of how this strategy lowers refinancing risk, lowers interest rate risk and lowers the actual return on debt. In the 2009 WACC review, for example, Envestra's corporate treasurer explained how the business's hedging strategy lowers interest rate risk:[585]

> … the interest rate of the principal is usually floating rate consisting of a base rate, such as BBSW, plus a credit margin plus establishment fees… The Treasury Policy requires that we hedge between 80% and 100% of the interest rate risk on the floating rate debt.
>
> So to explain that in more detail, for each regulatory period we enter into hedges over the Regulators designated risk free rate averaging period, in order to match as closely as we can the base rate of our actual debt (i.e. BBSW) with the risk free rate used in the regulatory cost of debt and WACC. The hedges are for the term of the regulatory period.

This statement is consistent with Lally's advice:

> Faced with the current regulatory regime, businesses have borrowed long term, with staggering, to deal with refinancing risk and used interest rate swap contracts to align the risk free rate component of their cost of debt with the regulatory cycle.[586]

Importance of size to financing strategy

A contentious issue in the current determinations is whether the strategy of using floating rate debt with interest rate swaps would have been feasible and efficient for all service providers. And in particular, whether a benchmark efficient entity with the risk profile of a large service provider during the GFC would have adopted this strategy. Chairmont and Lally have advised that such an entity would adopt a similar strategy, rather than the significantly different fixed rate strategy that the NSW service providers submit a benchmark efficient entity would adopt and which they did adopt.[587]

Chairmont considered the efficient financing practices of a benchmark efficient entity under the on-the-day approach from the perspective of:

- a typical or average sized service provider

- a large service provider the size of one of the NSW service providers, and

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[584] Jemena, *Submission to the rate of return guideline consultation paper*, June 2013, p. 19.

[585] JIA, *Submission on the explanatory statement: WACC review,* February 2009, Appendix F: statement of Gregory Damian Meredith, Treasurer for Envestra, p. 5.

[586] Lally, M, *The trailing average cost of debt*, 19 March 2014, p. 15.

[587] Chairmont, *Cost of debt: Transitional analysis*, April 2015, pp.5–11, 35–39, 44–45; Lally, *Review of submissions on the cost of debt*, April 2015, pp.10–12, 38–40, 71–74.

- a super sized service provider the size of the all of the NSW service providers collectively.

Chairmont advised:

> A Large [benchmark efficient entity] or Super [benchmark efficient entity] would have a similar portfolio to [an average benchmark efficient entity]. In 2009 and at the height of the GFC, a Large and Super [benchmark efficient entity] would have encountered difficulty in transacting enough swaps in the rate setting window. Nonetheless, the lowest risk approach would have been to transact the swaps as soon as possible, even if it meant going outside the window. Immediately prior to the 2014 new regulatory regime these swaps would be either maturing or about to mature, as is the case for a [benchmark efficient entity].

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 regulatory control period:[588]

> 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

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[588] Lally, M, *Transitional arrangements for the cost of debt*, November 2014, pp. 7–8.

maturing or about to mature; whereas, a 'trailing average' portfolio would consist of only staggered fixed rate debt.

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.[589] From this calculation, Lally considered the actual outcome for a benchmark efficient entity would not differ much from zero.[590]

Lally also investigated the impact of an alternative strategy for a benchmark efficient entity:[591]

> 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:[592]

> … 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,

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[589] 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.

[590] Lally, M, *Transitional arrangements for the cost of debt*, November 2014, p. 10.

[591] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.10.

[592] Lally, M, *Transitional arrangements for the cost of debt*, November 2014, p. 11.

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 it matches, over- or under compensates a benchmark efficient entity for the DRP component depends on whether the prevailing DRP at the start of the transition period and historical average DRP is higher, lower, or the same as each other.

Our assessment of the four options against the considerations in this section are summarised in the following table.

Table 3-23 Option analysis—Matches allowed return on debt with efficient financing cashflows regulatory 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.[593] 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.[594]

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).[595] 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:[596]

> 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.[597] 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.

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

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[593] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 79–80.

[594] Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9-10.

[595] 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.

[596] AER, *Access arrangement draft decision–Envestra victoria 2013–17*, September 2012, p.190.

[597] 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.

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.[598]

We agree with QTC's advice.

In contrast, the NSW service providers, ActewAGL and Directlink have proposed a backward looking trailing average approach (Option 4). They propose an approach where the resulting allowed return on debt is largely known at the time they proposed it. Under this approach, it is difficult to avoid the perception of bias—in the sense of selecting an approach that uses historical data after the results of that data is known. Lally also made this point.[599]

We also note JGN, SAPN and the Victorian service providers supported our proposed transition (Option 2) during the Guideline, but now support the hybrid transition approach (Option 3). The main difference between the 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 selecting an approach that uses historical data after the results of that data is known.

Our assessment of the four options against the considerations in this section are summarised in the following table.

Table 3-24   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

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[598]   QTC, *Moving average approach–Detailed design issues*, 8 June 2012.

[599]   Lally, Transitional arrangements for the cost of debt, November 2014, p.22.

Option		Assessment
4	Backwards looking trailing average approach	No

Source: AER analysis

In the next section, we 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 2005 to 2014.[600] 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 2014.

For the base rate component, high quality historical data is readily available.[601] 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.[602] 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 (CEG, NERA) proposed a combination of data series to implement the backwards looking trailing average approach:

    o ActewAGL proposed a simple average of the RBA and BVAL curves be used.

    o TransGrid proposed a simple average of the RBA and BVAL curves be used from 2012 onwards, and only the RBA be used before that time.

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[600] 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 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.

[601] 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.

[602] We note the BVAL series has missing data, particularly from late October 2010 to late January 2011.

- o Ausgrid, Endeavour Energy and Essential Energy proposed that only the RBA curve should be used from 2005 onwards, and only the BFV curve should be used in 2004 where the RBA curve is not available.

- o Directlink proposed that only the RBA curve be used.

- 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.[603] Lally stated:[604]

  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.

- 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.[605]

Figure 3-15 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.

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[603] 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.

[604] Lally, M, *Transitional arrangements for the cost of debt*, November 2014, p. 15.

[605] The number of bonds in the sample for any monthly estimate is published on the RBA's website.

Figure 3-15 Comparison of BBB rated return on debt data series over time
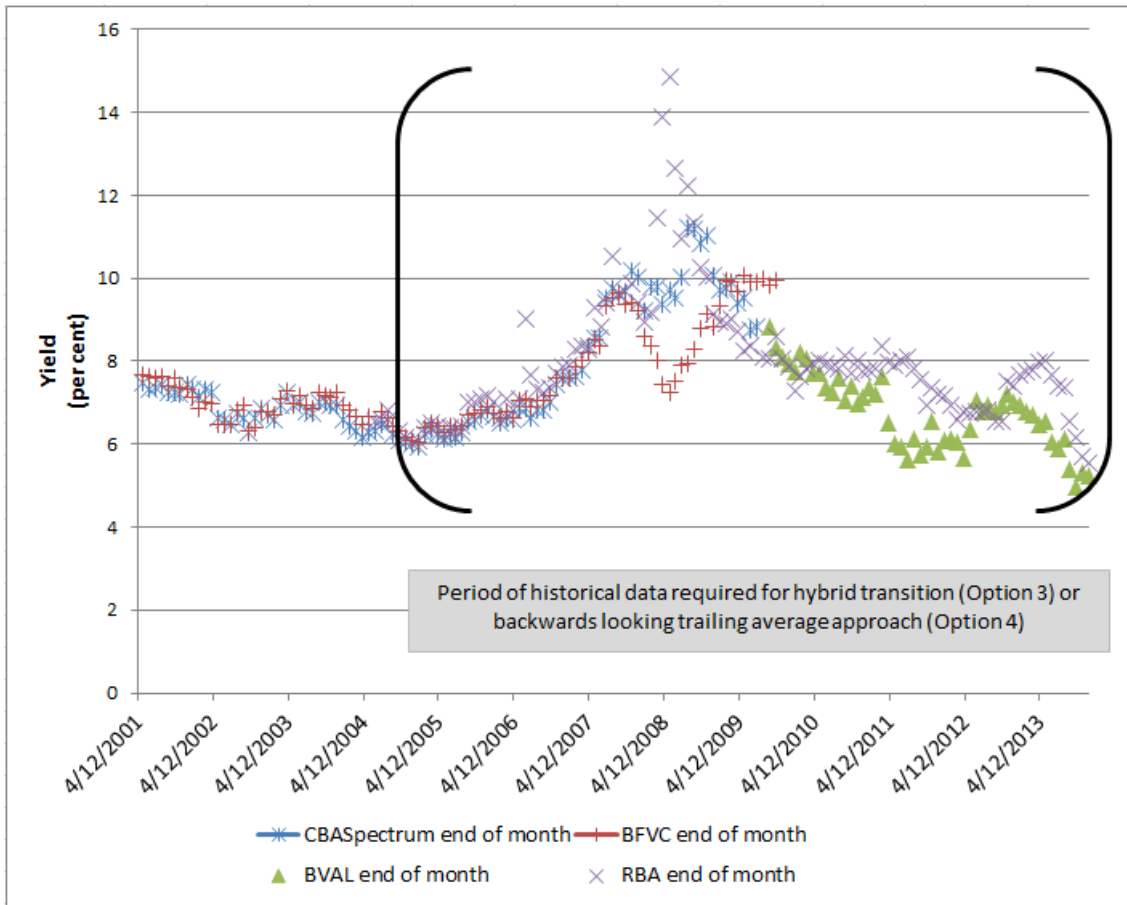
Source: CBA Spectrum, Bloomberg, RBA, AER analysis

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 2014. 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.

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 2014–15 or 2015–16 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.

Further, the benchmark credit rating also changed over time and differed between service providers. We currently adopt a BBB+ credit rating and apply this rating to service providers across electricity transmission and distribution. However, this was not the case in the past. For example:

- In the ACCC's 2005 transmission decision for TransGrid, it adopted an A rated credit rating. At that time, TransGrid also considered the benchmark credit rating should be higher than BBB+ and proposed an A- rating, though it submitted this view was "conservative".[606]

- In IPART's 2004 distribution decision for Ausgrid, Endeavour Energy and Essential Energy, it adopted an "investment grade" credit rating without adopting an explicit benchmark credit rating. It considered estimates from BBB and BBB+ data series, and then adopted a range that extended below those estimates on the basis that not all investment grade bonds are rated that low.[607]

Therefore in implementing Option 3 or 4, if we calculated the NSW service providers' historical return on debt over the 2004–09 regulatory control period based on a BBB data series, as the NSW service providers propose, we would overstate the return on debt. Previous regulatory decisions employed higher credit ratings. In the case of TransGrid, it considered efficient financing costs of a benchmark efficient transmission entity at the time were lower than currently.

Table 3-25 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

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[606] ACCC, *NSW and ACT transmission network revenue cap—TransGrid 2004-05 to 2008-09—Final decision*, April 2005, pp.139-143; AER, *TransGrid 2004-05 to 2008-09 revenue cap—Application by TransGrid for revocation and substitution*, February 2007.

[607] IPART, *NSW electricity distribution pricing 2004-05 to 2008-09—Final report*, June 2004, pp.224–226.

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.[608] All service providers with current regulatory proposals also proposed to update annually the return on debt.[609] We agree with this component of their proposals.

The NER states 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 regulatory control 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 regulatory control period.[610]

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 regulatory control periods (by introducing a smaller degree of price volatility within the regulatory control 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.[611]

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[608] 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 November 2014 draft decisions for ActewAGL, TransGrid, Endeavour Energy, Essential Energy, JGN, Directlink.

[609] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.177; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.199; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.288; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, p.116; Directlink, *Revised revenue proposal, 2015 –2020*, January 2015, p.12; ActewAGL, *Revised regulatory proposal, 2015 – 2019,* January 2015, p.472*; JGN, Revised access arrangement proposal 2015–20,* February 2015, p.98.

[610] NER, cl.6.5.2(i) and cl.6A.6.2(i).

[611] 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

As set out in the explanatory statement to the Guideline, we acknowledge the implementation of annual updates would be moderately complex. The NER require the change in revenue from the annual debt update to be effected through the automatic application of formula that is specified in a service provider's determination. [612] 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 regulatory proposals (rather than during the regulatory control 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 the handbook to the post-tax revenue model.[613]

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 a regulatory control period).[614] 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. ActewAGL disagrees with our requirement for service providers to nominate averaging periods upfront. Instead, it proposes to introduce a new annual process to nominate and assess averaging periods for the next year. We do not agree with the CCP's or ActewAGL's proposals for the reasons set out later in this attachment and in ActewAGL's final decision. At this point, we note that accepting either proposal would significantly increase the complexity of annual updating and may result in annual updating being impractical. Accordingly, if we accepted either proposal in the future then we would need to reassess our position on whether the advantages of annual updating continue to exceed the disadvantages.

We consulted on an amended post-tax revenue model (PTRM) that provides enough flexibility to implement the return on debt approach in this decision (or other potential approaches). We published the amended PTRM in January 2015, and have applied that version of the PTRM in this final decision.

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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.

[612] NER, cl.6.5.2(l) and cl. 6A.6.2(l).

[613] AER, *Final decision—Amendment—Electricity transmission network service providers—Post-tax revenue model handbook*, January 2015, pp.34-35; AER, *Final decision—Amendment—Electricity distribution network service providers—Post-tax revenue model handbook*, January 2015, pp.39-40.

[614] AER*, Explanatory statement—rate of return guideline*, December 2013, pp. 111–15.

In the next section, we consider whether the allowed return on debt should be a simple or weighted average.

Simple or weighted averaging

Our final decision is to calculate the allowed return on debt as a simple (that is, equally weighted) average of the prevailing market rates in each of the past 10 years, following a transition period. This is consistent with the approach we proposed in the Guideline and adopted in the draft decision.

All service providers with current revised proposals also proposed to adopt an equally weighted approach.[615] We agree with this component of their proposals.

In a separate determination process, Energex and Ergon Energy proposed an alternative weighting approach, based on the 'debt component of the forecast capex approved in the PTRM'.[616] This is a more complex approach, which effectively weights the prevailing rates in each of the past 10 years by the amount of debt that the service provider was forecast in its PTRM to have raised in that year. We refer to this approach as the 'PTRM-weighted average'.

We did not accept this aspect of Energex and Ergon Energy's proposals in our preliminary decisions for those service providers. We explain our reasons for this position in those preliminary decisions.

On balance, we choose to maintain the Guideline approach of calculating the allowed return on debt as the simple average of the prevailing market rates in each of the past 10 years, following a transition period. We acknowledge, however, the potential advantages of the PTRM-weighted average in some circumstances. We are therefore open to future consideration—especially under the next Guideline development process—of any new evidence that clearly demonstrates that the PTRM-weighted average better meets the objective and requirements of the NER.

Implementing the return on debt approach

In the previous section, we set out our approach to estimating the return on debt. This approach involves estimating an on-the-day rate (that is, 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 (that is, a moving historical

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[615] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.177; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.199; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.288; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, p.116; Directlink, *Revised revenue proposal, 2015 –2020*, January 2015, p.12; ActewAGL, *Revised regulatory proposal, 2015 – 2019, January 2015, p.472;* JGN*, Revised access arrangement proposal 2015–20,* February 2015, p.98.

[616] Energex, *Regulatory proposal 2015–2020*, October 2014, pp. 167–171; Ergon Energy, *Regulatory proposal 2015–2020*, October 2014, pp. 142–143.

average) over 10 years. 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.

In this section, we set out our considerations on the implementation issues associated with estimating the return on debt. These issues are:

- the term of debt issued by a benchmark efficient entity

- the credit rating of a benchmark efficient entity

- whether to use a 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 the 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

- the averaging period used to estimate the return on debt for each regulatory year, and

- the annual process to update the return on debt

Consistent with the Guideline and draft decision, 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 10 year broad BBB rated Reserve Bank of Australia (RBA) and Bloomberg Valuation Service (BVAL) curves, with some adjustments, is commensurate with the efficient financing costs of a benchmark efficient entity.

Term

Our final decision is to adopt a 10 year term for the return on debt. A 10 year term is the same as the term we proposed in the Guideline and adopted in the draft decision.

In the revised proposals currently before us, all service providers proposed a 10 year term for the return on debt.[617] We agree with that component of those proposals. A

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[617] ActewAGL, *Revised regulatory proposal*, January 2015, p. 430; JGN, *Response to the AER's draft decision and revised proposal: Appendix 7.10*, February 2014, p. 2; TransGrid, *Revised revenue proposal*, January 2015, p. 116. Directlink did not propose to depart form the Guideline for calculating the return on debt (which is based on a 10 year term) in Directlink, *Revised revenue proposal*, January 2015, p. 12. The NSW distributors did not depart from their initial proposals, where they used a 10 year tenor: Ausgrid, *Regulatory proposal*, May 2014, 68;

10 year term is also consistent with the advice from NERA and CEG submitted by several service providers with their initial proposals.[618]

We are satisfied that a 10 year term is commensurate with the efficient financing costs of a benchmark efficient entity. This is because:

- A long debt tenor is consistent with the long lived assets of the 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.

We explain each of these considerations further below.

The benchmark efficient entity is a regulated energy network service provider. Regulated energy network assets are long lived, and have asset lives that are longer than the terms that are commonly available for debt. The fewer the number of times the debt which funds these assets is required to be refinanced, the lower is the risk of not being able to refinance the debt upon maturity. We refer to this as refinancing risk. On the other hand, the cost of longer term debt is generally higher than shorter term debt as debt holders require compensation for the risks associated with holding debt over a longer time period. Accordingly, the benchmark efficient entity faces a trade-off between the higher cost of issuing long term debt and lower refinancing risk. Overall, these considerations suggest the average debt term of the benchmark efficient entity may be long term, but they do not provide clear guidance on what exactly that term should be.

During the development of Guideline, we requested information from a range of privately owned service providers on the amount, type, term and credit rating of their debt issuances.[619] 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.

However, as we discussed above in relation to the return on debt approach, we consider that under the on-the-day approach, the benchmark efficient entity would have issued interest rate swaps to closely match the base rate component of its actual

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Endeavour Energy, *Regulatory proposal*, May 2014, p. 104; Essential Energy, *Regulatory proposal*, May 2014, p. 91.

[618] 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.

[619] Information was received from APA Group, AusNet Services, CitiPower, Dampier to Bunbury Pipeline, ElectraNet, Envestra, Jemena, Multinet, Powercor, SA Power Networks and United Energy.

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 lowers the cost of debt (as shorter term debt is typically cheaper than longer term debt). 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 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.

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 of a benchmark efficient entity. This is because the industry average term at issuance is currently less than 10 years, and the benchmark efficient entity may have an incentive to enter into interest rate swaps on its existing debt that would further lower the effective term of that debt.

As we stated in the explanatory statement to the Guideline and the draft decision, we will continue to monitor the average debt term at issuance of service providers against the benchmark term.[620] We may also consider this information when we are assessing proposals for transactions costs, whether it is necessary to extrapolate the third party data series we have adopted out to the 10 year benchmark debt term, and any proposed adjustment to the foundation model estimate of the return on equity.

Credit rating

Our final 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 and applied in our draft decisions.[621]

The distributors proposed a BBB credit rating.[622] Several other service providers supported this position in their regulatory proposals and submissions on our draft decisions.[623] More broadly, in the resets that are currently open, different service

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[620]   AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 137.

[621]   AER, *Rate of return guideline*, 17 December 2013, p. 21; AER, *Draft decision: TransGrid transmission determination, Attachment 3: Rate of return*, November 2014, p. 9; AER, *Draft decision: Directlink transmission determination, Attachment 3: Rate of return*, November 2014, p. 10; AER, *Draft decision: TasNetworks transmission determination, Attachment 3: Rate of return*, November 2014, p. 11.

[622]   ActewAGL, *Revised regulatory proposal*, January 2015, pp. 431–432; Ausgrid, *Revised regulatory proposal and preliminary submission,* January 2015, pp. 70–71; Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 104–105; Essential Energy, *Revised regulatory proposal*, January 2015, p. 230.

[623]   AusNet Services, *Draft decisions NSW/ACT electricity distribution determination 2015–19*, February 2015, pp. 11–16; CitiPower/Powercor, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015; Ergon Energy, *Appendix C: Rate of return, Regulatory proposal*, October 2014, p. 123; JGN, *Access arrangement: Response to the AER's draft decision and revised proposal, Appendix 7.10 — Return on debt response*, February 2015, pp. 6–10; SAPN, *Regulatory proposal 2015–20*, October 2014, p. 305; United Energy, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015. To support these proposals, service providers submitted CEG, *WACC estimates*, May 2014, p. 64; CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, 24 May 2014, pp. 12–15.

providers, consultants and other stakeholders have proposed different credit ratings for the benchmark efficient entity. In particular:

- Service providers' positions were mixed. For instance, TransGrid, Directlink and TasNetworks each proposed a BBB+ credit rating.[624] In contrast, distributors proposed a BBB credit rating.[625] Several other service providers supported this position in their regulatory proposals and submissions on our draft decisions.[626] Some service providers submitted we should have regard to the individual circumstances of government owned service providers that risk having their indicative credit rating downgraded to be below our benchmark credit rating.[627]

- Consultants' positions were mixed. For instance, NERA and Houston Kemp (commissioned by TransGrid) recommended a BBB+ credit rating.[628] NERA stated 'in our opinion a BBB+ credit rating is the best estimate of the benchmark credit rating'.[629] In contrast, CEG (commissioned by Ausgrid, Endeavour Energy, Essential Energy and ActewAGL) recommended a BBB credit rating.[630] 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.[631] Similarly, the South Australian Centre for Economic 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).[632] Consumer groups generally submitted using a benchmark credit

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[624] For revised proposals, see TransGrid, *Revenue proposal*, May 2014, p. 178; Directlink, *Revenue proposal*, May 2014, p. 36; TasNetworks, *Tasmanian transmission revenue proposal,* May 2014, p. 108. Also see TransGrid, *Revenue proposal*, May 2014, p. 178; Directlink, *Revenue proposal*, May 2014, p. 36; TasNetworks, *Tasmanian transmission revenue proposal,* May 2014, p. 108.

[625] ActewAGL, *Revised regulatory proposal*, January 2015, pp. 431–432; Ausgrid, *Revised regulatory proposal and preliminary submission,* January 2015, pp. 70–71; Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 104–105; Essential Energy, *Revised regulatory proposal*, January 2015, p. 230.

[626] AusNet Services, *Draft decisions NSW/ACT electricity distribution determination 2015–19*, February 2015, pp. 11–16; CitiPower/Powercor, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015; Ergon Energy, *Appendix C: Rate of return, Regulatory proposal*, October 2014, p. 123; JGN, *Access arrangement: Response to the AER's draft decision and revised proposal, Appendix 7.10 — Return on debt response*, February 2015, pp. 6–10; SAPN, *Regulatory proposal 2015–20,* October 2014, p. 305; United Energy, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015. To support these proposals, service providers submitted CEG, *WACC estimates*, May 2014, p. 64; CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, 24 May 2014, pp. 12–15.

[627] Ergon Energy, *Submission on the draft decisions: NSW and ACT distribution determinations 2015–16 to 2018–19*, 13 February 2015, p. 7.

[628] Houston Kemp, *Response to the draft decision on the return on debt allowance*, January 2015, p. 4; NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 10.

[629] NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, pp. ii, 10.

[630] CEG, *WACC estimates*, May 2014, p. 64; CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, 24 May 2014, pp. 12–15.

[631] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 28–31.

[632] This recommendation was informed by a Kanangra report; which was written in mid-2013, before several credit rating upgrades occurred. See SACES, *Independent estimates of the WACC for SAPN: Report commissioned by the SACOSS*, January 2015, pp. 13–14.

rating of BBB+ or higher or submitted placing less reliance on credit ratings in general. For instance:

- o Several consumer groups and an energy retailer advised against lowering the benchmark credit rating from BBB+ to BBB.[633] Some consumer groups also submitted the benchmark credit rating of BBB+ was too low.[634] For instance, Queensland Council of Social Service (QCOSS) favoured an A- benchmark credit rating.[635] Several consumer groups indicated we should recognise or have regard to service providers' actual credit ratings — particularly those that are government owned.[636]

- o The CCP submitted that we do not need to base the allowed return on debt on the universe of bonds with a specified credit rating.[637] The CCP also noted that, 'TransGrid's actual borrowing costs are much lower than the costs implied by its credit rating'. [638] Further, the Energy Users Association of Australia (EUAA) supported using market information, benchmarking and investment returns to inform our rate of return allowance for network businesses.[639] While we see some merit in these 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.[640]

We are satisfied that a return on debt estimated on the basis of a BBB+ credit rating is commensurate with the efficient financing costs of a benchmark efficient entity. This is because:

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[633] AGL, *SAPN regulatory proposal July 2015 to June 2010*, 30 January 2015, p. 14; APVI, *Submission to the AER on the issues paper on SAPN's regulatory proposal*, December 2014, p. 5; ECCSA, *AER SA electricity distribution revenue reset SAPN application: A response*, December 2014, pp. 74–75; SACOSS, *Submission to AER on SAPN 2015–2020 regulatory proposal*, January 2015, p. 21.

[634] ECC, *Submission concerning the TransGrid revised revenue proposal 2014–19*, 3 February 2015; EMRF, NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal, January 2015, p. 21.

[635] QCOSS, Understanding the long term interests of electricity customers: Submission to the AER's Queensland electricity distribution determination 2015-2020, 30 January 2015, pp. 75–76.

[636] Hugh Grant (CCP member), *CCP submission AER draft TransGrid determination, TransGrid revised revenue proposal*, 6 February 2015., pp. 12–13; ECC, *Submission concerning the NSW distribution networks revised revenue proposal 2014–19: Submission to the AER*, 11 February 2015, p. 2; EMRF, *NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal*, January 2015, p. 23; MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 55; Tasmanian Small Business Council, *Submission to the AER: TasNetworks transmission revenue reset — Draft determination & revised proposal*, February 2015, p. 32.

[637] CCP, *Smelling the roses and escaping the rabbit holes: the value of looking at actual outcomes in deciding WACC*, July 2014, p. 6.

[638] Hugh Grant (CCP member), *CCP submission AER draft TransGrid determination, TransGrid revised revenue proposal*, 6 February 2015, p. 12.

[639] EUAA, *Submission to TransGrid response to draft determination (2014 to 2019)*, 6 February 2015, p. 5.

[640] The practical necessity predominately arises from the requirement for annual updating and our subsequent use of a third party data series. See the section on the use of a third party data series in this attachment. Also, see appendix H on return on debt implementation, for an explanation on why we use credit ratings as an indicator of the return on debt.

- A BBB+ credit rating is consistent with the conceptual position that the benchmark efficient entity is likely to face low credit risk. This is supported by advice from McKenzie and Partington and reports from Moody's and Standard and Poor's.[641]

- We are satisfied that, on balance, 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.[642] The median credit rating is currently BBB+.[643] 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).

Table 3-26 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 (S&P), AER analysis.

Further details supporting our reasons are set out in appendix H—Return on debt implementation.

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[641] For information we consider supports this position, see McKenzie, *Partington, Risk, asset pricing models and WACC*, June 2013, p. 15; Moody's, *Industry outlook: Australian Regulated Utility Networks*, 21 February 2013, p. 8; Standard and Poor's, *Key credit factors: Business and financial risks in the investor–owned utilities industry*, November 2008, p. 8.

[642] 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 at the end of the 2014 calendar year.

[643] Data are subject to updates and were last checked 7 April 2015.

Use of third party data series

Our final 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 and applied in the draft decisions.[644]

The service provider proposals currently before us all propose using third party data series to estimate the return on debt. This includes the revised proposals before us.[645] This also includes service provider submissions on our draft decisions and service provider proposals for Queensland and SA.[646] In its submission to SAPN's regulatory proposal, the South Australian Centre for Economic Studies (SACES) also appeared to support this.[647] We agree with using third party data series to estimate the return on debt.

The CCP and several other consumer groups raised our use of third party data service providers as an issue in several of the current resets.[648] We have regard to these submissions in this final decision. 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.[649] Similarly, in its submission to SAPN's regulatory proposal, the Energy Consumers Coalification of SA (ECCSA) submitted that both available third party yield curves have shortcomings. It also noted MEU's

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[644] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 126–130; *AER, Draft decision: ActewAGL distribution determination, Attachment 3*, November 2014, p. 11; AER, *Draft decision: Ausgrid distribution determination, Attachment 3*, November 2014, p. 10 ('46'); 10 AER, *Draft decision: Directlink transmission determination, Attachment 3*, November 2014, p. 10; AER, *Draft decision: Endeavour Energy distribution determination, Attachment 3*, November 2014, p. 8; AER, *Draft decision: Essential Energy distribution determination, Attachment 3*, November 2014, p. AER, *Draft decision: TasNetworks transmission determination, Attachment 3*, November 2014, p. 11; AER, *Draft decision: TransGrid transmission determination, Attachment 3*, November 2014, p. 9.

[645] ActewAGL, *Revised regulatory proposal*, January 2015, p, 428; Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p, 178; Directlink, *Revised revenue proposal*, January 2015, p, 13; Endeavour Energy, *Revised regulatory proposal*, January 2015, p, 200; Essential Energy, *Revised regulatory proposal*, January 2015, p, 219; JGN, 2*015–20 access arrangement: Response to the AER's draft decision and revised proposal, Appendix 7.10 — Return on debt response*, February 2015, p. 1; TasNetworks, *Revenue proposal*, May 2014, p. 108; TransGrid, *Revised revenue proposal*, January 2015, p. 116.

[646] Service provider proposals for Queensland and SA include Energex, *Regulatory proposal*, October 2014, p, 172–173; Ergon Energy, *Regulatory proposal*, October 2014, pp. 144–146; SAPN, *Regulatory proposal*, October 2014, p. 339. JGN and United Energy proposed this, but considered we should select which service provider to use annually. See JGN, *Submission in relation to the first round of regulatory determinations under the new rules*, 6 February 2015; United Energy, *Submission in relation to the first round of regulatory determinations under the new rules*, 6 February 2015. Ergon Energy proposed this, but considered we should only use RBA data. See Ergon Energy, *Submission on the draft decisions: NSW and ACT distribution determinations 2015–16 to 2018–19*, 13 February 2015.

[647] SACES, *Independent estimates of the WACC for SAPN: Report commissioned by the SACOSS*, January 2015, p. 14.

[648] We are concurrently assessing eight revised regulatory proposals. We are also assessing three regulatory proposals for Queensland and South Australia.

[649] CCP, *Smelling the roses and escaping the rabbit holes: the value of looking at actual outcomes in deciding WACC*, July 2014, pp. 4, 12.

recommendation during the Guideline development process for the AER to develop its own series to replicate the return on debt for a pure play energy network. However, ECCSA accepted our use of third party data series for this review given we have not developed our own data series.[650]

We are satisfied that using a third party data series (or multiple series), appropriately chosen, is commensurate with the efficient debt financing costs of the 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 further below.

- 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).[651] The Australian Competition Tribunal has found both approaches reasonable.[652]

We explain our first reason listed above in more detail here. The NER 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.[653] Even if this were not a

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[650] ECCSA, *SA electricity distribution revenue reset: A response*, December 2014, p. 80.
[651] IPART has recently 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 an econometric approach (and uses the approaches of independent data service providers 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.
[652] 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.
[653] NER, cl.6A.6.3(l), NER, cl. 6.5.2(l).

rule requirement, using a third party data series may be the only practical option to update the return on debt annually. This position is supported by NERA, who advised that:

> …a third party data service provider is essential to allow the return on debt to be updated automatically'.[654]

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 in the section on the averaging period. This process needs to occur relatively quickly and without 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 distribution determination. We can then add a formula to the determination and apply it mechanistically during the annual debt update process.

During the Guideline development process, we considered the use of a third party data series, in consultation with stakeholders.[655] Service providers tended to support using a third party data series.[656] While consumer representatives tended to consider we should develop our own data series.[657] We acknowledge these views and respond to them in appendix H—Return on debt implementation. However, our final decision is to use a third party data series, in the context of annual updating. This is for the reasons set out above.

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 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)

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[654] NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 10.

[655] 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.

[656] 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.

[657] 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.

- 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.[658]

    - 7 year estimate extrapolated to a 10 year term using the 7–10 year margin from the RBA curve.

    - 5 year estimate extrapolated to a 10 year term using the 5–10 year margin from the RBA curve.

This is consistent with the position we adopted in the draft decision.

It is also consistent with the approach we proposed in the Guideline to use one or more third party data series to estimate the return on debt.[659] 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 stakeholders. In our November 2014 draft decision we formed a position on which data series to use, and set out our reasons for this position. Our position was informed by reports we commissioned from Dr Martin Lally and the ACCC/AER Regulatory Economic Unit, which we published with the draft decision.

In response to our draft decision, the most common position among service providers was to support a simple average of the RBA and BVAL curves in all or most circumstances:

- TasNetworks[660] and Directlink[661] agreed with our draft decision. In a separate regulatory process, SAPN and Energex also supported using a simple average of the RBA and BVAL curves.[662]

- TransGrid largely adopted our draft decision, but proposed to use only the RBA curve where the BVAL curve was only available for terms less than the 7 year mark[663]

- JGN supported using a simple average of the RBA and BVAL curves where the difference between them was not 'a material divergence' (which it considered to be

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[658] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommended publishing a 10 year yield estimate. Therefore, in line with our specified contingencies in the draft decision and this final decision, we will adopt this curve where it is available. As Bloomberg has not backcast the updated curve methodology, we will apply the previous methodology as per the draft decision to estimate the annual cost of debt for 2014–15 and 2015–16.

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

[660] TasNetworks, *Revised revenue proposal*, January 2015, p. 1.

[661] Directlink, *Revised revenue proposal*, January 2015, p. 12.

[662] The 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 they were also supportive of using a simple average of the RBA and BVAL curves. See: SAPN, *Regulatory proposal*, November 2014, p. 339. Energex, *Response to AER Issues Paper – Qld electricity distribution regulatory proposals*, January 2015, p. 24.

[663] TransGrid, *Revised revenue proposal*, January 2015, p. 118.

60 basis points), but not necessarily when the difference was greater than 60 basis points.

- The Ausgrid, Endeavour Energy and Essential Energy did not adopt our draft decision, and maintained their initial proposal to use only the RBA curve. In a separate regulatory process, Ergon Energy proposed to adopt only the RBA curve.[664]

We are satisfied that a simple average of the two curves will result in a return on debt that contributes to achievement of the allowed rate of return objective. This is because:

- Based on analysis of the bond selection criteria, we are not satisfied that either curve is clearly superior to the other.

- Based on analysis of the curve fitting (or averaging) methodologies, we are not satisfied that either curve is clearly superior to the other.

- Both curves require adjustments from their published form to make them suitable,[665] and we are not satisfied that either can be more simply or reliably used for estimation of the annual return on debt.

- 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,[666] subject to the necessary adjustments to each curve. 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 noted 'on the question of which index better reflects the cost of debt for the efficient benchmark entity, there is no clear winner'.[667]

- The two curves have regularly produced substantially different results at particular points in time. While we are not satisfied that either curve is clearly superior, this suggests that it may not be appropriate to simply select one curve or 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.[668]

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[664] Ergon Energy, *Regulatory proposal*, October 2014, p. 124.

[665] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommended 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.

[666] Lally, *Implementation issues for the cost of debt*, November 2014, p.3.

[667] Lally, *Implementation issues for the cost of debt*, November 2014, p. 5.

[668] In this decision, the issue before the Australian Competition Tribunal was the choice between the Bloomberg BFVC and the CBASpectrum curve, neither of which are currently published. See: *Application by ActewAGL Distribution [2010] ACompT4*, 17 September 2010, paragraph 78.

- 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 the draft decision, we explained each of these reasons in more detail.

Response to key issues raised by stakeholders

In its revised proposal, TransGrid largely adopted our draft decision.[669] However, TransGrid proposed that where the 7 year BVAL curve is not available, we should adopt 100 per cent weight on the RBA curve. TransGrid submitted a report from HoustonKemp that, among other rate of return matters, recommended this approach. We are not persuaded by TransGrid's or Houston Kemp's reasons for this approach.

Where the maximum BVAL estimate is 7 years, we extrapolate the BVAL curve from 7 to 10 years using the 7–10 year margin from the RBA curve. We then average this extrapolated estimate with the 10 year RBA estimate., Where the 7 year BVAL estimate is not available, our final decision is to extrapolate the 5 year BVAL estimate to 10 years using the 5–10 year margin from the RBA curve. Compared to extrapolating from 7 years, this gives the RBA approach greater weight, but retains some weight on the BVAL curve. In contrast, TransGrid's proposed approach would place zero weight on the RBA curve in these circumstances. Based on our assessment of the strengths and weaknesses of the two series, we remain satisfied that the combination of two curves will result in a return on debt that contributes to achievement of the allowed rate of return objective. We also note that as of April 2015, BVAL has recommenced publishing a 10 year estimate. Accordingly, TransGrid's concern about extrapolating 5 year BVAL data does not currently arise and only applies to a small period of historical data.

In contrast, Ausgrid, Endeavour and Essential did not adopt our draft decision. They maintained instead their proposal to place 100 per cent reliance on the RBA curve.[670] The revised proposals by these service providers did not engage with the reasons we set out in our draft decision for adopting a simple average, nor did the revised proposals include substantive new analysis supporting using only the RBA curve. We therefore are not satisfied that their proposed approach as set out in the initial and revised proposals will result in a return on debt that contributes to achievement of the allowed rate of return objective.

In its revised proposal, JGN supported using a simple average of the two curves where the difference between them was not substantial (less than 60 basis points), but when the difference was greater than 60 basis points JGN proposed to adopt the RBA, BVAL or simple average of the curves (or some other curve or average of curves that become available) based a line of best fit exercise against a sample of bonds chosen

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[669] TransGrid, *Revised revenue proposal*, January 2015, p. 118.

[670] Ausgrid, *Revised revenue proposal and preliminary submission*, January 2015, p. 176; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 200; Essential Energy, *Revised regulatory proposal*, January 2015, p. 219.

using particular bond selection criteria.[671] We will assess JGN's proposed methodology in its final decision, to be released in late May 2015.

Also, in submissions on the draft determinations for the NSW and ACT distribution service providers:

- Ergon Energy submitted that the inclusion of the BVAL curve created unnecessary complexity.[672] However, we are not satisfied that the use of the second curve is substantially more complex. For the reasons set out above, we are satisfied that an average of the two curves will result in a return on debt that would contribute to achievement of the allowed rate of return objective.

- Jemena and United Energy submitted that the selection of appropriate bond curves should be formulaically re-tested each year against a sample of bonds.[673] This is consistent with the proposal by JGN which we discuss above. Further, the service providers submitted that the Tribunal required the AER to compare the past performance of any third party data source against bond data. However, the Australian Competition Tribunal only identified such a test as a way the AER 'is able to' compare the data sources.[674] We are not persuaded that the Australian Competition Tribunal decision referred to by Jemena and United Energy implies this is required or even necessary. For the reasons set out in our draft determination,[675] we are not satisfied that testing the past performance of curves is a reliable indicator of future curve performance. In contrast, we have assessed in detail the underlying characteristics and differences between the curves in reaching our decision.

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:

- 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

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[671] JGN, *Return on debt response*, February 2015, p. 17.

[672] Ergon Energy, *Submissions on the draft decisions: NSW and ACT distribution determinations 2015–16 to 2018–19*, February 2015, p. 17.

[673] Jemena, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015, p. 8; United Energy, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015, p. 8.

[674] Australian Competition Tribunal, *Application by ActewAGL Distribution [2010] ACompT 4*, September 2010, paragraph 77.

[675] AER, *Draft decision: TransGrid transmission determination, Attachment 3: Rate of return*, November 2014, p. 9,144–145.

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 3-27 and Table 3-28. The impact of these adjustments is set out in Figure 3.16 and Figure 3.17.

Table 3-27 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.[676]
		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).[677]
		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. However, we do not agree it is necessary to extrapolate the base component. As identified by the RBA and Lally,[678] the base component of the published 10 year yield already matches the benchmark term of debt. Therefore, extrapolating this component would result would be erroneous and lead to overcompensation in most circumstances, where the yield curve is upward sloping.

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[676] For example, the difference between approaches over the 2-June 2014 to 30-June 2014 indicative averaging period is 0.22 basis points, or 0.0022 per cent.

[677] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

[678] 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.

Adjustment Type	Amendment made?	Comments
		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.[679] 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.[680] 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 final decision, we have maintained our draft decision position. However, we may revisit this in in future decisions or the next Guideline review.
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'.[681] 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

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[679] AER, *Rate of return guideline—Explanatory statement*, December 2013, p. 136.

[680] RBA, *Aggregate measures of Australia corporate bond spreads and yields*, available at: http://www.rba.gov.au/statistics/tables/xls/f03hist.xls.

[681] RBA, *Email in response to: AER follow up question on the basis of YTM quotations in RBA statistical table F3*, 16 October 2014.

Figure 3.16 Impact of adjustments to the published 10 year RBA yields
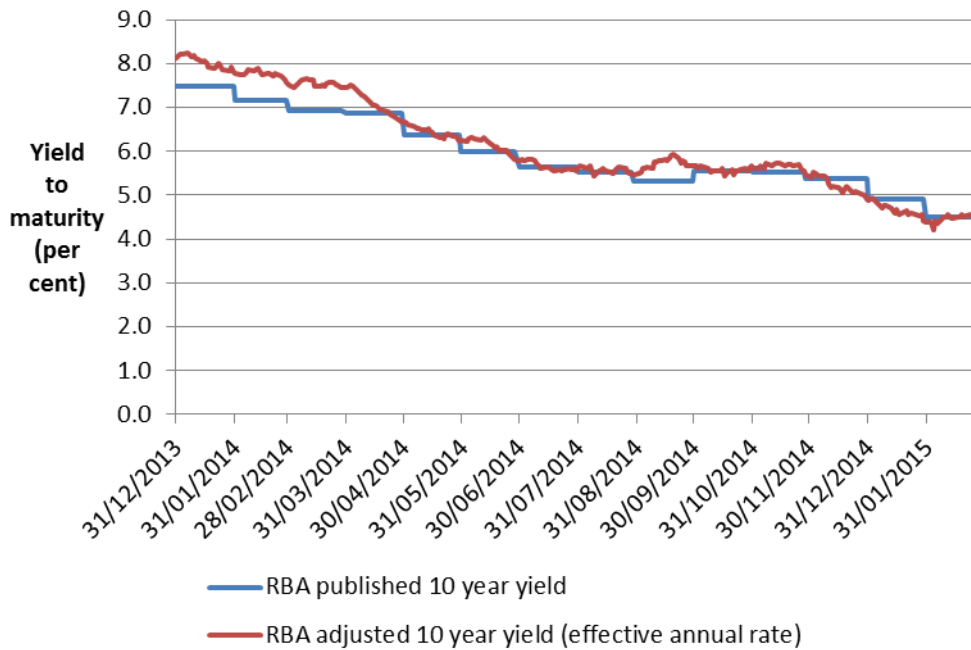
Source: AER analysis, RBA

Table 3-28 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.[682] In April 2015, Bloomberg revised its methodology for the BVAL curve (BVCSAB10) and it now publishes a 10 year estimate.[683] 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

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[682] Specifically, from 15 September 2014 to 3 November 2014.

[683] Specifically, 14 April 2015.

Adjustment Type	Amendment made?	Comments
		spread to CGS from 7 to 10 years
		As recommended by Lally,[684] we are satisfied this approach is comparably reliable to the more complex approaches submitted by other stakeholders,[685] 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 recommended publishing a 10 year yield estimate. Therefore, in line with our specified contingencies in this decision, we will adopt this curve where it is available. As Bloomberg has not backcast the updated curve methodology, we will apply the previous methodology as per the draft decision to estimate the annual cost of debt for 2014¬–15 and 2015–16.
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.

Figure 3.17 Impact of adjustments to the published 7 and 5 year BVAL yields

BVAL published 7 year yield
BVAL adjusted 10 year yield (effective annual rate)
BVAL published 5 year yield

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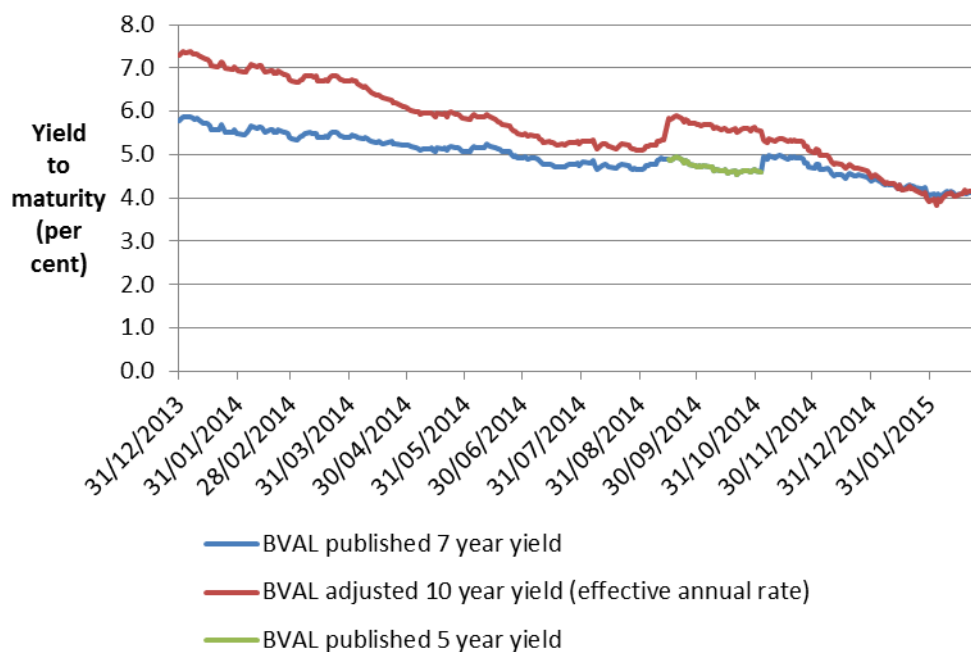
[684] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.
[685] Incenta, *Methodology for extrapolating the debt risk premium*, June 2014, pp. 2–3.

Our extrapolation and interpolation approaches are consistent with the draft decision. Our position on these matters appears to be relatively non-contentious. None of the service providers who have recently submitted revised proposals identified problems with the AER's extrapolation or interpolation approach. We are also not aware of any submissions from consumer representatives commenting on these matters.

In contrast, in a separate regulatory process, the Queensland and South Australian service providers proposed alternative extrapolation methodologies to the approach set out in our draft decision. Generally, these approaches were regression based and also incorporated yield information from curve points with shorter terms to maturity. For the reasons set out in the preliminary determinations for these service providers, we are not persuaded that these approaches will better contribute to a return on debt that is commensurate with the efficient debt financing costs of the benchmark efficient entity. In particular, 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 those preliminary determinations as adopted in this decision.

Overall, we remain satisfied that our extrapolation and interpolation approaches will result in a return on debt that is commensurate with the allowed rate of return objective.

Choice of data series—Contingencies

Our final decision is to largely maintain the set of contingencies as set out in our draft decision. We have for two contingencies expanded the definition for more general contingency scenarios. Specifically, the contingencies now address any expansion or reduction of the longest available BVAL term, where in the draft decision they addressed changes to a 5 year term, less than 5 year term or a 10 year term.

Service providers appear to have accepted the contingencies from our draft decision in full, with the exception of TransGrid. We are also not aware of any submissions from consumer representatives commenting on these matters.

TransGrid proposed only to use the RBA curve to estimate the return on debt where the 7 year BVAL curve is not available.[686] For the reasons set out in a previous section above, we are not persuaded by this component of TransGrid's revised proposal.

As identified in the draft decision, we have made our final decision based on the information and third party data that is currently available.[687] Nonetheless, in our

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[686]   TransGrid, *Revised revenue proposal*, January 2015, p. 118.

experience it is common that the availability of third party data changes. Our final decision is to annually update the trailing average portfolio return on debt. Under the NER,[688] the change in revenue resulting from the annual update must occur by automatic application of a formula that is specified in the decision. 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 3-29, 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 3-29   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.
Bloomberg reduces the maximum published BVAL term from 7 years	If Bloomberg still publishes the BVAL curve to 5 or more years years, we will extrapolate the BVAL curve from the longest published term using the 5 to 10 year yield margin from the RBA curve. We have adopted this approach for the period from 15 September 2014 to 3 November 2014 where the 7 year BVAL curve was unavailable. 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,[689] from the RBA's longest published effective 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.
Bloomberg increases the	If the longest published term is between 7–10 years, we will extrapolate it to a 10

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[687] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommended publishing a 10 year yield estimate. Therefore, in line with our specified contingencies in this decision, we will adopt this curve where it is available. As Bloomberg has not backcast the updated curve methodology, we will apply the previous methodology as per the draft decision to estimate the annual cost of debt for 2014¬–15 and 2015–16.

[688] NER, cl. 6A.6.2(l), NER, cl. 6.5.2(l).

[689] Specifically, the spread to CGS.

Event	Changes to approach
maximum published BVAL term from 7 years.	year term using the corresponding margin from the RBA curve.
	If the longest term is 10 or more years, we will apply the 10 year BVAL curve un-extrapolated, but still adjusted to be an effective annual rate.
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.

- 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.[690] 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 final decision is to accept Essential Energy's proposed debt averaging periods for 2014–15 to 2018–19, consistent with our draft decision.

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[690] AER, *Explanatory statement−Rate of return guideline*, December 2013, pp. 23–24.

In assessing Essential Energy's averaging periods, we applied the approach in the Guideline.[691] In the Guideline, we proposed that service providers could nominate averaging periods of between 10 business days and 12 months. 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 rate of return objective.

Table 3-30 sets out why we consider an averaging period that meets these conditions contributes to the achievement of the rate of return objective. Our detailed assessment is set out in confidential appendix K on the rate of return averaging periods.

Table 3-30   AER final decision—Assessment of Essential Energy's revised averaging periods

Condition in the Guideline	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 at least 10 days smooths out short term volatility in the annually updated return on debt allowance. Allowing service providers to nominate averaging periods up to 12 months provides service providers with a degree of flexibility over how they manage their financing arrangements.	Yes
It should be specified prior to the commencement of the regulatory control period.	This allows us to substantively assess the service provider's proposal during the distribution determination process. This avoids the practical difficulties with either (1) creating a new process during the regulatory control period for 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.	Yes
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 because the service provider would be able to observe the historical data and select the time period that results in the highest estimates.[692]	Yes
It should be as close as practical to the commencement of each	An averaging period at the start of the regulatory year would better reflect the return on debt for that period. However, to be capable of being practically	Yes

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691   AER, *Rate of return guideline*, December 2013, pp. 21–22.
692   Lally, *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

Condition in the Guideline	Reasons for condition	Condition met?
regulatory year in a regulatory control period.	applied, the period must typically end somewhat before this date to allow us to complete our regulatory tasks such as modelling and pricing compliance. It also allows sufficient time to complete our quality assurance checks on the calculations.	
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 over how they manage their financing arrangements.	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.

Annual debt update process

One of the conditions we proposed in the Guideline is that the averaging period should be, 'as close as practical to the commencement of each regulatory year'.[693] We considered how the process to annually update the return on debt would align with the publication of distribution prices. The timing of publishing distribution prices affects how late an averaging period can end and still be implemented in practice.

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[693]   AER, *Rate of return guideline*, December 2013, p. 21.

Table 3-31 outlines the general process we propose to adopt for the annual debt update for distribution network service provider (distributors). This is the same process we proposed in the draft decision. When we put this forward, we encouraged submissions from stakeholders on this process, including from distributors with future regulatory determinations.[694] Since we did not receive any comments on this process, we are satisfied with maintaining this process for this final decision.

Our assessment of the proposed averaging periods for distributors with current regulatory proposals (including Essential Energy) 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.

Table 3-31   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.[695]

Source: AER analysis.

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[694]   AER, *Draft decision, Essential Energy distribution determination, Attachment 3*, November 2014, p. 158.
[695]   A longer (or shorter) time period would move back (or forward) the maximum practical end date of the averaging period by the same timeframe.

The process outlined in Table 3-31 does not apply to the transitional regulatory control period or the first year of the subsequent regulatory control period. This is because in the distribution determination, X factors will already incorporate the return on debt for 2014–15 and 2015–16. Therefore, this process will generally apply to the subsequent years of a regulatory control period.

In Table 3-31, we propose calculating the return on debt, annual building block revenue requirement and X factor in accordance with the formula in the distribution determination. We propose informing the distributor of these calculations annually. An alternative option would be for the distributor to initially perform the update itself, and for us to check these calculations. 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 distribution prices to be published. The AEMC has recently made a rule determination that, among other matters, affects this date:[696]

- From 2017—distributors will be required to submit their annual pricing proposal to us by 31 March each year.[697]

- Before 2017—transitional arrangements will apply that maintain the current date by which distributors must submit their annual pricing proposals.[698] This is by 1 May each year.[699]

3.4.3 Gearing

Our final 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 revised proposals currently before us, service providers proposed a 60 per cent gearing ratio.[700] We agree with that component of those proposals. The consumer

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[696] AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014.

[697] 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. See AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014.

[698] AEMC, *Distribution network pricing arrangements, rule determination*, 27 November 2014.

[699] NER 6.18.2(a)(2) requires DNSPs 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 non-Victorian DNSPs, each regulatory year commences at the start of the financial year.

[700] ActewAGL, *Revised regulatory proposal*, January 2015, p. 426; Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 177; Directlink, *Revised revenue proposal*, January 2015, p. 11; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 72; Essential Energy, *Revised regulatory proposal*, January 2015, p. 218; JGN, *2015–20 access arrangement: Response to the AER's draft decision & revised proposal*, February 2015, p. 100. TasNetworks accepted our draft decision. See TasNetworks, *Tasmanian*

challenge panel submitted that while the benchmark gearing is 60 per cent, 'in practice gearing is typically above 70 per cent'.[701]

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 Table 3-32 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.

Table 3-32   Average 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

revised transmission revenue proposal, January 2015, p. 5. TransGrid did not propose a different gearing ratio. See TransGrid, *Revised revenue proposal*, January 2015.

[701]   Consumer challenge panel, *CCP1 submission to the AER re: the NSW DNSPs: Jam tomorrow?*, August 2014, p. 5.

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
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.[702]

3.4.4 Expected inflation rate

Our expected inflation rate forecast is set out in Table 3-33. We base our approach on an average of the Reserve Bank of Australia's (RBA) short term inflation forecasts and the mid-point of the RBA's inflation targeting band. This method is consistent with what we have previously adopted.

Table 3-33   AER inflation forecast (per cent)

Forecast inflation	2014–15	2015–16	2016–17	2017–18 to 2023–24	Geometric average
Essential Energy's	2.5	2.5	2.5	2.5	2.50

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[702]   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.

Forecast inflation	2014–15	2015–16	2016–17	2017–18 to 2023–24	Geometric average
placeholder					
Draft decision update	2.0 [a]	3.0 [a]	2.5	2.5	2.50
AER final decision	1.25 [b]	2.75 [b]	2.75 [b]	2.5	2.38

Source: RBA, *Statement on Monetary Policy*, November 2014, p. 61; RBA, *Statement on Monetary Policy*, February 2015, p. 71.

(a)   In November 2014, the RBA published a range of 1.5–2.5 per cent and a range of 2.5–3.5 per cent for its June 2015 and June 2016 CPI inflation forecasts respectively. We select the mid-points from these ranges.

(b)   In February 2015, the RBA published 1.25 per cent, a range of 2.25–3.25 per cent and a range of 2.25–3.25 per cent for its June 2015, June 2016 and June 2017 CPI inflation forecasts respectively. Where the RBA published ranges, we select the mid-points.

In the draft decision, we were satisfied with Essential Energy's proposed method for forecasting inflation. Essential Energy used 2.5 per cent as a placeholder inflation forecast and proposed, 'that this forecast be updated using the AER's approach to calculating forecast inflation'.[703]

For the draft decision, we updated this placeholder inflation estimate to reflect the latest RBA forecasts at the time and also stated that we expect the RBA to publish a more recent inflation forecast before our final decision, which we would use to update the value of the expected inflation rate accordingly in our final decision.[704]

We have since updated the forecast inflation rate in line with the most recent RBA forecasts, which result in an inflation forecast of 2.38 per cent per annum.

In its report for the NSW distributors, CEG submitted that our inflation forecasts resulted in a different real risk free rate than what 10 year inflation indexed CGSs implied. CEG expressed the view that this was anomalous, but CEG's submission and reasoning is unclear.[705] Having had regard to this report, we remain satisfied with our approach and do not consider it produces anomalous results. This is for the following reasons:

- The NSW distributors (and other service providers) have proposed and/or accepted our approach to estimating inflation; which is based on the RBA forecasts.[706]

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[703]   Essential Energy, *Regulatory Proposal 1 July 2014 to 30 June 2019*, May 2014, p. 30.

[704]   AER, *Draft decision Essential Energy distribution determination 2015-16 to 2018-19, Attachment 3: Rate of return, November 2014,* p. 163.

[705]   CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 30-31.

[706]   For example, see ActewAGL, *Regulatory proposal (resubmitted 10 July 2014)*, p. 295; Ausgrid, *Regulatory proposal*, May 2014, p. 23; Endeavour Energy, *Regulatory proposal*, May 2014, p. 35; Energex, *Regulatory proposal*, October 2014, p. 176; Essential Energy, *Regulatory proposal*, May 2014, p. 30; JGN, *Access arrangement information*, June 2014, p. 98; SAPN, *Regulatory proposal*, October 2014, p. 342; TasNetworks,

Further, we initially adopted this method in response to previous regulatory proposals, which agreed to our decision to cease the forecasting of expected inflation using indexed CGS yields.[707] If CEG is suggesting it has a preferred alternative method of calculating inflation, it has not set out the merits for this preference.[708]

- If CEG is providing an example for why we should change our estimate of the risk free rate, this is unclear. The two estimates of the real risk free rate differ because of the inflation forecasts, not because of the estimated nominal risk free rates. Regarding the differing inflation forecasts, it is not anomalous for two different forecasting methods to produce different results. Further, we are satisfied with our method of estimating the risk free rate (see step three under section 3.4.1 of this attachment).

We are satisfied with our method of forecasting inflation and note that this method has been in use for a number of years and all regulatory and revised regulatory proposals currently under consideration adopt it.

Tasmanian transmission revenue proposal, 31 May 2014, p. 108; TransGrid, *Revenue proposal 2014/15–2018/19*, May 2014, p. 209. Directlink applied a rate consistent with our transitional decision: Directlink, *Revenue proposal*, May 2014, p. 38.

[707] AER, *Final Decision Transend Transmission Determination 2009-10 to 2013-14*, April 2009, pp. 80-83; AER, *Final decision New South Wales distribution determination 2009-10 to 2013-14*, April 2009, pp. 233-236.

[708] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 30-31.

A   Equity models

During the rate of return guideline (the Guideline) process, we focused on four key models that might 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 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 satisfied 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 and long term (historical) specification. Section A.3 discusses the role we assign to each of these models, and our reasons for assigning these roles.

We consider the revised regulatory proposals largely reiterated positions set out in the initial proposals.[709] In response to our draft decisions, several service providers expressed preferences towards using models differently to how we have in the foundation model approach. Some service providers 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.

*   The foundation model approach is, in effect, a mechanistic application of the SLCAPM (similar to that under the old rules) because we have regard to other evidence in a way that has no material impact on our estimate.

We are satisfied that we do not 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 have mischaracterised our foundation model approach. We elaborate on these considerations below.

A.1   Estimating models

Several service providers expressed preferences towards estimating the return on equity using four models — SLCAPM, Black CAPM, FFM and DGM. These service providers considered these four models to be relevant information that should be given substantial weight.

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[709]   For Essential Energy's position, see Essential Energy, *Revised regulatory proposal*, January 2015, pp. 231–242.

We do not agree. These submissions appear to be motivated by an interpretation of NER clause 6.5.2(e)(1), which states:

> In determining the *allowed rate of return*, regard must be had to:
>
> (1) Relevant estimation methods, financial models, market data and other evidence

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, 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.[710]

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 satisfied that combining four 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.

A.1.1 The multi-model approach

Several service providers expressed preferences towards estimating the return on equity by combining four estimates from the SLCAPM, Black CAPM, FFM and DGM (the multi-model approach).[711] 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 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 the options of adopting a primary model, a primary model with reasonableness checks, several primary models with fixed weights or a multi-model approach.[712] 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.[713] Service providers broadly preferred a multi-model approach.[714]

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[710] NER 6.5.2(f).

[711] 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.

[712] AER, *Explanatory statement to the draft rate of return guideline*, pp. 99–100.

[713] COSBOA, *Comments – draft guideline*, October 2013; Ethnic Communities' Council of NSW, *Submission to Better Regulation: Draft rate of return guidelines*, 10 October 2013; EUAA, S*ubmission to the draft guideline*, October

In the Guideline, we adopted a foundation model approach over a multi-model approach.[715] 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 would 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.[716] 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 a variety of reasons.[717] 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.[718]
    - 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.[719] A similar observation can

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2013, p. 2; MEU, *Comments on the draft guideline*, October 2013, p. 25; PIAC, *Submission to the draft guideline*, October 2013, p. 29

714 See for example, APIA, *Submission to the draft guideline*, October 2013; ENA, *Response to the draft guideline*, October 2013.

715 For more discussion, see AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 54–72.

716 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.

717 For a discussion, see AER, *Explanatory statement to the draft rate of return guideline*, pp. 101–102.

718 AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 71.

719 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.

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 the regulatory proposals. For instance, SFG currently places 25 per cent weight on its DGM estimate, but incorporates DGMs into the other models by giving it 50 per cent weight in its MRP estimates that are used in other models.[720]

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 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

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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.

[720]   For example, see 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. 42–44.

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.[721] 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.[722] Given this, there would be little point in attempting to run the model. 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)(1) indicates 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 SFG used its DGM in its reports for several service providers.[723]

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[721] AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 86.

[722] McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 15–17.

[723] 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.

A.2   Characterisation of the foundation model approach

Several service providers submitted responses that appeared to suggest our foundation model approach simply entailed applying the SLCAPM as a single formula without considering whether the final output was commercially realistic. For instance, this opinion appeared to be expressed in a short response by Grant Samuel.[724] 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'.[725] Similarly, two submissions from infrastructure investment groups considered our draft decisions placed too much reliance on the SLCAPM.[726]

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.[727] 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 cent at the time of our draft decision.[728] As it was, we applied an indicative return on equity of 8.1 per cent in our draft decision.[729] We do not consider this difference of 155 basis points should be treated as a mechanistic application of one formula.

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[724] Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015.

[725] 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.

[726] 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.

[727] See appendix D—Equity beta; Henry, *Estimating β: An update*, April 2014.

[728] 3.55% + 0.5 × 6.0% = 6.55%.

[729] 3.55% + 0.7 × 6.5% = 8.1%.

- 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:
  - 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 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, nor does it bound 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 control period. SFG observed that this lower estimate was driven by currently low risk free rates. We are satisfied with the risk free rate used in our foundation model. While the risk free rate varies over time, it still indicates the rate that other investments must beat because this compensates investors for the time value of money.[730] 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.[731] Further, market evidence like

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[730] McKenzie, Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, pp. 11–12.

[731] 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.

conditioning variables and debt market movements indicate that market conditions have been stabilising since the GFC.

In forming our decision, we have recognised that the SLCAPM has limitations (and other models, like DGMs, have strengths). 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 our draft decision ignored many of the SLCAPM's shortcomings.[732] 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'.[733] We hold this view for the reasons set out in this appendix (in particular, see section A.3.1).

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.[734] 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.[735] 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.[736] 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.

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[732]   Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 2.

[733]   Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 4.

[734]   AER, *Explanatory statement rate of return guideline*, 17 December 2013, p. 58.

[735]   AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 54–56.

[736]   AER, *Rate of return guideline*, 17 December 2013, p. 13.

We have assessed the models against our assessment criteria in the explanatory statement to the Guideline.[737] We have not used these criteria determinatively; contrary to some service providers' views.[738] 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.

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 of the six models below.[739]

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.[740]

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 decision and in the Guideline's explanatory statement and its appendices.[741] 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.[742]

The SLCAPM is the dominant model used to estimate firms' cost of capital by providers of capital to firms (that is, investors).[743] 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

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[737]   AER, *Explanatory statement rate of return guideline*, 17 December 2013, pp. 24–30.

[738]   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.

[739]   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.

[740]   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.

[741]   AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 10–14.

[742]   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.

[743]   See Brealey, Myers, Partington and Robinson, *Principles of corporate finance*, McGraw Hill Australia, 2007, p. 216.

- 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.[744] We 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.[745] The majority of other stakeholders supported the use of the SLCAPM as the foundation model.[746] However, a number of them submitted we should consider lowering our SLCAPM input parameters relative to those published with the Guideline.[747]

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[744] 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 model of modern finance both in theory and practice. See *Report to the AER part A: Return on equity*, October 2014 p. 9.

[745] For revised proposals, see: ActewAGL, *Revised regulatory proposal*, January 2015, p. 427; Ausgrid, *Revised revenue proposal and preliminary submission*, January 2015, p. 194; Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 219–220; Essential Energy, *Revised regulatory proposal*, January 2015, p. 238; JGN, *Response to the AER's draft decision and revised proposal, Appendix 7.1 — Return on equity response*, February 2015, p. 2; TransGrid, *Revised revenue proposal*, January 2015, p. 115. Also see ActewAGL *Regulatory Proposal 2015-19 Subsequent regulatory control period*, 2 June 2014, p. 267; Ausgrid, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 80-84; Endeavour Energy, *Regulatory Proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 119–126; Energex, *2015–20 regulatory proposal*, October 2014, pp. 156–160; Ergon Energy, *Regulatory proposal appendix C: Rate of return*, October 2014, pp. 125–130; Essential Energy, *Regulatory Proposal 1 July 2014 to 30 June 2019, 30 May 2014*, pp. 105-112; JGN, *2015-20 access arrangement information*, appendix 9.03 Return on equity proposal, 5 June 2014, p. 2; SAPN, *Regulatory proposal 2015–20*, October 2014, pp. 316, 319; TasNetworks, Regulatory Proposal, 2014, p. 107; TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, p. 186.

[746] CCP, *Submission on NSW DNSPs regulatory proposals 2014-19*, 15 August 2014, pp. 14–15; MEU, *Submission on TasNetworks' revenue proposal*, 8 Aug 2014, p. 36; EMRF, *Submission on DNSPs regulatory proposal*, 8 August 2014, p. 32.

[747] CCP, *Submission on NSW DNSPs regulatory proposals 2014–19*, 15 August 2014, pp. 15–17; MEU, *Submission on TasNetworks' revenue proposal*, 8 Aug 2014, pp. 32–34; Bell Bay Aluminium, *Submission on TasNetworks revenue proposal*, 8 Aug 2014, p. 3; Tasmanian Small Business Council, *Submission on TasNetworks revenue proposal*, 8 August 2014, p. 42; Norske Skog Paper Mills, *Submission on TransGrid's revenue proposal*, p. 8; Origin Energy, *Submission on DNSPs regulatory proposal (attachment 1)*, 8 August 2014, p. 1; EUAA, *Submission*

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. We 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.[748]

Submissions supporting the SLCAPM as the foundation model

The majority of stakeholders (other than service providers) supported using the SLCAPM as the foundation model.[749] However, a number of them submitted we should consider lowering our SLCAPM input parameters relative to those published with the Guideline.[750] 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.[751] Table 3-34 summarises a number of these submissions.

Table 3-34   Submissions supporting the SLCAPM

Stakeholder	Submission
AGL	AGL submitted with respect to the NSW distributors, we should enforce our Guideline as good regulatory principle because it seems to provide a realistic benchmark rate of return for a low risk, regulated monopoly asset.[752]
Bell Bay Aluminium	Submitted that while TasNetworks' proposed WACC is less than previously allowed and that TasNetworks has followed the Guideline, we should review the parameters in its revenue proposal. It particularly considered both the MRP and beta could be reduced (from 6.5 per cent and 0.7). It noted the

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748 *to TasNetworks' revenue proposal*, 8 August 2014, p. 8; EUAA, *Submission on TransGrid's revenue proposal*, 8 August 2014, pp. 8–9.

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

749 CCP, *Submission on NSW DNSPs regulatory proposals 2014-19*, 15 August 2014, pp. 14–15; MEU, *Submission on TasNetworks' revenue proposal*, 8 Aug 2014, p. 36; EMRF, *Submission on DNSPs regulatory proposal*, 8 August 2014, p. 32.

750 CCP, *Submission on NSW DNSPs regulatory proposals 2014–19*, 15 August 2014, pp. 15–17; MEU, *Submission on TasNetworks' revenue proposal*, 8 Aug 2014, pp. 32–34; Bell Bay Aluminium, *Submission on TasNetworks revenue proposal*, 8 Aug 2014, p. 3; Tasmanian Small Business Council, *Submission on TasNetworks revenue proposal*, 8 August 2014, p. 42; Norske Skog Paper Mills, *Submission on TransGrid's revenue proposal*, p. 8; Origin Energy, *Submission on DNSPs regulatory proposal (attachment 1)*, 8 August 2014, p. 1; EUAA, *Submission to TasNetworks' revenue proposal*, 8 August 2014, p. 8; EUAA, *Submission on TransGrid's revenue proposal*, 8 August 2014, pp. 8–9.

751 For example, CCP, *Submission on NSW DNSPs regulatory proposals 2014–19*, 15 August 2014, pp. 15–17; MEU, *Submission on TasNetworks' revenue proposal*, 8 August 2014, pp. 32–34; Bell Bay Aluminium, *Submission on TasNetworks revenue proposal*, 8 Aug 2014, p. 3; Norske Skog Paper Mills, *Submission on TransGrid's revenue proposal*, p. 8; Origin Energy, *Submission on DNSPs regulatory proposal (attachment 1)*, 8 August 2014, p. 1; EUAA, *Submission to TasNetworks' revenue proposal*, 8 August 2014, p. 8; EUAA, *Submission on TransGrid's revenue proposal*, 8 August 2014, pp. 8–9.

752 AGL, *Submission on DNSPs regulatory proposals*, 8 August 2014, p. 19.

Stakeholder	Submission
	Guideline indicated 6.0 per cent is more appropriate for the MRP and the equity beta has a range of 0.4 to 0.7.[753]
Business South Australia	'Business SA supports the AER adopting a foundation model, Sharpe Lintner CAPM, to determine SAPN's required return on equity and does not support SFG's approach which involves allocating arbitrary weights to each of the four models with an apparent bias towards the models which produce higher estimates'.[754]
Consumer Challenge Panel (CCP)	In developing its Guideline, the AER had regard to the NER, took into account feedback from extensive consultation, decided against using this model, and provided its reasons for this decision. The CCP could see no clear evidence from the distributors to support straying from the SLCAPM. They suggested we do not admit the FFM into our return on equity considerations.[755] The CCP also submitted, 'lower values for both market risk premium and equity beta than those chosen by the AER – 6.5% and 0.7 respectively - are plausible within the evidence that has been used by the AER, and that use of lower parameters would be in the better long term interests of consumers.'[756]
Energy Consumers Coalition of SA (ECCSA)	ECCSA considered that, when assessed in detail, SFG's report advocating the multi-model approach provides little information as to the underlying strengths and weaknesses of the different models other than SFG's views at a macro level. ECCSA observed: 'what is intriguing is that SFG provides the least weight to the model most commonly used in the financial advice sector and by most regulators worldwide. This weighting approach also ignores the fact that the S-L CAPM has been used in the energy regulation process in Australia for over 15 years and has allowed network owners to buy and sell networks at premiums well in excess of the regulatory asset base. This provides market evidence that the S-L CAPM is well proven to provide outcomes that are realistic'.[757]
Energy Markets Reform Forum (EMRF)	EMRF submitted that distributors have regurgitated arguments made during the Guideline development process and the conclusions drawn during this process have been effectively overlooked. It submitted that the distributors have provided no new information to justify the use of other models that might otherwise lead varying our assessment in the Guideline. EMRF did accept that new information had been submitted by TransGrid in the form of Grant Samuel's assessment of the valuation of Envestra.[758] With regards Grant's Samuel's report, EMRF does not consider it provides new information. Even if

[753] Bell Bay Aluminium, *Submission on TasNetworks revenue proposal*, 8 Aug 2014, p. 3.

[754] Business SA, *SAPN regulatory proposal 2015-20*, January 2015, p. 30.

[755] CCP, *Submission on NSW DNSPs regulatory proposals 2014–19*, 15 August 2014, pp. 14–15.

[756] CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, February 2015, p. 7.

[757] ECCSA, *AER SA electricity distribution revenue reset SAPN application: A response*, December 2014, p. 78.

[758] EMRF, *Submission on DNSPs regulatory proposal*, 8 August 2014, pp. 34–35; EMRF, *Submission on TransGrid's regulatory proposal*, 8 August 2014, pp. 30–31.

Stakeholder	Submission
	it did, EMRF submitted that we should consider this just another expert report. The EMRF considered the Guideline to be similar to what Australian regulators have used over the last 15 years, which has been lucrative for service providers — noting asset sales have been greater than the RAB.[759]
The Energy Users Association of Australia (EUAA)	EUAA submitted that while it was supportive of the Better Regulation program and the associated Guidelines, the return on investment is very generous for the low level of risk faced by network regulated businesses. The EUAA encouraged us to revisit some input parameters, particularly the MRP and the equity beta to provide a balanced point allocation within the parameter ranges mooted by us to date.[760]
Major Energy users (MEU)	MEU supported using an equity beta consistent with the median value (0.3285) in Henry's 2014 report.[761] MEU considered 'the Guideline approach results in a WACC that is still excessive when considering the risks faced by monopoly networks and the protections that the regulatory framework provides such as a revenue cap, pass through arrangements, contingent projects and potential to recover excess capital expenditure if it is established to be prudent and efficient'.[762] It also generally supported the AER's approach but noted the conservative bias of the AER in selecting its point estimates within the SLCAPM range. MEU submitted: 'The multi-model approach proposed by the NSPs is untested; it includes multiple assumptions, and provides very unstable and uncertain outcomes for consumers and investors alike. In the MEU's view, the NSPs approach will generally over compensate the networks and fail to satisfy the NEO…the AER has met the requirements under the rules for considering a variety of data and models as part of its RoR Guideline development process – having considered these, it is at liberty to exercise its discretion to use the models that it considers as "fit-for-purpose" including deciding not to use some models at all (such as the Fama French 3 Factor model)'.[763]
Norke Skog Paper mills	Norske Skog Paper mills submitted with respect to TransGrid, we should reduce our Guideline beta estimate from 0.7 to the median estimate in Henry's beta work published in 2014. It considered the median estimate from this work represents the most common equity beta value for firms in Australia operating under the Australian regulatory environment and therefore should be adopted.[764]

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[759] EMRF, *NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal*, January 2015, p. 27.

[760] EUAA, *Submission to TasNetworks revenue proposal*, 8 Aug 2014, p. 8. EUAA also submitted its support for the Guideline in EUAA, Su*bmission to the SAPN revenue proposal (2015 to 2020)*, 30 January 2015, p. 13.

[761] MEU, *Submission on TasNetworks' revenue proposal*, 8 Aug 2014, pp. 33–34.

[762] MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 52.

[763] MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 53.

[764] Norske Skog Paper Mills, *Submission on TransGrid's revenue proposal*, p. 8.

Stakeholder	Submission
Origin Energy	Urged us to set SLCAPM input parameters at the bottom of ranges where these would more closely approximate the networks' true funding costs TransGrid's and the NSW distributors' proposed rates of return appear excessive. This is given TransGrid is a monopoly under a revenue cap with a pass through mechanism, while the NSW distributors are providing an essential service with no volume risk and with a pass through mechanism.[765] ActewAGL also faces substantially lower risks than what would support its proposed return on equity of 10.71 per cent. ActewAGL is under a revenue cap and has an unders and overs mechanism and cost pass through provisions.[766]

Origin Energy supported our return on equity estimate in the draft decision. It found that this, 'considers relevant material, provides certain and predictable outcomes for investors, aligns with stakeholder expectations and is consistent with the rate of return objective'. In applying our foundation model, Origin Energy found 'the AER has considered abroad range of relevant information to determine input parameter point estimates to be used to inform the overall return of equity'. It submitted, 'Origin does not agree that failure to adopt TransGrid's approach would prevent it from recovering its efficient costs. Origin considers that the AER's approach produces an estimate of the cost of equity that is consistent with historic regulatory decisions and reflects the efficient financing costs of a business exposed to the level of risk that applies to an Australian regulated business'.[767] |
| PIAC | PIAC submitted that the distributors ' approach (which is significantly different to the Guideline in the models used) varies from the relatively straightforward calculation of the forward looking SLCAPM and introduces considerable complexity and uncertainty.[768] |
| Queensland Council of Social Service (QCOSS) and its consultant, ENGINEROOM | Recommended using the SLCAPM modified for the observed upward bias in returns available to low beta stocks. QCOSS and ENGINEROOM submitted that empirical evidence from market studies supported the view that the market rewards low beta stocks over high beta stocks, which would justify setting a rate of return below the mid-point estimate. They agreed the SLCAPM is transparent, well supported by theory, and well-understood. QCOSS was concerned that the foundation model approach increases the complexity and uncertainty because it uses multiple models (the SLCAPM, Black CAPM, DGM, Wright approach). ENGINEROOM's advice to QCOSS suggested that the approach of using a range of models together was flawed because the models have conflicting conceptual bases and assumptions and |

[765] Origin Energy, *Submission on TransGrid's revenue proposal*, 8 August 2014, p. 1; Origin Energy, *Submission on DNSPs regulatory proposal (attachment 1)*, 8 August 2014, p. 1.

[766] Origin Energy, *Submission in response to ActewAGL 2014–19 Regulatory Proposal*, 20 Aug 2014, p. 4.

[767] Origin Energy, *Submission to AER TransGrid draft determination*, 6 February 2015, pp. 5–6.

[768] PIAC, *Submission on DNSPs regulatory proposal*, 8 August 2014, p. 74.

Stakeholder	Submission
	are not compatible. Further, this increases scope for distributors to vary the weight that they put on models between regulatory periods.[769]
Tasmanian Minerals and Energy Council (TMEC)	TasNetworks and a market-based change to the risk free rate have driven the lower costs. The AER has not exercised its discretion to deliver an outcome which protects the interests of consumers and has selected estimates of the equity beta and MRP to benefit the service providers.[770]

Source: AER analysis of submissions.

We consider the submissions in Table 3-34 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. 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.[771] These service providers resubmitted these positions in their revised regulatory proposals and in their submissions on other service providers' revised regulatory proposals.[772] These service

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[769]   QCOSS, *Understanding the long term interests of electricity customers: Submission to the AER's Queensland electricity distribution determination 2015-2020*, 30 January 2015, pp. 76, 103–106.

[770]   TMEC, *Submission to the AER draft determination*, 6 February 2015, p. 1.

[771]   ActewAGL *Regulatory Proposal 2015-19 Subsequent regulatory control period*, 2 June 2014, p. 267; Ausgrid, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 80-85; Endeavour Energy, *Regulatory Proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 119–129; Energex, *2015–20 regulatory proposal*, October 2014, pp. 156–160; Ergon Energy, *Regulatory proposal appendix C: Rate of return*, October 2014, pp. 125–130; Essential Energy, *Regulatory Proposal 1 July 2014 to 30 June 2019, 30 May 2014*, pp. 105-115; JGN, *2015-20 access arrangement information*, appendix 9.03 Return on equity proposal, 5 June 2014, p. 2; SAPN, *Regulatory proposal 2015–20*, October 2014, pp. 316, 319; TasNetworks, *Regulatory Proposal*, 2014, p. 107; TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, p. 185–187.

[772]   Revised proposals include Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, pp. 188–198;ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, pp. 433–449; Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 212–224; Essential Energy, *Revised regulatory proposal*, January 2015, pp. 231–242; TransGrid, *Revised revenue proposal*, January 2015, pp. 113–115. Additionally, 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 2015. For other submissions, see ActewAGL, *Submission on the AER's draft decision: ActewAGL distribution determination*, 13 February 2015 (Public version); ENA, *AER draft decisions for NSW and ACT electricity distributors*, 13 February 2015; Ergon 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.

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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.[773]

- 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.[774] For example, Ausgrid, Endeavour Energy and Essential Energy (the NSW distributors) submitted we should consider return on equity estimates from the FFM and Black CAPM when setting the return on equity.[775] They also submitted that DGM estimates of the required return on equity are likely to improve estimates of the required return on equity.[776]

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 positons in their initial proposals.[777] They also resubmitted these positions in their revised proposals.[778] The key information that service providers used to base these propositions on included:

- Studies of ex post performance of the SLCAPM.[779]

- Empirical and theoretical information related to the estimation of the SLCAPM input parameters (particularly in relation to equity beta).[780]

- Other direct estimates of the return on equity from alternative sources to the SLCAPM.[781]

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[773] ActewAGL, Energex, Ergon Energy, JGN, SAPN, TransGrid.

[774] ActewAGL, Ausgrid, Endeavour Energy, Energex, Ergon Energy, Essential Energy, JGN, SAPN.

[775] Ausgrid, *Revised revenue proposal and preliminary submission*, January 2015, p. 194; Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 219–220; Essential Energy, *Revised regulatory proposal*, January 2015, p. 238.

[776] Ausgrid, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 83–85; Endeavour Energy, *Regulatory Proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 125–129; Essential Energy, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 111–115.

[777] ActewAGL, *Regulatory Proposal 2015-19 Subsequent regulatory control period*, 2 June 2014, p. 258; Ausgrid, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, p. 84; Endeavour Energy; *Regulatory Proposal 1 July 2015 to 30 June 2019*, 30 May 2014, p. 126; Energex, *2015–20 regulatory proposal*, October 2014, pp. 157–158; Ergon Energy, *Regulatory proposal appendix C: Rate of return*, October 2014, p. 128; Essential Energy, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 111–112; JGN, *2015-20 access arrangement information, appendix 9.03 Return on equity proposal*, 5 June 2014, p. 40; SAPN, *Regulatory proposal 2015–20*, October 2014, p. 319; TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, p. 187.

[778] Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, pp. 188–198;ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, pp. 433–449; Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 212–224; Essential Energy, *Revised regulatory proposal*, January 2015, pp. 231–242; TransGrid, *Revised revenue proposal*, January 2015, pp. 113–115.

[779] For instance, several service providers recently submitted the consultant report, NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

[780] For instance, several service providers recently submitted the consultant report, SFG, *Beta and the Black CAPM*, February 2015.

We have considered the key submissions on these points. 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 Essential Energy for its efficient equity financing costs.

In addition to these submissions, Spark Infrastructure proposed removing the link between bond rates and the return on equity because long term infrastructure investors consider absolute returns, which they expect to be relatively constant.[782] 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.[783] 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). [784] We consider 10 year CGS yields are the most suitable proxy for the risk free rate.[785] We also recognise there is broad consensus with this positon.[786]

Bias and the SLCAPM as the foundation model

In their initial regulatory proposals, the majority of service providers submitted that the SLCAPM is downward biased for stocks with a beta of less than one.[787] To support this position, service providers submitted reports from CEG, SFG, and NERA.[788] A key

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[781] 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 CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015; SFG, *The required return on equity for the benchmark efficient entity*, February 2015; SFG, *The required return on equity: Initial review of the AER draft decisions*, January 2015

[782] Spark Infrastructure, *Submission on the AER's draft decision for NSW electricity distributors*, February 2015, p. 1.

[783] 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.

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

[785] Gregory, *The risk free rate and the present value principle*, November 2012, p.5; Lally, *The present value principle*, March 2013, p. 10-12.

[786] 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.

[787] Ausgrid, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, p. 80; ActewAGL Distribution, *Regulatory Proposal 2015-19 Subsequent regulatory control period*, 2 June 2014, p. 262; Endeavour Energy; *Regulatory Proposal 1 July 2015 to 30 June 2019*, 30 May 2014, p. 120; Essential Energy, *Regulatory Proposal 1 July 2014 to 30 June 2019*, 30 May 2014, p. 106; JGN, *2015-20 access arrangement information, appendix 9.03 Return on equity proposal*, 5 June 2014, p. 12; TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, p. 191.

[788] Ausgrid, Endeavour Energy and Essential Energy submitted CEG, *WACC estimates: A report for NSW DNSPs*, May 2014. TransGrid submitted NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014. ActewAGL, Ergon Energy, JGN, TasNetworks and SAPN submitted SFG Consulting, *The required*

argument in these reports is that empirical tests of the SLCAPM reject the SLCAPM. 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).[789] Several service providers resubmitted this position in their revised regulatory proposals.[790] Further, in submissions to revised regulatory proposals and our draft decisions, several service providers submitted a NERA report on the empirical performance of the SLCAPM.[791] 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.[792] 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.

After receiving service providers' initial proposals, we engaged Associate Professor Graham Partington and Professor Michael McKenzie (McKenzie and Partington) to review these proposals and the expert reports submitted with them. We also engaged Associate Professor John Handley (Handley) do a high level review of our foundation model approach. This took into account Partington and McKenzie's report, the service providers' initial proposals, and three key expert reports that service providers submitted.[793] This analysis still applies to much of the material submitted to us after commissioning these reports. This is because:

- Ergon Energy and SAPN submitted the same SFG report that our consultants analysed.[794]

- Energex based its return on equity estimate on the methodology contained within this SFG report.[795]

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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.

[789] CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, pp. 11–16; 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; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, pp. 82–84.

[790] Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 189; ActewAGL, *Revised regulatory proposal*, January 2015, pp. 441–444; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 232. TransGrid maintained its position in its initial revenue proposal. See TransGrid, *Revised revenue proposal*, January 2015, p. 8.

[791] NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

[792] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 11–13.

[793] The three expert reports Handley was asked to examine were CEG, *WACC estimates: A report for NSW DNSPs*, May 2014; SFG Consulting, *The required return on equity for regulated gas and electricity network businesses: Report for Jemena Gas Networks, ActewAGL Distribution, Ergon, TasNetworks (previously Transend) and SA Power Networks*, 6 June 2014; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014.

[794] That is, 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.

[795] SFG, *Estimating the required return on equity: Report for ENERGEX*, 28 August 2014.

- Service providers maintained their initial positions in their revised regulatory proposals.[796]

- Partington considered the material presented in the revised proposals and found:[797]

  > In brief, our position is that none of the information and arguments presented in these reports would give us cause to change our previously stated position. That is to say, the findings of McKenzie and Partington (2014) would remain unaltered in light of these additional submissions.

In relation to the SLCAPM, McKenzie and Partington found the following:[798]

- 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.[799]

- 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.

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.[800]

Several service providers submitted an empirical test of the SLCAPM and the Black CAPM by NERA.[801] We observe that this material responds to the position we have

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[796] Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 189; ActewAGL, *Revised regulatory proposal*, January 2015, pp. 441–444; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 232. TransGrid maintained its position in its initial revenue proposal. See TransGrid, *Revised revenue proposal*, January 2015, p. 8.

[797] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

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

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

[800] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 22–23.

[801] NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

held since the Guideline. However, we received this material in February 2015 — with JGN's revised access arrangement and with submissions on several revised regulatory proposals. Given the level of technical detail and when we received this report, we have not been able to consider and respond to specific econometric issues in depth. Notwithstanding this, we 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.[802] NERA also provided an estimate of the zero-beta premium of 10.75 per cent.[803] It has been acknowledged that it is implausible for the zero beta premium to be equal to or greater than the MRP.[804] Further, having reviewed this report in relation to its results on the Black CAPM, Partington advised:[805]

> 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 and SFG restrict the choice by fitting a regression model to the data in order to obtain a single estimate.

Further, having considered this report (among other relevant material), Partington maintained the view that the foundation model does not provide a downwardly biased estimate in the current context. He also advised:[806]

> 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.

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 it efficient cost of equity. The benchmark firm is not average risk and its risk is not expected to change given its regulated monopoly nature providing services with relatively inelastic demand.

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[802]   NERA, *Empirical performance of the Sharpe–Lintner and Black CAPMs*, February 2015, pp. 25, 31.

[803]   NERA, *Empirical performance of the Sharpe–Lintner and Black CAPMs*, February 2015, p. 29.

[804]   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.

[805]   Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 25.

[806]   Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 33.

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:[807]

> 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)

McKenzie and Partington confirmed their view prior to the publication of the Guideline that the equity beta of the benchmark firm is likely to be very low. They considered issues that the service providers' consultants raised with their 2012 report as unfounded.[808]

McKenzie and Partington expressed that the foundation model approach, using the SLCAPM as the foundation model, would be expected to:[809]

- 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.

McKenzie and Partington 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.[810] However, they also stated that they 'have significant reservations about the implementations of the models as proposed by the network service providers'.[811] After considering service providers' revised proposals, Partington 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'.[812]

Handley indicated that our use of the SLCAPM as foundation model was entirely appropriate and reasonable.[813] He noted:[814]

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[807] Partington, *Report to the AER: Return on equity (updated), April 2015*, pp. 33–34.

[808] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 10–13. For the 2012 report, see McKenzie and Partington, *Report to the AER: Estimation of the equity beta (conceptual and regulatory issues) for a gas regulatory process in 2012*, 3 April 2012.

[809] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 13–14.

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

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

[812] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 14.

[813] Handley, *Advice on return on equity,* 16 October 2014, p. 4.

[814] Handley, *Advice on return on equity,* 16 October 2014, p. 4.

> '[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.[815]

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 also 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.[816] 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.[817] 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 against the assessment criteria in section 3.4.1 of attachment three.

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[815]   42 independent valuation reports dated between 27 April 2013 and 28 February 2015 contained a discounted cash flow analysis, but only five of these reports used another model (the dividend growth model) to estimate the return on equity. Four of these five 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).

[816]   Henry, *Estimating β: An update*, April 2014.

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

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.[818] 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.[819] We note our beta of 0.7 is generally below the equity beta service providers and their consultants have proposed (typically between 0.82 and 0.94).[820] However, it is above the equity beta a number of stakeholders considered appropriate, given the risk of the service providers.[821]

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[818] 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

[819] Henry, *Estimating beta: An update*, April 2014.

[820] Directlink and TasNetworks proposed an equity beta of 0.7, consistent with the Guideline. Otherwise, equity beta estimates from service providers ranged from 0.82 to 0.94. The former is based on SFG's econometric estimate from SFG, *Equity beta: Report for JGN, ActewAGL and Networks NSW*, 12 May 2014. 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 May 2015.

[821] For some examples, see CCP, *Submission to TransGrid's revenue proposal*, August 2014, p. 7; CCP, *Submission to the NSW DNSPs' regulatory proposals*, August 2014, pp. 15–17;CCP, *Submission to TasNetworks' revenue proposal*, September 2014, p. 8; Bell Bay Aluminium, *Submission to TasNetworks' revenue proposal*, August 2014, p. 3; EMRF, *Submission to the NSW DNSPs' regulatory proposals*, July 2014, pp. 35–36; EMRF, *Submission to JGN's access arrangement proposal*, August 2014, pp. 71, 75–76; EMRF, *Submission to TransGrid's revenue proposal*, July 2014, p. 32; EUAA, *Submission to TransGrid's revenue proposal*, August 2014; EUAA, *Submission to TasNetworks' revenue proposal*, August 2014, p. 8; MEU, *Submission to TasNetworks' revenue proposal*, August 2014, pp. 33–34; Norske Skog, *Submission to TransGrid's revenue proposal*, p. 8; Nyrstar, *Submission to TasNetworks' revenue proposal*, August 2014, p. 2; Origin, *Submission to TransGrid's revenue proposal*, August 2014, pp. 1–2; Origin, *Submission to the NSW DNSPs' regulatory proposals*, August 2014, p. 7; PIAC, *Submission to the NSW DNSPs' regulatory proposals*, August 2014, p. 80; TSBC, *Submission to TasNetworks' revenue proposal*, August 2014, p. 42; UnitingCare, *Submission to the NSW DNSPs' regulatory proposals*, September 2014, p. 20; UnitingCare, *Submission to ActewAGL's regulatory proposal*, September 2014, p. 20. Also see appendix D–Equity beta.

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. The key reasons for using the SLCAPM as our foundation model remain unchanged from the reasons in the Guideline. These include:[822]

- 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.[823] It incorporates the following three risk factors:[824]

- 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 also maintain our reasons for this position as set out in the Guideline's explanatory statement and its appendices.[825] We do not consider that using

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[822] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 13–14.

[823] Fama, E.F., French, K.R., 'The cross section of expected stock returns', *The Journal of Finance*, 47, 1992, pp. 427–66.

[824] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 15–16.

[825] 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.

the FFM will result in a return on equity estimate that contributes to the achievement of the allowed rate of return objective.

We maintain this position having reviewed service providers' initial and revised proposals, supporting documents and submissions on our draft decisions.[826] McKenzie and Partington also supported our decision to not use the model.[827] After reviewing the revised proposals and submissions, Partington did not alter this view.[828] We consider Handley's comments on the model also support our decision to not use the FFM.[829]

The key reasons for giving the FFM no role at the time of publishing the Guideline were:[830]

- 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:

    o 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.

    o 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).

In its submission relating to the NSW distributors, the Consumer Challenge Panel (CCP) indicated they did not see any clear new evidence on the FFM relative to the material we considered when developing the Guideline. Consequently, they submitted we should not use the FFM.[831] Similarly, Major Energy Users (MEU) considered we

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[826] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, pp. 1–4; NERA, *Return on Capital of a Electricity Network*, May 2014, pp. 96–103; 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.

[827] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 15–19.

[828] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

[829] 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*, April 2015, pp. 3–4.

[830] 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.

[831] CCP, *Submission on the NSW DNSPs regulatory proposal 2014-19*, pp. 14-15.

had met the rule requirements for considering a variety of data and models and we were at liberty to exercise our discretion to not use some models, such as the FFM.[832]

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.[833] Service providers resubmitted these positions in their revised proposals.[834] The 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).[835]

- 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.[836]

- To 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.[837]

Service providers responded to our key reasons for giving the FFM no role at the time of the publication of the Guideline in their initial and revised proposals. These responses have been principally through reports by SFG and NERA and a short response by Professor Bruce Grundy.[838] The main responses to our Guideline's reasoning include:

- 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.[839]

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[832] MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 53.

[833] 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, pp. 79–85; Endeavour Energy, *Regulatory proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 119–127; Energex, *2015–20 regulatory proposal*, October 2014, pp. 164–165; Ergon Energy, *Regulatory proposal, appendix C: Rate of return*, October r2014, pp. 128–129 Essential Energy, *Regulatory proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 104–113; 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, pp. 313–319; TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, pp. 12–13, 188–191.

[834] Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 176; ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, p. 468; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 216; JGN, *2015–20 access arrangement: Response to the AER's draft decision and revised proposal, Appendix 7.1 — Return on equity response*, February 2015, p. 38; TransGrid, *Revised revenue proposal*, January 2015, pp. 113.

[835] ActewAGL, Energex, Ergon Energy, JGN, SAPN, TransGrid.

[836] ActewAGL, Ausgrid, Endeavour Energy, Essential Energy, JGN, TransGrid.

[837] ActewAGL, Ausgrid, Endeavour Energy, Ergon Energy, Essential Energy, JGN, SAPN, TransGrid.

[838] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, pp. 1–4; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, pp. 96–103; 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.

[839] SFG, *The Fama–French model*, May 2014, pp. 23–26.

Regarding sensitivity, SFG and Grundy noted that the beta risk factor in the SLCAPM is also sensitive.[840]

- Our position that the model is relatively complex and opaque is not a valid reason to not use the model.[841] Even so, SFG and Grundy did not consider the FFM complex to implement.[842]

- 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.[843]

- 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.[844] Further, theoretical justification for the FFM was developed after the model was developed, and this is standard for scientific progression.[845]

- 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.[846] Rather, SFG considered the FFM and SLCAPM shared the same purpose — to explain the cross-section of stock returns.[847] Grundy considered it unsafe to assume models that do not explain historical data will reliably explain future data.[848]

We are not satisfied with this reasoning. 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.[849] 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

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[840] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 11–14l Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 3.

[841] SFG, *The Fama–French model*, May 2014, pp. 23–26.

[842] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 17–18; Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 2.

[843] SFG, *The Fama–French model*, May 2014, pp. 20–21; Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 2.

[844] SFG, *The Fama–French model*, May 2014, pp. 27–32. Further, Grundy considered the data do not support concluding that the size effect has disappeared: Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 4.

[845] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 15–16; Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, pp. 3–4.

[846] SFG, *The Fama–French model*, May 2014, pp. 26–27.

[847] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 14–15.

[848] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 4.

[849] 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.

methodologies generated substantially different results. A principal conclusion of 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'.[850] 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'.[851] 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.[852] 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.[853] Various consumer groups have characterised this as a conservative response, to the benefit of service providers.[854]

Regarding sensitivity, SFG considered all models requiring parameter estimates to be sensitive — including the SLCAPM.[855] While we recognise that all models can be

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[850] 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.

[851] Brailsford, T., Guant, C., and O'Brien, M., 'The investment value of the value premium', *Pacific-Basin Finance Journal*, 20, 2012, p. 417.

[852] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 49.

[853] 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.

[854] 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, Su*bmission 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.

[855] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 11–14.

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 arises from its one factor, 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.

- McKenzie and Partington, having reviewed the service providers' proposals, 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.[856] 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.[857]

- Partington did not agree with SFG's submission that all models are sensitive to different estimation periods and methodologies. He advised:[858]

  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 arises because the studies that produce them are of different quality. We should only consider estimates from the best studies.[859] Further, NERA submitted:[860]

  [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.[861] While SFG argued that one methodology to estimating the FFM is superior to other methodologies, we disagree.[862]

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[856] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18.

[857] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18.

[858] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 25.

[859] 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.

[860] NERA, *The Fama–French Three–Factor Model A report for the ENA*, October 2013, p. 31.

[861] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18.

[862] SFG, *The Fama-French model*, 13 May 2014, p. 24.

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.[863] 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.[864] 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.[865]

Complexity

On our position that the FFM is complex to implement (relative to the SLCAPM), service providers submitted the following consultant views:

- SFG submitted, 'the regulator would need to have regard to a relevant financial model even if it was complex'.[866]

- 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.[867]

- SFG and Grundy did not consider the FFM complex to implement because it simply required estimating three factors instead of the one factor in the SLCAPM.[868]

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 and Grundy's most recent position that FFM is not complex to implement because it simply requires estimating three factors instead of the

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[863] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18.

[864] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 16–17.

[865] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 16.

[866] 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 by a number of variables, a model is not less accurate if it includes all the variables (pp. 23–24).

[867] 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.

[868] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 2; SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 17–18.

one factor in the SLCAPM.[869] 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.[870] 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:[871]

- The background paper for the Nobel Prize awarded to Eugene Fama for his finance work stated that the FFM factors are now standard.

- The CFA certification includes extensive coverage of the FFM.

- Leading journals on financial economics continue to publish articles on the FFM.

- Survey evidence may be misleading. In addition, Grundy referenced a survey of CFOs where about 30 per cent of participants used a 'multi-beta CAPM'.[872]

- There are two examples of the FFM being used in US courts.

- Morningstar provides betas for the FFM. Grundy also submitted this.[873]

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

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[869] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 17–18.

[870] 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.

[871] SFG, *The Fama-French model*, 13 May 2014, pp. 17–32.

[872] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 2 references Graham, John R. and Cambell R. Harvey, 2001, 'The theory and practice of corporate finance: evidence from the field', *Journal of Financial Economics 60*, pp. 187–243. 73.5% of respondents used the CAPM, and a proportion of CFOs used more than one method.

[873] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 2.

returns and considered the parameter instability demonstrated in the literature to be symptomatic of its weakness.[874]

We maintain the view in the Guideline 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 model is not used in regulatory decisions.[875] Partington advised, 'regulators have flirted with the use of the Fama and French model, but that has not encouraged its ultimate adoption in regulation'.[876] 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:[877]

> 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.[878]

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[874] McKenzie and Partington o, *Report to the AER part A: Return on equity*, October 2014, p. 18.

[875] 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.

[876] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 15.

[877] 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.

[878] 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.

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.[879] 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.[880] 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 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

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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.

[879] 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.

[880] Cochrane, 'Presidential address: discount rates', *Journal of Finance*, Vol. 66, No. 4, August 2011, pp. 1047–1108.

not for developing an asset model that is generally accepted as correct.[881] The paper stated:[882]

> [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.[883] With this in mind, 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.[884]

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.[885] 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.[886] 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'.[887]

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

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881 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.

882 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.

883 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).

884 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.

885 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 18–19.

886 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 19.

887 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 18.

genuinely priced in average returns in the cross section.[888] However, none of the possible reasons is commonly accepted.[889]

- 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'.[890] 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.[891]

- NERA submitted that one can interpret the book-to-market ratio as a proxy for either (i) a financial distress risk factor (ii) a GDP growth risk factor (iii) the exposure to market risks.[892]

- 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.[893] On the other hand, NERA maintained that both factors may be

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[888] 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.

[889] 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.

[890] SFG, *The Fama–French model*, 13 May 2014, p. 26.

[891] SFG, *The Fama–French model*, 13 May 2014, p. 2.

[892] 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.

[893] SFG, *The Fama–French model*, 13 May 2014, pp. 11–15.

persistent, although noting the size premium is not statistically significant.[894] Grundy also considered the size effect appeared to have disappeared and returned.[895]

- 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.[896] SFG and Grundy also submitted this position.[897]

In response to the 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:[898]

- 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.[899] SFG conceded this.[900] While Grundy considered the size effect reappeared, this appeared to be in reference to US equity market.[901] Further, this does not appear consistent with other empirical evidence that service providers have put before us.[902] Moreover, estimates of the value factor also change in magnitude over time.[903] 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 also 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.[904]

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[894] NERA, *The market, size and value premiums: A report for the ENA*, June 2013, p. 91.

[895] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 4.

[896] SFG, *The Fama–French model*, 13 May 2014, pp. 28–29.

[897] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, pp. 3–4; SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 2, 15–16.

[898] 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.

[899] NERA, *The market, size and value premiums A report for the ENA*, June 2013, p. 91.

[900] SFG, *The Fama-French model*, 13 May 2014, p. 15.

[901] Grundy, *Letter to CFO, Networks NSW*, 9 January 2014, p. 4. Grundy references Fama, E.F., French, K.R. 2004, 'The capital asset pricing model: Theory and evidence', *Journal of Economic Perspectives* 18(3), pp. 25-46.

[902] SFG, *Using the Fama–French model to estimate the required return on equity*, February 2015, p. 28.

[903] SFG, *The Fama–French model*, 13 May 2014, p. 36.

[904] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 17.

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.[905] 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.

Finally, while we have not used the model for this 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.

A.3.3   The Black CAPM

Fischer Black developed a version of the CAPM with restricted borrowing (the Black CAPM).[906] 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

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[905]   AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 18–23.

[906]   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.

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.[907] Unlimited short selling does not hold in practice either.[908]

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.[909] 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.[910] We maintain these reasons, having fully reviewed the criticisms in the service providers' initial proposals and supporting documents.[911] We have also reviewed the service providers' revised proposals, supporting documents and submissions.[912]

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

908 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.

909 Black, F., 'Capital market equilibrium with restricted borrowing', *The Journal of Business*, 45(3), 1972, pp. 446–450.

910 AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 16–18, 68–77.

911 For service providers' proposals on the Black CAPM see. 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, pp. 79–84; Endeavour Energy, *Regulatory proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 119–126; 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; Essential Energy, *Regulatory proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 104–112; 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. 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.

912 Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 176; ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, p. 468; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 216; TransGrid, *Revised revenue*

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 to us illustrated the unreliability of the Black CAPM. This presented estimates of a Black CAPM that implied a negative MRP.[913]

- There is little evidence that other regulators, academics or market practitioners use the Black CAPM to estimate the return on equity.[914] In particular, regulators rarely have recourse to the Black CAPM.[915]

- Using a conservative estimate of beta in the SLCAPM can accommodate potential issues that arise from not estimating the Black CAPM.[916]

We discussed many of the issues facing the Black CAPM during the Guideline development process.[917] In the initial proposals, most service providers submitted that empirical estimates from the Black CAPM should be used for estimating the return on equity.[918] Service providers appeared to maintain this position in their revised

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proposal, January 2015, p . 113. Also see 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.

[913] 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.

[914] 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.

[915] 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.

[916] 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 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.

[917] See AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 213, pp. 16–18, 68–77.

[918] 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, pp. 79–84; Endeavour Energy, *Regulatory proposal 1 July 2015 to 30 June 2019*, 30 May 2014, pp. 119–126; 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; Essential Energy, *Regulatory proposal 1 July 2014 to 30 June 2019*, 30 May 2014, pp. 104–112; JGN, *2015-20 access arrangement information, appendix 9.03 Return on equity proposal*, 5 June

proposals.[919] Service providers 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).[920]

- 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.[921]

- 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.[922]

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.[923] 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.[924]

- 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.[925]

- SFG implied 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.[926]

- 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.[927]

[ ] 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.

[919] Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 176; ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, p. 468; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 216; TransGrid, *Revised revenue proposal*, January 2015, p . 113.

[920] ActewAGL, Energex, Ergon Energy, JGN, SAPN, TransGrid.

[921] ActewAGL, Ausgrid, Endeavour Energy, Essential Energy, JGN, TransGrid.

[922] ActewAGL, Ausgrid, Endeavour Energy, Ergon Energy, Essential Energy, JGN, TransGrid.

[923] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 8, 68–73.

[924] SFG, *Beta and the Black CAPM*, February 2015, pp. 7–8.

[925] 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.

[926] 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.

[927] 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.

- NERA indicated that the SLCAPM suffered from low beta bias, but also indicated that neither the Black CAPM nor the SLCAPM performed well empirically.[928]

Having considered these submissions, we remain satisfied with our position in the Guideline and draft 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 is highlighted in NERA's report for TransGrid's revenue proposal. This report lists the following prior estimates of the zero beta return for the Australian market:[929]

- 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:[930]

> 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.

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.[931] Handley described this as, 'NERA offers what it believes to be a plausible explanation for an apparently implausible result'.[932] Similarly, SFG submitted that imprecise estimates of the zero beta premium arose from the imprecision in the relationship between beta and stock returns.[933]

SFG acknowledged that one might expect the zero beta return to lie below the expected return on the market.[934] SFG estimated a somewhat more plausible estimate

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[928] NERA, *Empirical performance of Sharpe–Lintner and Black CAPMs*, February 2015.

[929] NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 91

[930] NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 91.

[931] NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 92.

[932] Handley, *Report prepared for the AER: Further advice on the return on equity*, April 2015, p. 6.

[933] SFG, *Beta and the Black CAPM*, February 2015, p. 8.

[934] SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, p. 3.

of the zero beta premium of 3.34 per cent per annum.[935] It then attempted to reconcile its estimate with NERA's and stated:[936]

> 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.[937] Having reviewed SFG's report, Partington advised:[938]

> 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 estimates represent.

In the Guideline, we found that estimates from the Black CAPM were unreliable because:

- 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).[939] We set these responses our in our draft decision and considered these did not change our view on the empirical use of the model.[940] 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

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[935] SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, p. 3.

[936] SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, pp. 3–4.

[937] 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.

[938] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

[939] NERA, *Estimates of the Zero-Beta Premium: A report for the ENA*, June 2013.

[940] AER, *Draft decision, Essential Energy distribution determination, Attachment 3*, November 2014, pp. 182–187.

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:[941]

> 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.[942] 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.[943] 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.[944]

In contrast, SFG 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.[945] 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 theory. However, we are not aware of any circumstance where this was the motivation.[946] 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'.[947]

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

[942] 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.

[943] 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.

[944] 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.

[945] 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.

[946] 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.

[947] SFG, *Beta and the Black CAPM*, February 2015, p. 23.

Use in the foundation model

Our consultants, McKenzie and Partington, reviewed the service providers' initial proposals and supporting documents relating to the Black CAPM.[948] 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.[949] As discussed in section 3.4.1, 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.[950] As such, any attempt to compare the Black CAPM and SLCAPM must be done with great care.[951]

- 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.[952]

- 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.[953]

- The model (of itself) does not justify any uplift to the equity beta.[954]

Handley also considered the Black CAPM in his reports.[955] 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.[956]

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948 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 20–25. We engaged McKenzie and Partington before we received regulatory proposals from Energex, Ergon Energy and SAPN. However, these service providers submitted material on the Black CAPM that McKenzie and Partington considered in their report. For instance, Ergon Energy and SAPN submitted SFG, *Cost of equity in the Black capital asset pricing model*, May 2014. Energex submitted a new report that included material on the Black CAPM — SFG, *Estimating the required return on equity*, 28 August 2014, pp. 76–79, 83. However, this material was similar to that already analysed from SFG, *The regulated return on equity for regulated gas and electricity network businesses*, 27 May 2014, pp. 25–27, 92–95.

949 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

950 McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 22–23.

951 Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 17.

952 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*, p. 12.

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

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

955 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.

956 Handley, *Advice on return on equity,* 16 October 2014, p. 12.

- 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.[957]

- It is unclear that low beta bias is a priced risk not already captured by the SLCAPM.[958] Handley later reiterated that our understanding of the low beta bias is still far from clear.[959]

- 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.'[960]

We agree with McKenzie and Partington that the Black CAPM (of itself) does not justify an uplift to the equity beta in the SLCAPM.[961] 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 (unobservable) required return on equity to vary from the SLCAPM-based estimate. We consider this a relevant consideration in selecting the equity 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).[962]

See the section 3.4.1 of this attachment for our assessment of the Black CAPM against our assessment criteria.

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[957]   Handley, *Advice on return on equity,* 16 October 2014, p. 10.

[958]   Handley, *Advice on return on equity,* 16 October 2014, p. 11.

[959]   Handley*, Report prepared for the AER: Further advice on the return on equity*, April 2015, p. 6.

[960]   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.

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

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

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.

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.[963] We also indicated we would not use a DGM to estimate the required return on equity on individual network businesses.[964]

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.[965] We noted there were difficulties with constructing credible datasets for implementing industry specific DGMs.[966] We also noted there were not enough Australian businesses to perform DGMs on individual businesses.[967]

- 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.[968]

- 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.[969] 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.[970]

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[963] AER, *Rate of return guideline*, 17 December 2013, p. 13.

[964] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 14–17.

[965] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 15.

[966] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 77.

[967] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 119.

[968] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 15.

[969] For example, see CEG, *Internal consistency of the risk free rate and MRP in the CAPM*, 30 March 2012, p. 50.

[970] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 120–122.

The majority of service providers proposed using empirical estimates from the DGM to inform the overall return on equity.[971] The majority of service providers also supported SFG's approach to estimating the return on equity for the benchmark efficient entity using a DGM.[972] SFG's approach entails applying the following steps:

1. Estimate the return on equity for network businesses using the DGM for each of the analyst forecasts. 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 ERPs from step one by the relevant MRP from the DGM.[973]

3. Take a simple average of the risk premium ratios (determined in step two) to derive an average risk premium of 0.94.[974]

4. Multiply the average risk premium by the prevailing MRP and add a prevailing risk free rate.

Service providers then used their empirical estimates of the return on equity to do one or more of the following:[975]

• To estimate their proposed return on equity as part of a multi model approach, or to inform input parameters into the SLCAPM).[976]

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[971] For revised proposals, see Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 176; ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, p. 468; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 216; TransGrid, *Revised revenue proposal*, January 2015, p . 113. Also see TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, p. 12; ActewAGL, *Distribution, Regulatory Proposal 2015-19 Subsequent regulatory control period*, 2 June 2014, p. 261; Jemena Gas Networks, *2015-20 access arrangement information*, *appendix 9.03 Return on equity proposal*, 5 June 2014, p. 1.

[972] 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.

[973] 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.

[974] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 20, p. 48.

[975] For revised proposals, see Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 176; ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, p. 468; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 216; TransGrid, *Revised revenue proposal*, January 2015, p . 113. Also see ActewAGL, *Regulatory Proposal 2015-19 Subsequent regulatory control period, 2 June 2014*, pp. 262–276; 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, *2015–20 regulatory proposal*, October 2014, pp. 164–165; Ergon Energy, *Regulatory proposal appendix C: Rate of return*, October 2014, pp. pp. 128–129; 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, p. 2; SAPN, *Regulatory proposal 2015–20*, October 2014, p. 319;TransGrid, *Revenue proposal 2014/15 to 2018/19*, May 2014, pp. 188–191, pp. 12–13.

[976] ActewAGL, Energex, Ergon Energy, JGN, SAPN, TransGrid.

- 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.[977]

- 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.[978]

Several service providers criticised our position in the Guideline and our draft 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.[979] The majority of service providers used an estimate by SFG of an industry wide return to estimate the equity beta and MRP for the SLCAPM.[980]

In 2014, McKenzie and Partington reviewed the service providers' initial proposals and supporting documents. In 2015, Partington reviewed the revised proposals and associated material and maintained the positions in his 2014 report.[981] Having reviewed 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.[982] However, they raised concerns around the reliability of DGM estimates.[983] While we use the DGM to inform the estimate of the MRP, we also take these concerns into account (see appendix C—MRP and appendix B—DGM).

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.[984]

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

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[977] ActewAGL, Ausgrid, Endeavour Energy, Essential Energy, JGN, TransGrid.

[978] ActewAGL, Ausgrid, Endeavour Energy, Essential Energy, Ergon Energy, JGN, TransGrid.

[979] For revised proposals, see Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p. 176; ActewAGL, *Revised regulatory proposal 2015–19*, January 2014, p. 468; Endeavour Energy, *Revised regulatory proposal*, January 2015, p. 213; Essential Energy, *Revised regulatory proposal*, January 2015, p. 216; TransGrid, *Revised revenue proposal*, January 2015, p . 113. Also see ActewAGL Distribution, Regulatory Proposal 2015-19 Subsequent regulatory control period, 2 June 2014, p. 258, 268; Ausgrid, Regulatory Proposal 1 July 2014 to 30 June 2019, 30 May 2014, pp. 79, 85; Endeavour Energy; Regulatory Proposal 1 July 2015 to 30 June 2019, 30 May 2014, pp. 119,128-129 ; Essential Energy, Regulatory Proposal 1 July 2014 to 30 June 2019, 30 May 2014, pp. 104,114-115; NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 50, 103; SFG, *Alternative versions of the dividend discount model and the implied cost of equity Report for Jemena Gas Networks, ActewAGL, APA, Networks NSW, Transend and TransGrid*, 15 May 2014, pp. 56–59.

[980] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014; CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, pp. 7, 19–20.

[981] Partington, *Report to the AER: Return on equity (updated), April 2015*, p. 12.

[982] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 39.

[983] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 26–36.

[984] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 34–36.

material submitted since the Guideline has changed our view. We consider our consultants' reports support this view.[985] 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 draft decision, SFG responded to this by defending its approach of producing an indirect estimate of beta.[986] 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 business than for all firms in the market.[987] 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 draft decisions, SFG responded to this with, 'we cannot compare the usefulness of one estimation technique to another just by counting data points'.[988] 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.[989] These also appear inconsistent with the low risk nature of regulated natural monopolies with very low elasticity of demand for their services.[990] After we made this point in our draft decisions, SFG appears to have responded by criticising our conceptual analysis and our reliance on OLS to

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[985] Handley, *Advice on return on equity,* 16 October 2014, pp. 13–15; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 26–41.

[986] 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.

[987] For instance, 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. SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, pp. 49–50.

[988] 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.

[989] 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.

[990] See Frontier Economics, *Assessing risk for regulated energy networks*, July 2013; McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

estimate the equity beta.[991] We remain satisfied with our position in the draft 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'.[992] However, under the SLCAPM, the relevant risk of an individual stock is its contribution to the risk of a 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.[993]

In a short note for several service providers, Grant Samuel considered we did not give balanced regard to these two sources of information.[994] 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 (both in our draft and final decisions) 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 — both in our draft and final decisions. For example, see section 3.4.1 of attachment three, appendix C—MRP and appendix B—DGM. 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:[995]

  > 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

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[991] 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.

[992] SFG, *Share prices, the DDM and the cost of equity for the market and a benchmark energy network*, February 2015, p. 32.

[993] Brigham, Daves, 'Intermediate financial management', 2010, Ed. 10, South-Western Cengage Learning, pp. 48–49.

[994] Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 2. ActewAGL, JGN and TransGrid submitted this response.

[995] Grant Samuel & Associates, *AER — Draft decision*, 12 January 2015, p. 3.

reasoning, as set out in appendix B. Further, we consider it is evident, both in our draft and final decisions, 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.

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.

- 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 around our DGM's outputs and have taken these concerns into account when using MRP estimates based on DGMs.

See appendix C—MRP and appendix B—DGM 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   Other model-based estimates of the return on equity

Service providers have put forward a number of other estimates of the return on equity to support their proposals.[996] While we also discuss these in section 3.4.1, we consider CEG's and NERA's specific applications of these models below.

We have had regard to and considered the empirical estimates based on these alternative specifications of the SLCAPM. 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 the achievement of the allowed rate of return objective. The Wright approach does not have a large role in informing our return on equity

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[996]   We note that NERA does not submit that any of its estimates from the different SLCPAM specifications reflect the benchmark entity's required return on equity.

estimate. We do not consider that giving this information a large role would contribute to the achievement of the allowed rate of return objective.[997]

We consider NERA's 'prevailing' specification of the SLCAPM substantively the same as our specification, with the exception of using different input parameters.[998] Therefore, we do not discuss NERA's model here.

NERA long term average specification of the SLCAPM

In its report for TransGrid's initial revenue proposal, NERA estimated a 'long term average' specification of the SLCAPM. TransGrid's revised revenue proposal referenced NERA's report and confirmed, 'TransGrid maintains this position and does not propose to put forward further argument'.[999] This gave an estimated return on equity of 8.9 per cent.[1000] It used historically based estimates of both the risk free rate and MRP, combined with its equity beta estimate of 0.58.[1001] NERA calculated each input parameter as follows:

- It based its risk free rate on the average on 10 year Commonwealth Government Security (CGS) yield over the last 10 years to 31 March 2014 (5.11 per cent).

- It calculated its MRP of 6.5 per cent as the average excess return on the market portfolio over 1883 to 2012.[1002]

- It based its equity beta of 0.58 on an estimate by SFG using a group of nine Australian firms.[1003]

We consider NERA's long term average specification does not and would not be expected to result in a return on equity that would contribute to the achievement of the allowed rate of return objective. We do not agree with the form of the model (a historically based SLCAPM). The SLCAPM is a forward looking asset pricing model.[1004] 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

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[997] The Wright specification of the SLCAPM (Wright CAPM) assumes the real expected return on the market is constant. We use the Wright CAPM 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

[998] This specification was outlined in NERA's report submitted with TransGrid's initial revenue proposal. See NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014.

[999] TransGrid, *Revised revenue proposal*, January 2015, p. 115.

[1000] NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 45.

[1001] NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 80.

[1002] Based on NERA, *The MRP: Analysis in response to the AER's draft rate of return guidelines*, October 2013, p.iii.

[1003] NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 79. SFG produces this estimate using a group of nine comparable Australian firms. See SFG, *Regression-based estimates of risk parameters for the benchmark firm*, 24 June 2013, p. 16.

[1004] Bringham and Daves, *Intermediate financial management*, Ed. 10, Cengage Learning, 2010, p. 53.

historically based estimates that are clearly not representative of the forward looking rate will result in an unbiased estimate of the return on equity.[1005]

With respect to each input parameter NERA used, we note the following:

- The risk free rate estimate of 5.11 per cent is far above the current forward looking risk free rate estimated using 10 year CGS yields. This results in an overestimate of the required return on equity. We also consider this would result in a return on equity that has not had regard to prevailing conditions in the market for equity funds.[1006]

- We consider an MRP of 6.5 per cent a reasonable estimate of the forward looking MRP. For a discussion on the MRP, see section 3.4.1 and appendix C—MRP.

- We consider an equity beta estimate of 0.7 is more appropriate for the reasons discussed in section 3.4.1 and appendix D—Equity beta.

For our assessment of historical CAPM specifications against the assessment criteria, see section 3.4.1.

CEG long term average specification of the SLCAPM

CEG estimated a long term specification of the SLCAPM for the NSW distributors' initial and revised regulatory proposals. For the initial proposals, this gave an estimated return on equity of 10.1 per cent.[1007] For the revised proposals, this gave an estimated return on equity of 10.15 per cent.[1008] As with NERA's specification, it used historically based estimates of both the risk free rate and MRP, combined with its equity beta estimate. CEG estimated a historically based risk free rate over 1883 to 2011 in its initial report, and updated this to 2013 in its second report. In its second report, CEG calculated each input parameter as follows:

- It based the risk free rate on the average 10 year CGS yield over the period 1883 to 2013 (4.77 per cent).

- It calculated the MRP as the average excess return on the market portfolio over the period 1883 to 2013 (6.56 per cent).

- It based its equity beta estimate of 0.82 on regression-based beta estimates, using both Australian and US firms.

[1005] 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.

[1006] 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).

[1007] CEG, *WACC estimates: A report for NSW DNSPs*, May 2014.

[1008] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 6.

As with NERA's long term average specification of the SLCAPM, we do not agree with the form of the model.[1009] We consider CEG's long term average specification does not and would not be expected to result in a return on equity that will contribute to the achievement of the allowed rate of return objective.

With respect to each input parameter, we note the following:

- The risk free rate estimate of 4.77 per cent is far above the current forward looking risk free rate estimated using 10 year CGS yields. This results in an overestimate of the required return on equity. We also consider this would result in a return on equity that has not had regard to prevailing conditions in the market for equity funds.[1010]

- We consider the MRP of 6.5 per cent a reasonable estimate of the forward looking MRP. This is for the reasons discussed in section 3.4.1 and appendix C—MRP.

- We consider an equity beta estimate of 0.7 more appropriate for the reasons discussed in section 3.4.1 and appendix D—Equity beta.

See section 3.4.1 for our assessment of historical CAPM specifications against the assessment criteria.

NERA's Wright specification of the SLCAPM

For TransGrid's initial revenue proposal, NERA estimated a 'Wright' specification of the SLCAPM (Wright CAPM) that resulted in an estimated return on equity of 8.47 per cent.[1011] TransGrid's revised revenue proposal referenced NERA's report and confirmed, 'TransGrid maintains this position and does not propose to put forward further argument'.[1012] NERA 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. NERA calculated each input parameter as follows:

- It estimated the risk free rate as 4.14 per cent, based on 10 year CGS yields over the 20 business days to 31 March 2014.[1013]

- It based its equity beta of 0.58 on an estimate by SFG using a group of nine Australian firms.[1014]

[1009] That is, this is a historically based CAPM, whereas the SLCAPM is a forward looking asset pricing model. Bringham and Daves, *Intermediate financial management*, Ed. 10, Cengage Learning, 2010, p. 53.

[1010] 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).

[1011] NERA, *Return on Capital of a Regulated Electricity Network: A report for Ashurst*, May 2014, p. 81.

[1012] TransGrid, *Revised revenue proposal*, January 2015, p. 115.

[1013] We note this would be updated in any actual application.

[1014] NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 79. SFG produces this estimate using a group of nine comparable Australian firms. See SFG, *Regression-based estimates of risk parameters for the benchmark firm*, 24 June 2013, p. 16.

- It calculated the MRP as 7.46 per cent. This was based on an estimated real return on the market of 8.87 per cent and an inflation rate of 2.5 per cent. This gave a nominal return on the market of 11.6 per cent and an MRP of 7.46 per cent.[1015]

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.[1016] 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.[1017] 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.[1018]

We also note the following considerations with respect to NERA's application of the model:

- We agree with the proxy used to measure the risk free rate (an average of relatively current 10 year CGS yields).

- We consider the MRP estimate of 7.46 per cent too high for the reasons discussed in section 3.4.1 and appendix C—MRP.

- We consider an equity beta of 0.7 more appropriate for the reasons discussed in section 3.4.1 and the appendix D—Equity beta.

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.

CEG's Wright specification of the SLCAPM

CEG estimated a Wright CAPM for the NSW distributors' initial and revised regulatory proposals. For the initial proposals, this estimated a return on equity of 10.2 per cent, using a prevailing risk free rate (3.96 per cent) and CEG's estimate of the equity beta (0.82)[1019] For the revised proposals, this gave an estimated return on equity of 10.10 per cent using a prevailing risk free rate (3.07 per cent) and CEG's estimate of the

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[1015] 11.6% − 4.14% = 7.46%.

[1016] 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.

[1017] 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.

[1018] 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).

[1019] CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, p. 30.

equity beta (0.82).[1020] In its report for the revised proposals, CEG calculated each input parameter as follows:

- It estimated the risk free rate as 3.07 per cent, based on 10 year CGS yields averaged over 20 days ending 19 December 2014.[1021]

- It based its equity beta estimate of 0.82 on regression-based beta estimates, using both Australian and US firms.[1022]

- It calculated the MRP as 8.57 per cent. It based this on an estimated real return on the market of 8.92 per cent and an inflation rate of 2.5 per cent. This gave a nominal return on the market of 11.64 per cent and an MRP of 8.57 per cent.[1023]

We do not consider CEG's Wright CAPM does or would be expected to result in a return on equity that would contribute to the achievement of the allowed rate of return objective. Also, we are satisfied that the Wright approach could only have limited value in informing a return on equity that contributes to the achievement of the allowed rate of return objective. We do not consider the Wright CAPM is theoretically or empirically robust for the reasons discussed with respect to NERA's Wright SLCAPM specification.

We note the following with respect to CEG's application of the model:

- We agree with the proxy used to measure the risk free rate (an average of relatively current 10 year CGS yields).

- We consider the MRP estimate of 8.57 per cent too high for the reasons discussed in section 3.4.1 and appendix C—MRP.

- We consider CEG's equity beta estimate of 0.82 too high for the reasons discussed in section 3.4.1 and the appendix D—Equity beta.

For these reasons, we consider CEG's return on equity estimate using the Wright CAPM will not contribute to the achievement of the allowed rate of return objective. See section 3.4.1 for our assessment of the Wright CAPM against the assessment criteria.

Overall conclusions on long term and Wright specifications of the SLCAPM

For the reasons discussed above, 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:

[1020] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 5.

[1021] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 5. We would update this in any actual application.

[1022] 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, p. 5.

[1023] 11.64%–3.07% =8.57%.

- estimating the return on equity for the benchmark efficient entity

- 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 long term (historical) and 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.[1024] 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.

[1024] 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.[1025] Consistent with the rate of return guideline (Guideline), we use DGMs only to inform our estimate of the market risk premium (MRP).[1026]

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,[1027] 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. This is because:

- analyst forecasts are well understood to be upward biased[1028]

- 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.[1029] At the present time, SFG's DGM and our preferred construction of the 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.

[1025] 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.

[1026] AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 84.

[1027] 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.

[1028] 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.

[1029] 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).

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 potential bias in our, and other, DGM estimates and some sensitivity analysis surrounding our prevailing estimates.

B.1 Preferred construction of the dividend growth model

Our preferred construction of the DGM is consistent with that set out in the Guideline.[1030] The following equation depicts this DGM, which we apply to estimate 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[1031]

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.

[1030] 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.

[1031] 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.

- 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.[1032] We have considered a variety of submissions on our construction of the DGM,[1033] which have not persuaded us to depart.[1034] Further, experts have critically reviewed our construction of the DGM.[1035] We consider this advice suggests that, overall, our construction of the DGM is reasonable.[1036] 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[1037] of 4.6 per cent to be reasonable, if not 'somewhat on the generous side'.[1038] We derive this by:

[1032] 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.

[1033] 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.

[1034] 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.

[1035] 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.

[1036] 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.

[1037] Hereafter, we use long term dividend growth rate and long term growth rate of nominal dividends per share interchangeably.

[1038] 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).

- Starting with 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.[1039] When producing this estimate, Lally had regard to the following:[1040]

    > 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 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.[1041] In determining what deductions to apply, Lally considered the following:[1042]

    o 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.[1043] However, Lally considered this comparison would exaggerate the relevant adjustment in the presence of a declining dividend payout rate.[1044]

    o 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.

[1039] Lally, *The dividend growth model*, 4 March 2013, p. 13.

[1040] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, p. 14.

[1041] Bernstein, Arnott, 'Earnings Growth: The Two Percent Dilution', *Financial Analysts Journal*, September/October 2003.

[1042] Lally, *The dividend growth model*, 4 March 2013, p. 14.

[1043] Bernstein, Arnott, 'Earnings Growth: The Two Percent Dilution', *Financial Analysts Journal*, September/October 2003, table 1.

[1044] 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.

- 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.

McKenzie and Partington advised that if anything, the long term dividend growth rate we apply is somewhat on the generous side.[1045] 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.[1046] 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 generous.[1047] 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.[1048] Partington reiterated this view in his 2015 report.[1049]

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.[1050] 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.[1051]

[1045] 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.

[1046] 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.

[1047] 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.

[1048] McKenzie and Partington, *Report to the AER: Part A, return on equity*, October 2014, pp. 33–34

[1049] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 53.

[1050] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 3.

[1051] McKenzie, Partington, *Report to the AER: The Dividend Growth Model (DGM)*, 14 December 2013, p. 13.

- We accept that the above point is a long term argument.[1052] 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.[1053] SFG submitted this is because listed firms empirically exhibit dividends and earnings growth above our long term growth estimate.[1054] 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 upwards bias is widely accepted among researchers.[1055] McKenzie and Partington also noted this difference:[1056]

    > 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.[1057] 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.[1058] 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.[1059]

[1052] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 33.

[1053] 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'.

[1054] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, p. 6.

[1055] 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.

[1056] 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.

[1057] 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.

[1058] 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.

[1059] 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.

- 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:

    o 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.[1060]

    o 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 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.[1061]

- 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.[1062] 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.[1063] 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 grown at around 2.5 per cent on average in the past two years,[1064] and the RBA, in its most recent Monetary Policy decision, stated:[1065]

[1060] 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.

[1061] 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.

[1062] 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.

[1063] 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.

[1064] RBA, *Statement on Monetary Policy*, February 2015, p. 37.

[1065] RBA, *Statement by Glenn Stevens, Governor: Monetary Policy Decision*, 7 April 2015.

In Australia the available information suggests that growth is continuing at a below-trend pace, with overall domestic demand growth quite weak as business capital expenditure falls.

- 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.

- 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 above consideration 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.[1066] 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.[1067] We note that SFG have 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).[1068] 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.[1069]

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:

[1066] 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.

[1067] 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.

[1068] 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).

[1069] 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).

- 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.[1070] Further, many previous consultant reports from service providers have submitted that we should use a standard DGM.[1071] Since standard DGMs are more widely used, there is a better understanding of their limitations. Handley considered SFG's DGM and advised that it is a new model whose widespread use and acceptance has not been established.[1072]

- Standard DGMs are significantly less complicated than endogenous growth models. We consider there are significant costs associated with complexity. For instance:

  o 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.[1073]

  o 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.[1074] For instance, estimating the MRP over 10.5 years using SFG's model appears to require more than 128 million individual computations.[1075]

  o 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.[1076]

[1070] 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.

[1071] 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 the* A*CCC*, 2002, pp. 29–34.

[1072] Handley, *Advice on the return on equity*, 16 October 2014, p. 15.

[1073] McKenzie and Partington, *Report to the AER: The DGM*, 14 December 2013, p. 21.

[1074] 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'.

[1075] SFG 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.

[1076] 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.

o 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.[1077]

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.[1078] This is consistent with our consultant's 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.[1079] 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.[1080] 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.[1081] 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 than they are in practice.[1082] 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.

[1077] AER, *Explanatory Statement Rate of Return Guideline*, December 2013, p. 28.

[1078] 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.

[1079] McKenzie and Partington, *Report to the AER: The DGM*, December, 2013, p. 5.

[1080] 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.

[1081] 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.

[1082] 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.

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.[1083] 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.[1084]

- SFG's approach alters the assumptions that are employed, it does not eliminate them. As McKenzie and Partington described:[1085]

    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.[1086] 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'.[1087] McKenzie and Partington imposed this constraint on SFG's estimates and price/earnings model and estimated a market value return on equity of 6.9 per cent.[1088] McKenzie and Partington found:[1089]

    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

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[1083] 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.

[1084] McKenzie and Partington, *Report to the AER: The DGM*, 14 December 2013, p. 13

[1085] 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.

[1086] 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.

[1087] 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.

[1088] 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.

[1089] 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.

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.[1090] 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.[1091]

- 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.[1092] We consider these differences contribute to the opaqueness of the SFG's DGM and should be explained. In our November 2014 draft decisions we set out these differences, which include:

  o 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 errors. This can arise from noise in the data or from the modelling framework not holding for that stock.[1093]

  o 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.

[1090] 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).

[1091] Lally, *Review of the AER's proposed Dividend Growth Model*, 16 December 2013.

[1092] 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.

[1093] 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.

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.[1094]

- o Fitzgerald et al. uses a residual income model, while the SFG model is not.[1095]

- o 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.[1096]

- In its DGM, SFG imposed unexplained restrictions on the data. For instance, SFG assumed that growth in shares cannot be negative.[1097] 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 in its 2015 report. 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.[1098]

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.[1099] While this is a strong assumption, analysts commonly apply it to DGMs.[1100] We do not apply a term structure for the following reasons:

[1094] 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.

[1095] Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 573.

[1096] Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 575.

[1097] SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013, p. 11.

[1098] Lally, *The DGM*, 4 March 2013.

[1099] 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.

[1100] 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.

- It is not standard practice to apply a term structure to DGMs.[1101]

- 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:[1102]

  > 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'.[1103] SFG agreed with this view in its 2015 report.[1104]

- 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:[1105]

  > 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.

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:

[1101] 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.

[1102] 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.

[1103] 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.

[1104] 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.

[1105] 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.

- 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.[1106] 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: [1107]

  > 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:[1108]

  > 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'.[1109]

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:

- 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

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[1106] 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.

[1107] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

[1108] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

[1109] 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.

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:[1110]

  > 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.[1111] However, McKenzie and Partington recommended a transition of three to five years based on the length of business cycles.[1112] 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'.[1113]

- 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.

[1110] 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.

[1111] 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.

[1112] 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.

[1113] 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.

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.[1114] It also considered that we provide no indication of what this cross check means.[1115] 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.[1116] 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 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.

[1114] 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'.

[1115] 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.

[1116] 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'.

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 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.[1117] SFG has also observed this.[1118] 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.[1119]

- While SFG has found its approach decreases dispersion in market value return on equity estimates:[1120]

  o Dispersion is not necessarily problematic—particularly to the extent that the actual return on equity may be volatile.

  o 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).[1121]

  o 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.[1122]

- McKenzie and Partington have observed that analysts make sluggish adjustments to the information in prices. For this reason, matching the dates of analysts' 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.[1123]

[1117] By 'both approaches' we mean SFG's model with consensus forecast and SFG's model with individual analyst forecasts.

[1118] SFG, *Dividend discount model estimate of the cost of equity*, 19 June 2013, p. 10.

[1119] We use daily data, which we average across the month before applying it to our DGM.

[1120] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 8.

[1121] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 50.

[1122] 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.

[1123] 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.

- 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.[1124] SFG has not provided reasons for doing this. Further, this approach is not consistent with Fitzgerald et al., which state, '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'.[1125]

In its 2015 report, SFG changed its approach to average all forecasts over two months instead of six.[1126] 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.

- Both approaches appear to produce similar estimates of the market value return on equity, on average.[1127] Even at this time, SFG's latest DGM estimate of the MRP is 8.3 per cent when using our preferred imputation adjustment.[1128] This is very

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[1124] 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.

[1125] Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 581.

[1126] 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.

[1127] By 'both approaches' we mean SFG's model with consensus forecast and SFG's model with individual analyst forecasts.

[1128] 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.

similar to our three stage DGM estimate of the MRP of 8.2 per cent for the two months to end– February 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.[1129] 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.[1130] 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.[1131] 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 vary across analysts and time.[1132] 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.[1133] 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.

[1129] 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.

[1130] 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.

[1131] 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.

[1132] 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.

[1133] 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.

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.[1134] 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.[1135]

- 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.[1136] 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 opinion survey of analysts'.[1137] However, McKenzie and Partington observed the objective is to obtain the market's implied return on equity.[1138]

- 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.[1139]

- 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

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[1134] 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.

[1135] 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.

[1136] 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).

[1137] 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.

[1138] McKenzie and Partington, *Report to the AER: The DGM*, December 2013.

[1139] 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.

over the next 12 months. That is, the target price represents the analysts' expectation of the share price.[1140] 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.[1141] 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.[1142] SFG considered that by using target prices, this could offset bias in analyst dividend forecasts.[1143] 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.[1144] 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 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.[1145] 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:[1146]

[1140] Fitzgerald, T., Gray, S., Hall, J., Jeyaraj, R. 2013, 'Unconstrained estimate of the equity risk premium', *Review of Accounting Studies*, Vol. 18., p. 570.

[1141] 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.

[1142] SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013, p. 10.

[1143] 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.

[1144] 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'.

[1145] 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.

[1146] 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.

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's have written that 'a well-established literature finds clear evidence that analysts' forecasts are overly optimistic with respect to target prices, earnings and dividends'.[1147]

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.[1148]

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.[1149] Table 3-35 shows our construction of the DGM has less limitations than SFG's construction.

Table 3-35 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	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	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

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[1147] McKenzie and Partington, *Report to the AER: The DGM*, December 2013, p. 4.

[1148] AER, *Rate of return guideline*, 17 December 2013, p. 6.

[1149] Jemena Gas Networks, ActewAGL, Ausgrid, Essential Energy, Endeavour Energy, TransGrid, SA Power Networks, Ergon Energy and Energex 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; 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*, 13 February 2015, section 5.

Criteria	DGMs in general	AER's construction	SFG's construction
data		companies. This recognises it is implausible for dividends to grow larger than the economy in perpetuity.[1150]	DGM.[1151] 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 purpose. Also, promote simple over complex approaches where appropriate	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.[1152] DGMs can be simple or complex, depending on how they are constructed.	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 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	DGMs rely on market data. Therefore, if the methodology is transparent, it is possible to	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

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[1150] Lally, *The dividend growth model*, 4 March 2013, p. 13.

[1151] 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.

[1152] 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 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	DGMs in general	AER's construction	SFG's construction
available credible datasets	replicate results.		replicating the results.[1153]
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.[1154] 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.[1155]	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.[1156]	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.[1157] For instance, it allows 10% long term DPS growth, although this is implausible. SFG filters data by assuming growth in shares cannot be negative.[1158] It also assumes price/earnings ratios

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[1153] 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.

[1154] McKenzie and Partington, *Equity market risk premium*, December 2011, p. 25; AER, Final decision: APA GasNet, March 2013, p. 101.

[1155] 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.

[1156] 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 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.

[1157] 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.

[1158] This causes SFG to remove 20% of its data. We consider this unrealistic because share buybacks are widely used.

Criteria	DGMs in general	AER's construction	SFG's construction
			cannot be negative.[1159] 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.[1160]	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 appropriate.	Theoretically, readily reflects changes in the market data as it reflects changes in dividend forecasts and share prices. However, in practice, may not track these changes accurately.[1161] DGMs can generate volatile and conflicting results.[1162]	Averages estimates over 2 months. If the DGM produces accurate estimates, these will reflect changing market conditions.	In 2014, SFG averaged estimates over 6 months. All else equal, Averages estimates over 2 months. All else 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

[1159] 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.

[1160] 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.

[1161] 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.

[1162] 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.

Criteria	DGMs in general	AER's construction	SFG's construction
			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.

B.3 Reasons for estimating the market risk premium

We employ our construction of the DGM to inform our estimate of the MRP.[1163] This is consistent with the Guideline, where we considered DGM estimates of the MRP as a useful source of evidence.[1164] 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 November 2014 draft 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 on equity for Australian energy network service providers.[1165] There are difficulties with constructing credible datasets for implementing industry specific DGMs.[1166] Also, there are too few Australian businesses to perform DGMs on an individual business level.[1167]

- There are developed methods for estimating the growth rate of dividends in the Australian market.[1168] 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.[1169]

[1163] 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.

[1164] AER, *Rate of return guideline*, December 2013, pp. 13, 16.

[1165] AER, *Explanatory Statement to the rate of return guideline (appendices)*, December 2013, p. 15.

[1166] AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 77.

[1167] AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 119.

[1168] 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.

[1169] AER *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 15.

- 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 are highly sensitive to changes in the risk free rate and 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 less than the overall market.[1170]

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.[1171] 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.[1172] 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.[1173]

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.[1174] 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.

[1170] AER, *Explanatory statement rate of return guideline (appendices)*, December 2013, p. 120-122.

[1171] TransGrid, *Revised revenue proposal*, January 2015, pp. 8–9 (TransGrid maintains the position set out in its initial revenue proposal, see: TransGrid, *Revenue proposal*, May 2014, p. 12); ActewAGL, *Revised regulatory proposal*, January 2015, pp. 447–448, 468; JGN, *Revised access arrangement proposal—Appendix 7.1 Return on equity response*, February 2015, pp. 36–37; Ausgrid, *Revised regulatory proposal*, January 2015, p. 197; Essential Energy, *Revised regulatory proposal*, January 2015, pp. 241–242; Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 223–224; Ergon Energy, *Regulatory proposal—Appendix C: Rate of return*, October 2014, pp. 135–136; Energex, *Regulatory proposal*, October 2014, pp. 164–165; SAPN, *Regulatory proposal*, October 2014, p. 319. 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.

[1172] 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.

[1173] 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.

[1174] 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.

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.[1175] 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:[1176]

> 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 for individual firms.

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.

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.[1177] Specifically, SFG applied the following steps to estimate the return on equity for a benchmark efficient entity:[1178]

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.[1179] Then,

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[1175] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, p. 58.

[1176] 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.

[1177] 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.

[1178] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014, pp. 56–57, 59.

[1179] 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'.

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.[1180]

3. Take a simple average of the 99 risk premium ratios (determined in step two) to derive an average risk premium of 0.94.[1181]

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 MRP 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. 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.

- It 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.

- It used inappropriate weightings in the estimation process because SFG's 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 very 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

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[1180] 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).

[1181] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 20, p. 48.

for the network businesses over the period 2002 to 2014.[1182] 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.

In its 2015 report, SFG submitted that it did not give businesses with more analyst coverage more weight in its DGM analysis.[1183] 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).[1184] However, it submitted that it is appropriate to compare equity beta estimates resulting from the two approaches, as its DGM based estimate of the average risk premium ratio has the 'same quantitative effect as a beta estimate'.[1185] 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.[1186] Therefore, we can

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[1182] 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.

[1183] 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.

[1184] 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).

[1185] 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).

[1186] 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

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 effective equity beta estimate appears inconsistent with the low risk nature of regulated natural monopoly businesses with low elasticity of demand for their services.[1187] 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 very 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 its 2014 and 2015 reports, SFG submitted its DGM is more reliable and less volatile than our DGM.[1188] However, this perception of stability is subjective and we do not agree with it. Figure 3.18 illustrates this point by showing three time series:[1189]

- 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).

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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.

[1187] 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.

[1188] 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.

[1189] 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.

Figure 3.18 Movements in SFG's dividend growth model
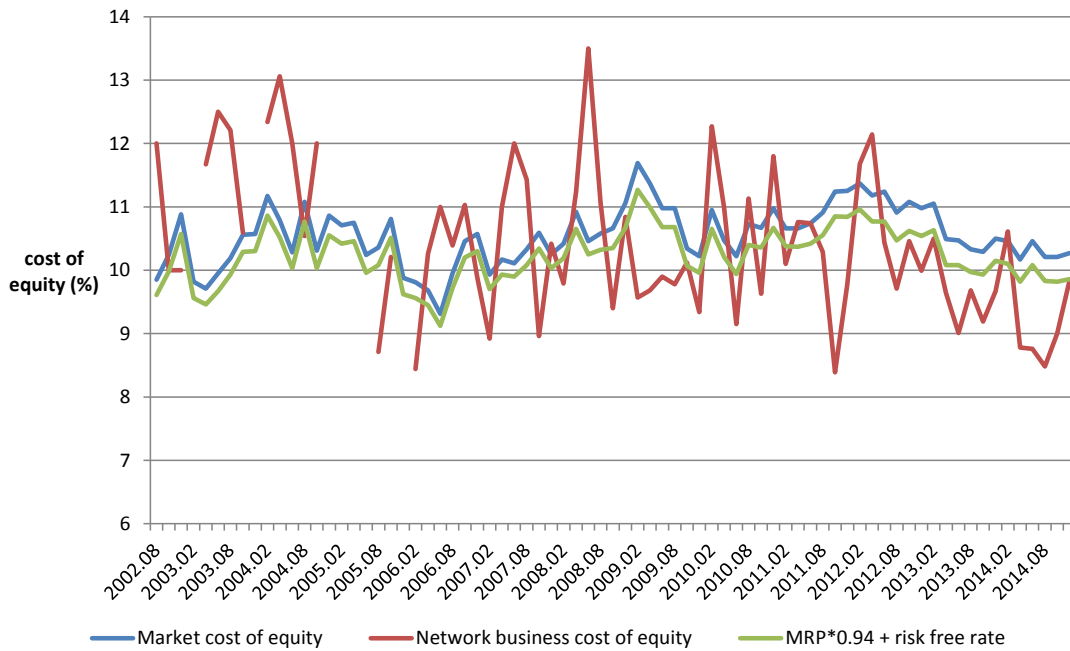
Source: SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015, pp. 40–41; AER analysis.

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 be estimated for these periods.

Figure 3.18 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

For the two months up to end-February 2015, DGMs produce an estimate of the MRP within the range of 7.4 to 8.6 per cent. We construct this range from DGM estimates under different assumptions. Table 3-36 shows this.

Table 3-36   MRP estimates under dividend growth models, 0.6 theta (per cent)

Growth rate [a]	Two stage model	Three stage model
4.0	7.4	7.8
4.6	8.0	8.2
5.1	8.4	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.

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.[1190] 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.[1191] There are a number of problems with this approach:

    o   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

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[1190]   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.

[1191]   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.

negative for a period. This is likely to result in upward biased DGM estimates of the return of equity.[1192]

  o 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 consider there is likely to be an asymmetry in the effects because of the greater reluctance to cut dividends than increase dividends.[1193]

- Analyst forecasts are well understood to be upward biased.[1194] 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.[1195] 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:[1196]

> 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 also consider how sensitive our DGM is to the following factors:

- our long term dividend growth rate

- the period we average estimates over

- biases in analyst forecasts

[1192] 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.

[1193] 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.

[1194] 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.

[1195] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

[1196] 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.

Long term dividend growth rate

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.[1197] 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.[1198] 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 3-37 sets out how these assumptions affect our estimates.

Table 3-37 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)	8.43	8.59
4.6% growth (AER point estimate, Lally's estimate)	7.97	8.20
3.78% growth (McKenzie and Partington's estimate)	7.22	7.59

Source: Bloomberg, AER analysis.

Averaging period

We have based our DGM estimate on data over January and February 2015. However, McKenzie and Partington advised that analysts' adjustment to the information in prices is sluggish.[1199] 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:[1200]

> Indeed, we would caution against relying on month by month, or even year by year, estimates from the DGM. Averaging measurement error over several

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[1197] 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.

[1198] 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'.

[1199] 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.

[1200] 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.

periods is likely to reduce the error and therefore, we would recommend taking 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 3-38 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 3-38 Averaging period sensitivities in the MRP, 0.6 theta (per cent)[1201]

Sensitivity	Two stage model	Three stage model
2 months to end February 2015	7.97	8.20
6 months to end February 2015	7.78	8.02
12 months to end February 2015	7.29	7.58

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.[1202] We consider it useful to have regard to our DGM's sensitivity to potential biases in analyst forecasts. In Table 3-39 we have adjusted forecast dividends per share 10 per cent downwards/upwards.

Table 3-39 DPS forecast sensitivities in the MRP, 0.6 theta (per cent) [1203]

Sensitivity	Two stage model	Three stage model
Forecast	7.97	8.20
Forecast + 10%	8.58	8.83
Forecast - 10%	7.36	7.58

Source: Bloomberg, AER analysis.

[1201]   Assuming we adopt our point estimate of the long term dividend growth (4.6 per cent).

[1202]   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.

[1203]   Assuming we adopt our point estimate of the long term dividend growth (4.6 per cent).

Combined sensitivities

Table 3-40 highlights the potential impact of errors in estimates and assumptions, by bringing these sensitivities together. Taken together, this highlights that DGMs can be very sensitive to assumptions and estimation errors.

Table 3-40   Combined sensitivities in the MRP, 0.6 theta (per cent)

Sensitivity	Two stage model	Three stage model
Baseline [a]	7.97	8.20
Low [b]	5.89	6.28
High [c]	9.04	9.20

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.[1204] 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.[1205] 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.[1206]

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.[1207] We are satisfied this is the most robust source of evidence for estimating a 10 year forward looking MRP.[1208] This view is consistent with the Rate of Return guideline (Guideline).[1209] 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 5.1 to 6.5 per cent.[1210]

[1204]   NER, cl 6.5.2(f); NER, cl. 6A.6.2(f); NGR, r. 87(6).

[1205]   NER, cl 6.5.2(g); NER, cl. 6A.6.2(g); NGR, r. 87(7).

[1206]   AER, *Rate of return guideline*, 17 December 2013, p. 16.

[1207]   See steps one and two in section 3.4.1 for our assessment of this information against our criteria.

[1208]   See steps one and two in section 3.4.1.

[1209]   AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 78.

[1210]   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. In the November 2014 draft decisions we updated these estimates to the 2013 calendar year end. For this decision we have updated these estimates to the 2014 calendar year end. 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. By setting the top of the range at 6.5 per cent, we fully cover the historical excess returns estimates using arithmetic averages (the highest estimate using arithmetic averages is 6.41 per cent).

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 3-41 sets out arithmetic and geometric average historical excess returns estimated over different sample periods up until the 2014 calendar year end.[1211] Arithmetic averages range between 5.8 and 6.4 per cent and geometric averages range between 3.9 and 4.9 per cent.

Table 3-41 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 3-41 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).

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:[1212]

[1211] 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.

[1212] 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.[1213]

- 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:[1214]

- Longer time series contain a greater number of observations, so generally produce a more statistically precise estimate.

- 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.[1215]

In its 2015 report for several service providers, NERA Economic Consulting (NERA) submitted that the use of multiple overlapping sampling periods places more weight on more recent data and reduces the statistical precision of the MRP estimates.[1216]

[1213] The Commercial and Industrial price index only included 5 stocks in 1875, 12 in 1905 and 47 in 1945.

[1214] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 82.

[1215] 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.

[1216] 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). 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: 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, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 57; SFG, *Updated estimate of the required return on equity: Report for SA*

However, 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.

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. The geometric average return is the average compounded annual return.[1217] In estimating the MRP, we have regard to both arithmetic and geometric average historical excess returns. This decision is informed by the following considerations:

- We consider the arithmetic average of 10 year historical excess returns would likely 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.[1218]

- We have previously considered arithmetic and geometric averages relevant when estimating a 10 year forward looking MRP using historical annual excess returns.[1219] The Australian Competition Tribunal (Tribunal) found no error with this approach.[1220]

Power Networks, 8 September 2014, p. 3; SFG, *The required return on equity: Initial review of the AER draft decisions: Report for ActewAGL, Ausgrid, Essential Energy and Endeavour Energy*, 19 January 2015, p. 42 (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, p. 42 (this report is very similar to SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, therefore, any references to the 19 January 2015 report in this appendix also apply to the 30 January 2015 report); 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: Ausgrid, Endeavour Energy and Essential Energy*, 12 March 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 February 2015 report in this appendix also apply to the March 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. NERA also applied its historical excess returns MRP estimate over the longest available period in its report for TransGrid (see: NERA, *Return on capital of a regulated electricity network*, May 2014, p. 80).

[1217]   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.

[1218]   For an additional example, see AER, *Draft decision: SPI Networks access arrangement*, September 2012, Appendix B.2.1.

[1219]   For example, see AER, *Final decision: SPI Networks (Gas) access arrangement*, March 2013, Part 3, B.5.1.

[1220]   Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT4*, 11 January 2012, paragraph 157.

- 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.[1221] While we do not adopt this approach, this indicates that experts and other regulators consider geometric averages valuable.

- McKenzie and Partington advised that 'the unbiased estimator of the MRP lies between the arithmetic average and the geometric average'.[1222]

- While we acknowledge geometric averages may exhibit downwards bias, we also note that arithmetic averages may exhibit upwards bias. This is because:[1223]

  > 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.

These views are consistent with our November 2014 draft decisions. We did not agree with SFG Consulting's (SFG's) recommendation that arithmetic average historical excess returns should be used in estimating the MRP, and geometric averages should not be used.[1224] In its August 2014 and January 2015 reports for several service providers, SFG has reiterated this recommendation.[1225] However, it has not provided any new analysis to support its view. Therefore, SFG has not convinced us to accept its recommendation. In turn, we continue to disagree with SFG on this issue.

In its 2015 report, NERA also recommended we give no weight to geometric average historical excess returns.[1226] It submitted that an estimate of the MRP based solely on arithmetic averages of historical excess returns will result in a materially better estimate than an estimate based (solely or in part) on geometric averages of historical excess returns. NERA based this submission on the following reasoning:[1227]

[1221] Wright and Smithers, *The cost of equity capital for regulated companies: A review of Ofgem*, 2014, p. 9.

[1222] McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 5.

[1223] McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 6.

[1224] SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, p. 49.

[1225] SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 28; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015.

[1226] NERA, *Historical estimates of the market risk premium*, February 2015, p. 12. In its 2014 and 2015 reports, CEG (and NERA, in its 2014 report for TransGrid) also relied on arithmetic averages because it used the historical excess returns MRP estimates derived by NERA (see footnote).

[1227] NERA, *Historical estimates of the market risk premium*, February 2015, p. 12.

- If geometric average historical excess returns are used to estimate the MRP, the estimate of the weighted average cost of capital (WACC) will be biased downward in any one year.

- If arithmetic average historical excess returns are used to estimate the MRP, the estimate of the WACC will only be biased upward if it is compounded over more than one year.

- 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. Therefore, using arithmetic average historical excess returns to estimate the MRP results in an unbiased WACC estimate (all else equal).

We maintain our view that it is reasonable to have regard to both arithmetic and geometric average historical excess returns in estimating the MRP.

We explained why we disagreed with NERA's view in the 2012 decision for the Roma to Brisbane pipeline and the 2013 decisions for the Victorian gas network businesses, and we are satisfied this material remains relevant.[1228] However, given the submissions received, we have reviewed the material before us.

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.[1229] Even if we do not compound the WACC in our building block model, we are still estimating a multi-period return on equity and the expected 10 year MRP. Moreover, NERA may have made simplifying assumptions in coming to its view. For example, NERA may be assuming that all cash flows are paid out rather than invested at the end of each period and that there is no capital expenditure at the end of the first period. These simplifying assumptions may not be consistent with reality.

Further, as shown in Table 3-41, 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 on the arithmetic averages (and place no weight on the geometric averages), they do not support NERA's proposed MRP estimate of 6.56 per cent.[1230]

We note consultants and stakeholders have expressed different views. For example:

[1228] 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.

[1229] 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.

[1230] NERA, *Historical estimates of the market risk premium*, February 2015, p. 42.

- McKenzie and Partington supported our view in their 2012 report. We sought their advice on whether there is a method to produce an unbiased MRP estimate using historical excess returns. They analysed alternative proposals in the literature and concluded that, as at February 2012, no single best estimator is indisputably best for long run historical excess returns.[1231] McKenzie and Partington recommended the use of both arithmetic averages and geometric averages, tempered by an understanding of their inherent biases.

- Lally recommended using arithmetic averages in his 2012 report. He considered 'the absence of a compounding effect leads to a preference for the arithmetic mean over the geometric mean'.[1232]

- The South Australian Council of Social Service (SACOSS) considered geometric averages 'should not be dismissed'.[1233] Its consultant, the SA Centre for Economic Studies (SACES), submitted that arithmetic averages are only superior to geometric averages if annual returns on the stock market represent an independent and identically distributed process, which is not the case for equities which exhibit strong year to year negative serial correlation in returns.[1234] It also noted that some authorities in the field regard geometric averages as a better measure of the MRP.[1235]

In view of the conflicting evidence, we consider regard should be had to both arithmetic and geometric averages when considering the historical excess returns estimates of the MRP. We are aware of potential deficiencies with both averages, so we do not exclusively rely on one or the other.

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.[1236] 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

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[1231] McKenzie and Partington, *Supplementary report on the MRP*, February 2012, pp. 7–9.

[1232] Lally, *The cost of equity and the market risk premium*, 25 July 2012, p. 31.

[1233] SACOSS, *Submission to SA Power Networks regulatory proposal for 2015–20*, January 2015, p. 20.

[1234] This weighting scheme gives the geometric mean a weight equal to the ratio of the investment horizon and the time period over which the average has been calculated. SACES, *Independent estimate of the weighted average cost of capital (WACC) for SA Power Networks 2015 to 2020: Report commissioned for the South Australian Council of Social Services*, January 2015, p. 9. (SACES, *Independent estimate of the WACC*, January 2015)

[1235] SACES referenced Dimson et al (2011) as an example. SACES, *Independent estimate of the WACC*, January 2015, pp. 8–9.

[1236] 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).

underlying series'.[1237] 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:[1238]

- Lamberton and the Sydney Stock Exchange (SSE) retrospectively constructed earlier yields for the period 1882 to 1955 and 1956 to 1961 respectively. 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:[1239]

  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 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.

- Brailsford et al. investigated whether the adjustment applied by the ASX was reasonable. They confirmed the adjustment was reasonable and concluded:[1240]

  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 dataset.[1241] In the November 2014 draft decisions we considered NERA's adjustment

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[1237] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 75.

[1238] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 79–81.

[1239] 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.

[1240] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 81.

[1241] 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: A report for the Energy Networks Association*, June 2013. (NERA, *The market size and value premiums*, June 2013). This alternative adjustment was supported by SFG in its 2014 report

was not warranted and did not lead to a material improvement in the quality of our data. In its 2015 report, NERA has again proposed its alternative adjustment to the Lamberton dataset.[1242]

In this decision, we maintain our position from the November 2014 draft decisions. We do not consider NERA's adjustment warranted, nor does it lead to a material improvement in the quality of our data. The ASX, which we consider to be a credible source, provided and adjusted the earlier data. Further, Brailsford et al. reviewed the ASX's adjustment in a comprehensive study, which a peer reviewed academic journal published.[1243] Brailsford et al. found, 'an adjustment factor somewhere in the range of 0.65–0.75 would be defensible'.[1244]

In the November 2014 draft decisions, we outlined several concerns with NERA's analysis:

- NERA noted that while its yields are 'strongly correlated' with Lamberton's, the two datasets do not reconcile completely.[1245] For this reason, it seems likely that NERA has different data to Lamberton. If this is the case, we are not satisfied that any adjustment to the Lamberton series based on NERA's findings would be appropriate. The difference in NERA's data could make a significant difference in terms of NERA's proposed adjustment. Handley observed: [1246]

  > a necessary first step in arguing there is a problem with the ASX adjustment (and by implication a problem with the BHM historic returns dataset) is to precisely reconcile their estimates with those of Lamberton. NERA have failed to do this.

- NERA used annual data, whereas Lamberton used quarterly data.[1247]

- NERA submitted a fine detail about accuracy, which we consider unachievable. NERA chose seven data points out of the 300 quarters available during the Lamberton data period.[1248] Further, NERA's estimated adjustment is only smaller

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for several service providers (see: SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 49–52).

[1242] NERA, *Historical estimates of the market risk premium*, February 2015, pp. i–vii. SFG has also reiterated its support for NERA's alternative adjustment in its August 2014 and February 2015 reports for several service providers (see: SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 28–31; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 23). In its 2014 and 2015 reports, CEG (and NERA, in its 2014 report for TransGrid) also used NERA's adjustment because it used the historical excess returns MRP estimates derived by NERA (see footnote).

[1243] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008.

[1244] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 81.

[1245] NERA, *The market, size and value premiums*, June 2013, p. 11.

[1246] Handley, *Advice on the return on equity*, 16 October 2014, p. 20.

[1247] NERA, *The market, size and value premiums*, June 2013, pp. 7–8.

[1248] NERA, *The market, size and value premiums*, June 2013, p. 11.

than the ASX adjustment for four of their data points.[1249] For this type of analysis to be effective, we consider there needs to be certainty that the calculated adjustment factors are correct. We consider such certainty unrealistic, particularly because estimates in the Lamberton data period are subject to many limitations.[1250]

NERA, in its 2015 report, responded to these concerns. It submitted:

- NERA considered its estimated adjustment is more accurate than the ASX's adjustment.[1251]

- Neither NERA nor Brailsford et al. use the original price series that Lamberton assembled. NERA submitted that in general it uses the same sources as Lamberton employs.[1252]

- NERA considered our statement that 'NERA used annual data, whereas Lamberton used quarterly data'[1253] is incorrect.[1254]

We have considered NERA's views and maintain our position from the November 2014 draft decisions for this decision. We maintain our reasoning as outlined above, and add the following:

- NERA's first point is based on correspondence from an ASX employee to Brailsford et al. about the ASX's adjustment and NERA's use of seven data points, which increases the statistical precision of its estimates. We are not satisfied the correspondence from an ASX employee to Brailsford et al. provides sufficient evidence to conclude the ASX's adjustment is inappropriate.

- In his 2015 report, Handley responds to NERA's submissions and reiterated that NERA has not reconciled their data back to the Lamberton data. He showed that NERA's estimates generally do not agree with Lamberton's, and states that:[1255]

    This means that any observed difference between the NERA adjustment factor and the ASX adjustment factor (for any particular data point) could simply be attributable to the difference between the NERA and Lamberton data sets – rather than indicating that the ASX adjustment factor is in error (as NERA has suggests).

- In his 2015 report, Handley concluded that NERA has not established there is a downward bias in the Brailsford et al. data set.[1256]

[1249] NERA, *The market, size and value premiums*, June 2013, table 2.2; Handley, *Advice on the return on equity*, 16 October 2014, p. 19.

[1250] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008.

[1251] NERA, *Historical estimates of the market risk premium*, February 2015, pp. 30–31. NERA also noted that five, rather than four, of the adjustment factors that it computes exceed the adjustment factor that Brailsford et al. use.

[1252] NERA, *Historical estimates of the market risk premium*, February 2015, pp. 32, 39.

[1253] AER, Draft *decision: ActewAGL distribution determination 2015–16 to 2018–19—Attachment 3: Rate of return*, November 2014, p. 3-199.

[1254] NERA, *Historical estimates of the market risk premium*, February 2015, p. 39.

[1255] Handley, *Further advice on the return on equity,* April 2015, pp. 8–9.

Further, using NERA's adjustment to earlier data does not change the estimate of the MRP based on historical excess returns. This is because:[1257]

- When estimating an MRP from historical excess returns, we have regard to a number of different time periods and averaging methods. Table 3-42 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.

- As discussed above, Brailsford et al. outline a number of general reasons why we should be careful when interpreting pre-1936 data.[1258] In fact, Brailsford et al. specified, 'estimates based on data before 1958 should be treated with caution because of concerns over data quality and the imprecision of the underlying series'.[1259] These concerns remain regardless of which adjustment is used.

- Concerns regarding the possible causes of upward bias in MRP estimates from historical excess returns are still applicable. This includes survivorship bias. This is when historical data overstates MRP estimates relative to true expectations because historical returns are only estimated on stocks that have survived.[1260] This upward bias is important because various Australian stock indexes exclude failed stocks.[1261]

Table 3-42 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

[1256] Handley, *Further advice on the return on equity,* April 2015, p. 9.

[1257] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 83–84.

[1258] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 79–81.

[1259] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, p. 75.

[1260] Damodoran, 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.

[1261] 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.

Sampling period	Arithmetic average (without NERA adjustment)	Arithmetic average (with NERA adjustment)
1988–2014	5.8	5.8

Source: AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, p. 83; AER updates

C.2   Dividend growth models

We can use DGMs to derive the return on equity.[1262] 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.[1263] 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[1264]

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

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.[1265]

Our preferred construction of the DGM produces an estimate of the MRP within the range of 7.4 to 8.6 per cent for the two months ending February 2015. Table 3-43

[1262]   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.

[1263]   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

[1264]   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.

[1265]   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.

shows how we construct this range from DGM estimates under different assumptions.[1266]

Table 3-43   MRP estimates under dividend growth models, 0.6 theta (per cent)

Growth rate [a]	Two stage model	Three stage model
4.0	7.4	7.8
4.6	8.0	8.2
5.1	8.4	8.6

Source: Bloomberg, AER analysis.

a)   See section B.2.1 of appendix B–DGM 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. See: Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013.

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

Several service providers have proposed applying an alternative version of the DGM, which we have regard to (see appendix B–DGM).[1267] 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 close consultation with stakeholders. Following this, we engaged experts

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[1266]   The range of the DGM estimates reflects our two and three stage DGMs and the range of Lally's estimates of the 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 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

[1267]   JGN, ActewAGL, the NSW DNSPs, TransGrid, SA Power Networks and the Qld DNSPs submitted we consider SFG's DGM (as part of multiple model approaches to determine either the return on equity or the equity beta for use in the SLCAPM). 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*, 13 February 2015, section 5.

to critically review our construction of the DGM.[1268] We consider their advice suggested that, overall, our construction of the DGM is reasonable.[1269]

- We have considered various submissions on our construction of the DGM during the Guideline development process and as a part of the recent regulatory proposals and revised proposals.[1270] 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'.[1271] We base this estimate on expert advice by Lally.[1272] 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 our criteria informs our use of this information.[1273]

Table 3-44 sets out key findings from market surveys published since 2013. Estimates from these surveys cluster around 6.0 per cent. We have not found any new surveys since the publication of the November 2014 draft decisions.

[1268] 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.

[1269] 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.

[1270] 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: 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).

[1271] 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).

[1272] Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, p. 14.

[1273] For our assessment, see steps one and two in section 3.4.1 of this attachment.

Table 3-44   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

Sources: 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 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.

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.

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.[1274] It stated:[1275]

> 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.[1276] We consider the surveys we rely on are reasonably consistent with the Tribunal's criteria for the following reasons:

[1274]   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.

[1275]   Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 11 January 2012, paragraphs 165–166.

[1276]   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.

- Timing of the survey—we consider the timing of each survey is clear in all but one survey we consider, and the earliest survey we consider was published in January 2013 but sent out its questionnaires in May and June 2012.[1277]

- Sample of respondents—financial managers and analysts, expert valuers, actuaries, finance academics, investment banks, professional services firms and infrastructure funds were 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).[1278]

- 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.[1279] All but one survey we consider has been repeated at least three times.[1280]

- 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.[1281] Three of the surveys we consider have over 30 respondents (see Table 3-44).[1282]

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.[1283] In its 2014 reports for several service providers, SFG submitted that we used this information to inform our

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[1277] The KPMG valuation practices survey does not clearly state the time period over which the survey was made. 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; Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 82 Countries in 2012*, IESE Business School, January 2013, p. 2.

[1278] 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.

[1279] 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.

[1280] We consider three Fernandez et al. surveys in our sample (and more have been published prior to 2013). The 2013 Asher and Hickling survey is the third year for which they had done the survey (see: Asher and Hickling, *Equity Risk Premium Survey*, Actuary Australia, December 2013, p. 26).

[1281] McKenzie and Partington, *Supplementary report on the MRP*, February 2012, pp. 17–18.

[1282] 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.

[1283] See steps one and two of this attachment.

MRP in the Guideline.[1284] SFG based this on the reliance we gave to the surveys, Ernst & Young (2012) and KPMG (2013).[1285] In this decision, we only consider MRP survey evidence from 2013. Further, we note that KPMG (2013) is not an independent valuation report, nor does it summarise independent valuation reports. Rather, it is a survey of methodologies adopted by Australian financial analysts and corporate financiers.[1286]

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.[1287] 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.

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.[1288] 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.[1289] Our assessment of conditioning variables against our criteria informs this position.[1290] From this assessment, we found there are some important limitations 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.[1291] Recently, when implied volatility estimates

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[1284]   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.

[1285]   Ernst & Young, *Market evidence on the cost of equity*, 8 November 2012; KPMG, *Valuation Practices Survey 2013*, February 2013.

[1286]   KPMG, *Valuation Practices Survey 2013*, February 2013, p. 1.

[1287]   SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 26.

[1288]   AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 93–100.

[1289]   NER cll. 6.5.2(g), 6A.6.2(g); NGR r. 87(7).

[1290]   See steps one and two in section 3.4.1 of this attachment.

[1291]   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.

have fallen, service providers have not proposed we consider this evidence.[1292] Similarly, service providers and their consultants have proposed dividend yields and credit spreads as useful indicators for the MRP when these supported higher estimates.[1293] Generally, they have not done so for this decision, when dividend yields and credit spreads are lower.[1294]

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.

In its 2015 report, SFG submitted that if conditioning variables are to be used in estimating the MRP, the risk free rate should be included among them.[1295] We do not agree with this submission. This is 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).

C.4.1 Dividend yields

We use dividend yields as a directional indicator of the MRP.[1296] We consider this information by comparing current dividend yields with the average dividend yield through time.[1297] Figure 3.19 shows dividend yields against their historical average.

Figure 3.19 shows, as at 6 March 2015, dividend yields are close to their long term average. These have been relatively steady over the last 12 to 18 months.

[1292] We note that the ENA recently 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. In its 2015 report, SFG makes reference to conditioning variables in response to our November 2014 draft decisions. It submitted that if conditioning variables are to be used, the risk free rate should be included among them (see: SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 26–27).

[1293] For example, CEG, *Update to March 2012 Report: On consistency of the risk free rate and MRP in the CAPM*, November 2012, pp. 11–16; SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, pp. 11–14.

[1294] The exception to this is CEG. In its 2015 report, CEG submitted that dividend yields have not fallen post-GFC, which is evidence that the MRP has not fallen as the risk free rate has fallen (see: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 26–27). Also, SFG makes reference to conditioning variables in response to our November 2014 draft decisions. It submitted that if conditioning variables are to be used, the risk free rate should be included among them (see: SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 26–27).

[1295] SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 27.

[1296] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 94.

[1297] For a similar approach, see SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, p. 13.

Figure 3.19 Dividend yields
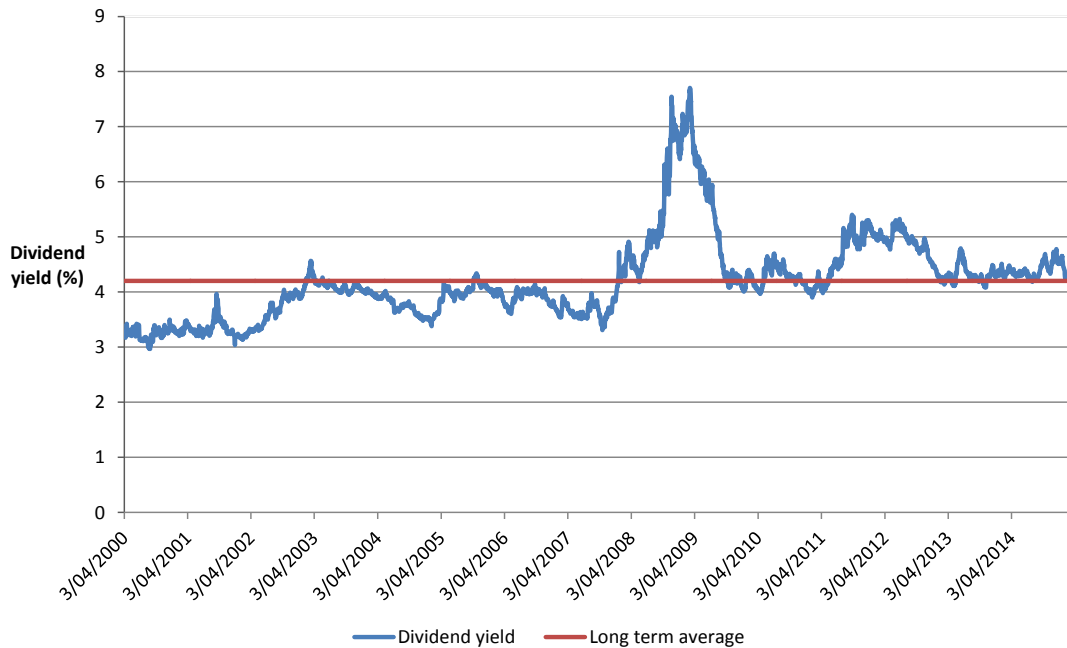
Source: Bloomberg, AER analysis.

In its 2015 report for several service providers, the Competition Economists Group (CEG) submitted that dividend yields have risen relative to pre-GFC levels. CEG stated that this implies 'the MRP measured relative to Commonwealth government securities (CGS) has risen by a more than offsetting amount than the fall in CGS'.[1298] We do not agree with this submission. Figure 3.19 shows dividend yields up to 6 March 2015. This figure shows that even though dividend yields appear slightly higher than their pre-2007 levels, they are very close to their long term average, and have been for the last 12 to 18 months. They do not appear to have increased as CGS yields have decreased.

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.[1299] 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 3.20 shows credit spreads for a range of debt instruments over yields on CGS. The RBA publishes this graph monthly. These credit spreads were showing a clear downward trend since approximately 2012, and now appear to be widening slightly (as at February 2015). Most credit spreads are also above their pre-2007 levels, while the

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[1298]   CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 26–27

[1299]   AER, *Explanatory statement rate of return guideline (appendices),* 17 December 2013, p. 96.

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 3.20 Australian bond spreads over government yields

Australian Bond Spreads*
Spread over government yields

* Swap spreads are for 3-year maturity. Corporate bond spreads are a weighted average of senior bonds with remaining maturities of 1 to 5 years; they include financial and non-financial corporates.

Sources: Bloomberg; RBA; UBS AG, Australia Branch
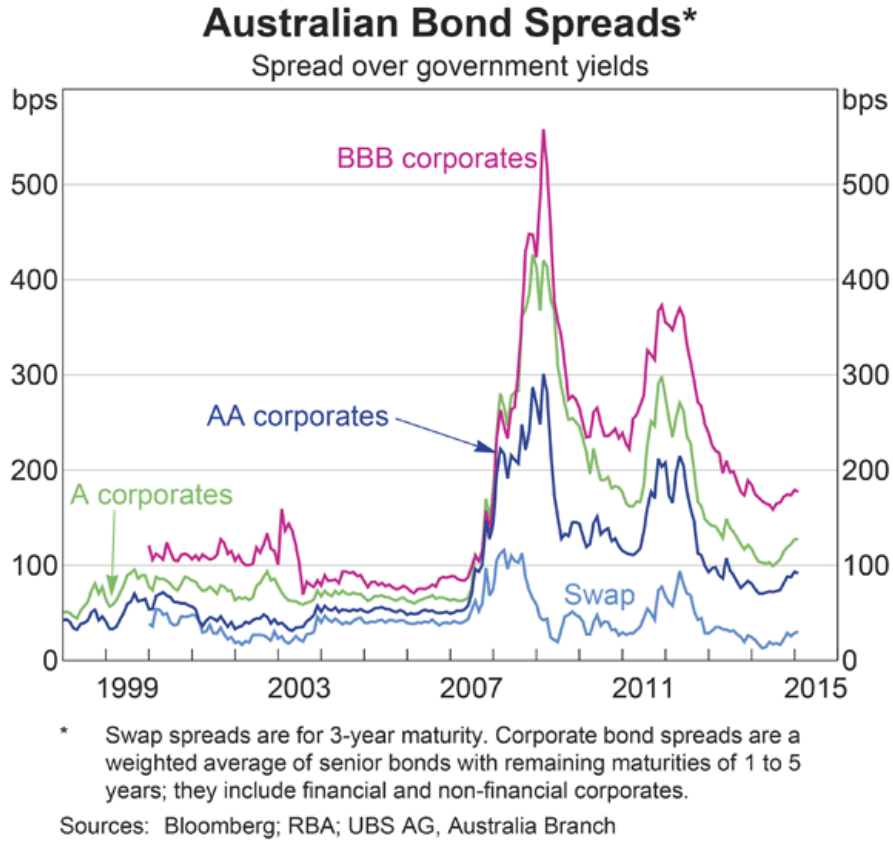
Source: RBA, Chart Pack, 4 March 2015.

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.

Figure 3.21 shows the spread between state government debt and CGS. This uses maturities of three years as more data are available. Figure 3.21 shows that credit spreads were falling since late 2012, and now appear to be widening slightly (as at 6 March 2015). However, it is not clear whether this increase is evidence of general movement in credit spreads, similar to the pre-2007 movement in the series, or whether it is part of a more pronounced increase away from pre-2007 levels. Regardless, the credit spreads remain close to their pre-2007 levels.

Figure 3.21 State government bond spreads over government yields
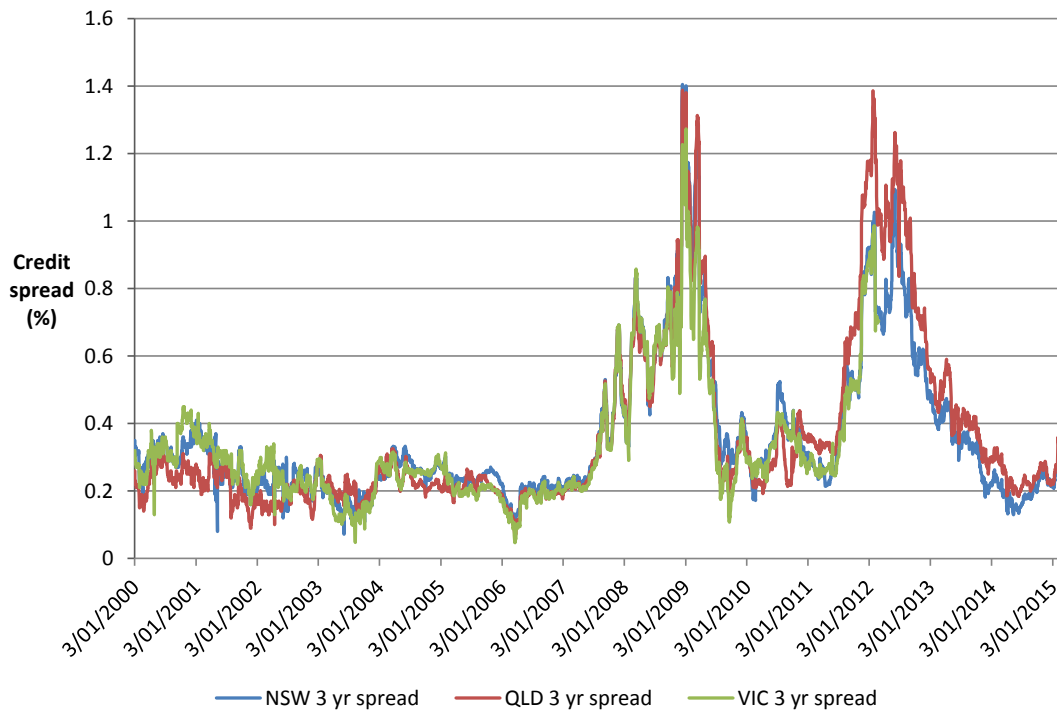
Source: RBA, AER analysis.

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).[1300] 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.[1301] 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.[1302] 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.

Implied volatility was high during the global financial crisis (GFC) and the height of the European debt crisis. However, recent implied volatility levels have been below the long run average of 18.2 per cent (measured from the start of the data series in 1997). On 6 March 2015, the ASX200 implied volatility index (VIX) was 13.6 per cent. Using

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[1300] 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.

[1301] 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.

[1302] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 98–99.

the same averaging period as the risk free rate, the ASX200 VIX was 14.9 per cent.[1303] Over the year ending 6 March 2015, the ASX200 VIX was 13.2 per cent. Figure 3.22 shows the value of this measure of implied volatility relative to its long run average level since the start of the data series in 1997. We consider this evidence suggests the MRP is currently below its historical average level.

Figure 3.22 Implied volatility (VIX) over time
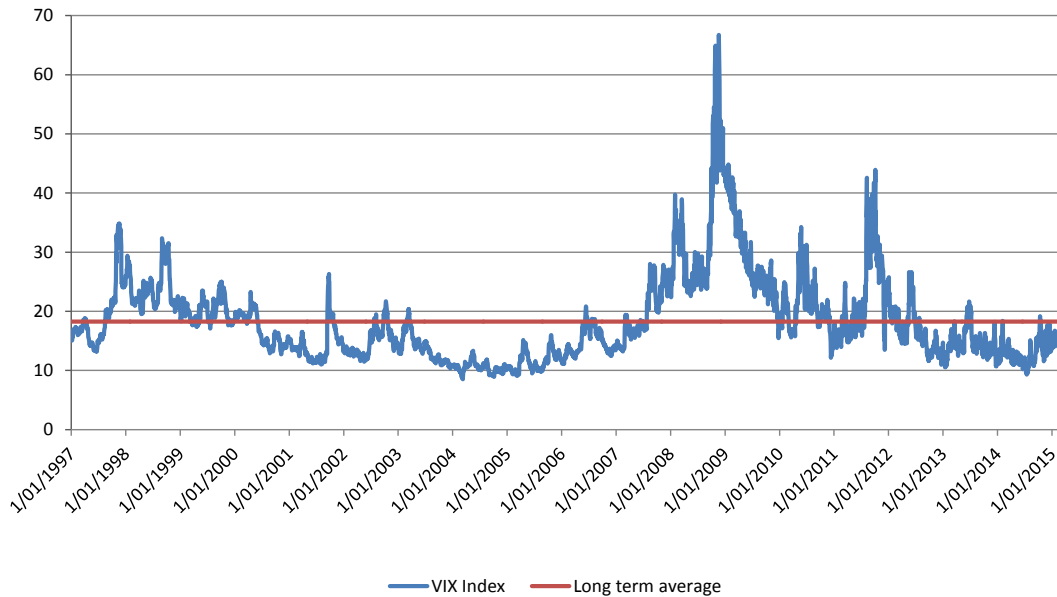
Source: ASX200 VIX volatility index, sourced via Bloomberg cost AS51VIX.

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.[1304] 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.

Table 3-45 sets out the MRPs adopted by other Australian regulators responsible for economic regulation across the electricity, water and rail industries.[1305] These estimates range from:

* 5.5 to 7.9 per cent using point estimates chosen by the regulator, or mid points where only a range is presented.

* 5.0 to 8.7 per cent using ranges. That is, the ranges in which the MRP could potentially fall within.[1306]

[1303]   This averaging period is 9 February to 6 March 2015.

[1304]   AER, *Explanatory statement: Rate of return guideline (appendices)*, 17 December 2013, pp. 100–102.

[1305]   We have updated this table since the November 2014 draft decisions.

Table 3-45 Recent regulatory decisions

Regulator	Decision date	Sector	MRP (%)
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
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)
NTUC	April 2014	Electricity	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)
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)

[1306] For the bottom of the range, see: 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. 161. For the top of the range, see: IPART, *NSW rail access undertaking review of the rate of return and remaining mine life—Transport final report and decision*, July 2014, p. 13.

Regulator	Decision date	Sector	MRP (%)
QCA	April 2013	Water	6.0
ERA	March 2013	Water	6.0
ERA	November 2012	Electricity	6.0
ESCV	June 2012	Rail	6.0
IPART	June 2012	Water	5.5–6.5
IPART	June 2012	Water	5.5–6.5

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).[1307]

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

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[1307]   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*, 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; NTUC, *Network price determination, Part A—Statement of reasons*, April 2014, p. 120; IPART, *Essential Energy's water and sewerage services in Broken Hill—Final report*, June 2014, p. 165; 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; ERA, *Further final decision on proposed revisions to the access arrangement for the Western Power network*, 29 November 2012, p. 21; ESCV, *V/line access arrangement final decision*, June 2012; IPART, *Water—Final report: Review of prices for Sydney Water Corporation's water, sewerage, stormwater drainage and other services: From 1 July 2012 to 30 June 2016*, June 2012; IPART, *Water—Final report: Review of prices for Sydney Catchment Authority: From 1 July 2012 to 30 June 2016*, June 2012.

because under an imputation tax system, some personal tax payments will be capitalised into the risk premium.[1308]

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.[1309] It is also a requirement in the NER and NGR.[1310]

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.[1311]

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:[1312]

- Estimating an annual series of imputation credit yields applicable to the underlying stock index.

    o 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).

    o 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.[1313]

[1308] Officer, 'The cost of capital under an imputation tax system'*, Accounting and Finance*, May 1994, 34, p. 1.

[1309] Officer, 'The cost of capital under an imputation tax system'*, Accounting and Finance*, May 1994, 34, pp. 1, 10.

[1310] NER, cl. 6.5.2(d)(2), 6A.6.2(d)(2); NGR, r. 87(4)(b).

[1311] Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, 1994, 34, 1–17.

[1312] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 84–85.

[1313] 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).

- 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).[1314] As such, we have confidence in these estimates. We note that Handley also applied this methodology when he updated the Brailsford et al. study.[1315]

NERA also applied the Brailsford et al. methodology to adjust its historical excess returns estimates for the value of imputation credits.[1316] The majority of service providers proposed NERA's historical excess returns estimate.[1317] 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.[1318] 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

[1314] This is known as 'the utilisation rate' or 'theta' (θ).

[1315] 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.

[1316] 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.

[1317] JGN, ActewAGL, submitted SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 23 with their revised proposals. SFG uses estimates of historical excess returns in NERA, *Historical estimates of the market risk premium*, February 2015. TransGrid proposed a return on capital estimated in NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p. 80. This refers to NERA, *The Market Risk Premium*, October 2013, page iii. TransGrid only updated the risk free rate in its revised proposal (see: TransGrid, Revised revenue proposal, January 2015, p. 115). The NSW DNSPs submitted CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 5 with their revised proposals. CEG uses estimates of historical excess returns in NERA, *Historical estimates of the market risk premium*, February 2015. Ergon Energy and SA Power Networks submitted SFG, The required return on equity for regulated gas and electricity network businesses, May 2014, p. 51 with their proposals and Energex submitted SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 30 with its proposal. SFG uses estimates of historical excess returns in NERA, *The market, size and value premiums*, June 2013.

[1318] 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.

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 full franked dividends is 0.75, which we draw from the empirical study produced by Brailsford et al.[1319] 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.

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.[1320] SFG provided a worked example of this adjustment as follows:[1321]

$$Market\ ROE\ with\ imputation\ benefits =$$
$$Market\ ROE\ excluding\ imputation\ benefits\ \times \left[1 + \frac{\gamma\tau}{1-\tau}\right]$$

$$Market\ ROE\ with\ imputation\ benefits = 10.12\% \times \left[1 + \frac{0.5 \times 0.3}{1 - 0.3}\right] = 12.29\%$$

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.[1322]

This adjustment differs from the adjustment typically used in the past, and to that in the Guideline.[1323] We did not agree with this proposed departure from the Guideline in the

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[1319] 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.

[1320] 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.

[1321] 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.

[1322] 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.

[1323] 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.

November 2014 draft 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:[1324]

  > 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 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.[1325] 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).[1326] 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'.[1327] Handley also observed:[1328]

  > 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).[1329] We have a number of concerns with SFG's reasoning (see section C.6.4).

[1324] 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.

[1325] 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.

[1326] 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.

[1327] McKenzie and Partington, *Report to the AER: The DGM*, December 2013, p. 24.

[1328] Handley, *Advice on the return on equity*, 16 October 2014, p. 22.

[1329] 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*

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.[1330] We did not agree with this position in the November draft decisions, and we do not agree with this position for this decision. This is for the following reasons:

- 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.[1331]

- 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.[1332]

- McKenzie and Partington advised:[1333]

  > 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:[1334]

  > 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.

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network, 13 February 2015, p. 17; SFG, *The required return on equity for regulated gas and electricity network businesses*, 27 May 2014, p. 41.

[1330] 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.

[1331] Truong, Partington, Peat, 'Cost of capital estimation and capital budgeting practice in Australia', *Australian Journal of Management*, 2008, 33, pp. 95–121.

[1332] McKenzie and Partington, *Supplementary report on the equity MRP*, February 2012, pp. 16–17.

[1333] McKenzie and Partington, *Supplementary report on the equity MRP*, February 2012, p. 17.

[1334] Lally, *Response to submissions on the risk-free rate and the MRP*, October 2013, p. 15.

Adjusting independent valuation reports

We do not use independent valuation reports to inform our estimate of the MRP.[1335] 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.[1336] We did not consider it necessary to adjust these estimates for our purposes in the November 2014 draft decisions and we maintain this position for this decision. We have formed this view because we only use independent valuation reports to compare current return on equity estimates to a baseline value (directional information).[1337] 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:[1338]

- 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.[1339]

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.[1340] For this purpose,[1341] 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

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[1335] See steps one and two in section 3.4.1 of this attachment.

[1336] 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.

[1337] AER, *Explanatory statement rate of return guideline*, 17 December 2013, p. 61.

[1338] See steps one and two in section 3.4.1 of this attachment.

[1339] CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, February 2013.

[1340] See step four in section 3.4.1 of this attachment.

[1341] Our discussion under step two in section 3.4.1 and in appendix E2 of this attachment outlines our concerns with grossing up return on equity estimates from independent valuation reports to account for dividend imputation.

franking rebate yield (as published by the ATO) multiplied by the franking credit utilisation rate.[1342]

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.[1343] SFG 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.[1344] 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:[1345]

$$ROE \text{ including imputation benefits} = ROE \text{ excluding imputation benefits} \times \left[1 + \frac{\gamma T}{1-T}\right]$$

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.[1346]

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.[1347] 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

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[1342]   This is also the approach adopted by Brailsford, Handley, and Maheswaran (2012) when estimating historical excess returns.

[1343]   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.

[1344]   We do not agree, as set out in the previous section.

[1345]   R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and Finance*, May 1994.

[1346]   Under the heading 'Adjusting the dividend growth model'.

[1347]   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.

not apply the Officer relationship in the manner SFG described.[1348] 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.[1349] The PTRM deducts this amount from the tax building block to ensure that equity investors receive (in total) the target imputation-inclusive return on equity.[1350]

- 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:

    o 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.[1351] This differs from the outcome produced in SFG's example proof in its 2013 report.[1352] 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).[1353] This reflects our adoption of the Officer framework as a base for the model.

[1348] *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.

[1349] The value ascribed to imputation credits (gamma) is an input into the PTRM.

[1350] 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.

[1351] 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.

[1352] SFG, *Dividend discount model estimate of the cost of equity*, 19 June 2013, pp. 37–40.

[1353] 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.

o 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 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.[1354]

o Our practice of populating the PTRM with non-perpetuity inputs is evident in how we are considering the regulatory proposals currently before us. For example, we can compare the value equity investors receive from imputation credits produced by the PTRM with that produced under the theoretical Officer (1994) formula, 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.[1355] In Table 3-46, 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 3-46, 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 3-46 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

[1354] 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.

[1355] Cells E60 and E61 on the analysis tab on the standard transmission PTRM.

Network	Return on equity (imputation inclusive)	PTRM calculated imputation credit yield	Officer (SFG) formula imputation credit yield	Difference
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 all November 2014 draft decisions, where gamma is set to 0.4. It does not show JGN because JGN does not use our standard PTRM. We have preserved the draft decision figures because updating to use final and/or preliminary decision figures would not change the substantive point, and these numbers are referenced in SFG's latest (2015) report.

SFG's latest (2015) report now 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.[1356] 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.[1357]

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.[1358] This is entirely consistent with the November 2014 draft decisions and our reasoning above. However, this is not an incidental change, as per SFG's 2015 report. Rather, it goes to the fundamental reason why our approach is reasonable, and SFG's approach is not.[1359]

[1356] 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.

[1357] 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.

[1358] 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.

[1359] 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).

The Officer perpetuity framework, by construction, will always apply the statutory tax rate.[1360] However, beyond a perpetuity framework, the effective tax rate can differ from the statutory tax rate.[1361] 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.[1362] 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.[1363] In other words, it reverses the relevant reason why the perpetuity framework will not 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.[1364]

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).[1365]

[1360] 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).

[1361] Of course, the statutory tax rate may coincide with the effective tax rate, but this is a rare event.

[1362] 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.

[1363] 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 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.

[1364] 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.

[1365] 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.

Our estimate of gamma for the benchmark firm (used in the PTRM) reflects market wide averages.[1366] 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.[1367]

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.[1368]

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.[1369] 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.[1370]

C.6.5 Assessment against our criteria

We must have regard to relevant estimation methods, financial models, market data and other evidence.[1371] In the Guideline, we proposed using criteria to assess the merits of the various sources of information in setting the allowed rate of return.[1372] 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 3-47 sets out the assessment of our imputation adjustment and SFG's alternative adjustment against the criteria set out in the Guideline.

[1366] While an alternative approach could have been taken, we adopted this approach after extensive consultation with stakeholders.

[1367] 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.

[1368] 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.

[1369] 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).

[1370] 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).

[1371] NER, cl. 6.5.2(e)(1); NER, cl. 6A.6.2(e)(1); NGR, r. 87(5)(a).

[1372] AER, *Rate of return guideline*, 17 December 2013, p. 6.

Table 3-47 Assessment of imputation adjustments against criteria

Criteria[1373]	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.[1374] 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.[1375] 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 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

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[1373] 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.

[1374] 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.

[1375] Officer, 'The cost of capital under an imputation tax system'*, Accounting and Finance*, May 1994, 34.

Criteria[1373]	AER adjustment	SFG's adjustment
		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.

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 his 2015 report, Partington supported our view.[1376]

We assessed this issue at length in the Guideline and Victorian gas decisions, and this material remains relevant.[1377] 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 risk free rate and MRP. 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.[1378] 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).

In a number of reports for several service providers, CEG, SFG and Incenta submitted that the MRP has increased as CGS yields (our proxy for the risk free rate) have decreased, mainly because of a widespread 'flight to safety' or 'flight to quality' among

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[1376]   Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 71–74.

[1377]   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.

[1378]   McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, pp. 6, 24.

investors.[1379] Table 3-48 shows how SFG's MRP and risk free rate estimates have varied over its expert reports from May 2014 to February 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.[1380]

Table 3-48   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

Source: SFG reports[1381]

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

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[1379] 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, *Estimating the required return on equity: Report for Energex*, August 2014, pp. 31, 53; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, pp. 9, 41; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, pp. 22, 27–29, 34; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 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).

[1380] 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.

[1381] 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*, 12 March 2015 did not provide an overall MRP estimate.

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'.[1382] He stated:[1383]

> 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.

Moreover, current market evidence does not appear to be consistent with the view that there 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[1384]

- sharp increases in conditioning variables; dividend yields, credit spreads and implied volatility (see Figure 3.19 to Figure 3.22).

However, over the past 12 months, we have seen a:

- decrease in CGS yields[1385]

- limited movement in conditioning variables, which have remained fairly steady and close to their long term averages (see Figure 3.19 to Figure 3.22).

Partington considered that 'that the general and very substantial decline in credit spreads since the GFC seems inconsistent with increasing risk aversion'.[1386] However, Partington also noted that we should be cautious in using this evidence to infer a decrease in the MRP.[1387] This is because movements in the credit spread do not necessarily have direct parallels in movements of the equity risk premium.

We also received a submission in 2015 from the South Australian Centre of Social Service (SACOSS) and South Australian Centre for Economic Studies (SACES).[1388] In this submission, SACES did not consider there is currently any robust evidence to suggest the market for Australian government securities is significantly affected by a

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[1382] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

[1383] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

[1384] See CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 23 (figure 5).

[1385] See CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 23 (figure 5).

[1386] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 74.

[1387] 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.

[1388] SACOSS, *Submission to SA Power Networks' regulatory proposal for 2015–20*, January 2015; SACES, *Independent estimate of the weighted average cost of capital (WACC) for SA Power Networks 2015 to 2020: Final report*, January 2015, pp. 6–7.

'flight to quality' among investors. It noted the ASX has been experiencing strong but not excessive returns over the past few years. It also noted the recent decreases in CGS yields have been accompanied by even larger falls in the yields on corporate debt. We have regard to this submission, but note that movements of stock index returns and corporate bond yields do not necessarily imply similar movements of the MRP.

We are not satisfied that there is a clear relationship between the risk free rate and MRP. We are not satisfied that there is evidence of a widespread 'flight to quality' among investors in current market conditions. In fact, there is evidence to suggest investors may be engaging in a 'search for yield'. 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'.[1389] This is the benchmark rate against which other risky assets are priced to attract equity funds.

C.8   Selection of range and point estimate

We adopt an MRP point estimate of 6.5 from a range of 5.1 to 8.6 per cent. 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.[1390]

The MRP cannot be directly observed and there is no consensus among experts on which method produces the best estimate of the MRP.[1391] 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.[1392]

C.8.1   Selection of range

Based on the evidence before us, we consider a range of 5.1 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'.[1393] Therefore, while we have regard to geometric averages, we consider a reasonable estimate of the lower bound will be

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[1389]   Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

[1390]   NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

[1391]   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'.

[1392]   AER, *Rate of return guideline*, 17 December 2013, p. 16.

[1393]   McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012, p. 5.

above the geometric average.[1394] Therefore, we apply a lower bound estimate of 5.1 per cent.[1395]

- 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.[1396] 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.[1397] The upper bound of the MRP range has increased by 80 basis points since the November 2014 draft decisions. This increase is wholly the result of increased DGM estimates of the MRP.

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 using geometric averages. We consider 5.1 to 6.5 per cent a reasonable range and 6.0 per cent a reasonable point estimate based on this source of evidence.[1398]

- DGMs—these estimates, from two applications of the DGM and a range of inputs, suggest a range of 7.4 to 8.6 per cent for the two months to end February 2015.[1399]

- Survey evidence—surveys of market practitioners indicate that MRPs applied in Australia cluster around 6.0 per cent.[1400] This holds when considering averages, medians and modes across surveys.

[1394] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 83; AER, *Draft decision: SPI Networks access arrangement*, September 2012, Appendix B.2.1.

[1395] 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.

[1396] As such, this is a conservatively high estimate using our construction of the DGM. This estimate is for the two months ending February 2015.

[1397] NER, cll. 6.5.2(g); NER, cll. 6A.6.2(g); NGR, rr. 87(7).

[1398] In the worked example in the Guideline, we considered a reasonable MRP range based on historical excess returns evidence was 5.0 to 6.5 per cent, based on geometric mean estimates of 3.6 to 4.8 per cent and arithmetic mean estimates of 5.7 to 6.4 per cent. By setting the upper bound of the historical excess returns range at 6.5 per cent, we fully cover the historical excess returns estimates using arithmetic averages (the highest estimate using arithmetic averages is 6.41 per cent).

[1399] This end date is as close as practical to the publication of this decision. This is also close to the end of the averaging period used for the risk free rate (6 March 2015).

[1400] 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 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.

- 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.[1401]

- 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 7.9 per cent. The average of these decisions is 6.5 per cent.[1402]

We have also considered:

- Tribunal decisions—the Tribunal upheld our approach to estimating the MRP when APA GasNet appealed our decision in 2013.[1403] The MRP approach brought before the Tribunal was similar to that applied in this decision.[1404]

- 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.

- 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.[1405]

Figure 3.23 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.[1406]

[1401] See section C.4 for more information on, and charts of, the conditioning variables.

[1402] In November 2014, the ERA released a revised draft decision of the WACC for regulated rail networks, which adopted an MRP of 7.9 per cent. This forms the top of the range, though we note that the ERA's estimate is based on the Wright approach, which is adopted after consideration of the annuity pricing approach used by the ERA in its rail access regime and which may not be applicable in our case (ERA, *Review of the method for estimating the weighted average cost of capital for the regulated railway networks – Revised draft decision*, 28 November 2014, p. 89). The bottom of the range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC and TER. See: ERA, *Review of the method for estimating the weighted average cost of capital for the regulated railway networks—Revised draft decision*, 28 November 2014, p. 98; ESCV, *Proposed approach to Melbourne Water's 2016 water price review—Consultation paper*, February 2015, p. 39; TER *Draft report: 2015 price determination investigation—Regulated water and sewerage services*, January 2015, p. 41; NTUC, *Network price determination, Part A—Statement of reasons*, April 2014, p. 125; ESCOSA, *SA Water's water and sewerage revenues 2013/14–2015/16: Final determination—Statement of reasons*, May 2013, p. 136.

[1403] Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8*, 18 September 2013, Para 308.

[1404] The most notable change to our approach is that we now place more reliance on DGMs than using them as a cross check.

[1405] See discussion under 'Views of service providers and other stakeholders' in section C.8.2 for more information and full reference list.

[1406] 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.

Figure 3.23 Empirical estimates of the MRP against our point estimate of 6.5 (per cent)
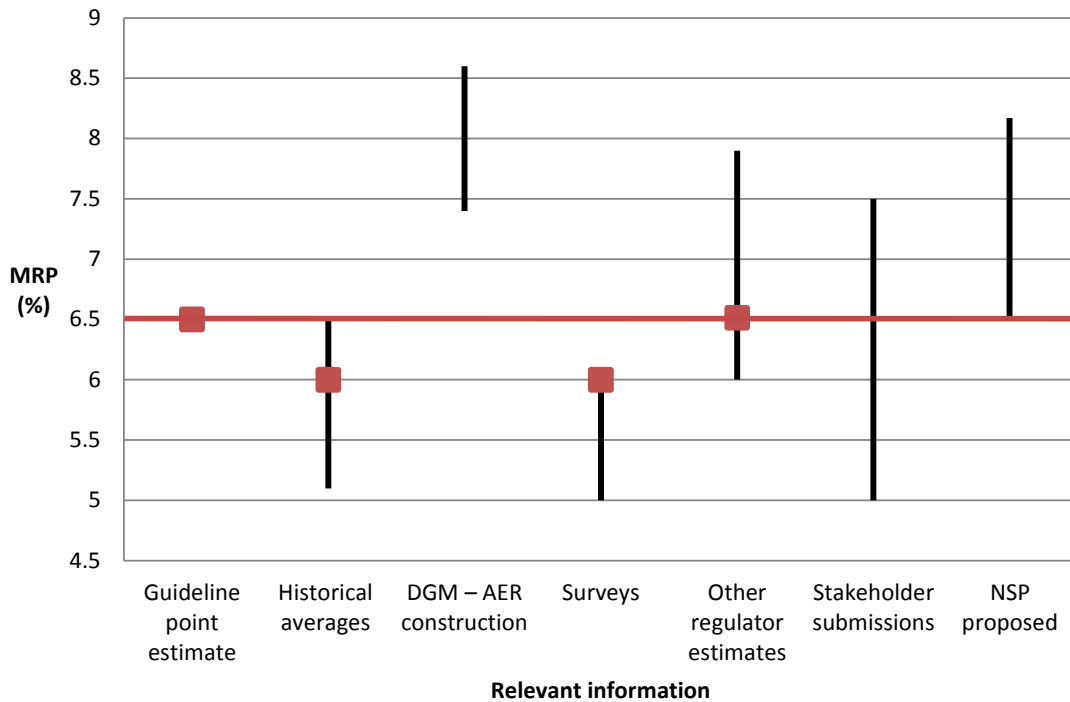
Source: AER analysis

Note: The average of each state regulator's most recent decision/update on the MRP forms the point estimate (6.5 per cent) for other regulator estimates. In November 2014, the ERA released a revised draft decision of the WACC for regulated rail networks, which adopted an MRP of 7.9 per cent.[1407] This forms the top of the other regulator estimates range. The bottom of this range is 6.0 per cent—the latest estimate of the MRP applied by the ESCV, ESCOSA, NTUC and TER.[1408] The stakeholder 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.[1409] The bottom of the NSP range

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[1407]   ERA, *Review of the method for estimating the weighted average cost of capital for the regulated railway networks—Revised draft decision*, 28 November 2014, pp. 89, 98. We note that the ERA's estimate is based on the Wright approach, which is adopted after consideration of the annuity pricing approach used by the ERA in its rail access regime and which may not be applicable in our case.

[1408]   ESCV, *Proposed approach to Melbourne Water's 2016 water price review—Consultation paper*, February 2015, p. 39; TER *Draft report: 2015 price determination investigation—Regulated water and sewerage services*, January 2015, p. 41; NTUC, *Network price determination, Part A—Statement of reasons*, April 2014, p. 125; ESCOSA, *SA Water's water and sewerage revenues 2013/14–2015/16: Final determination—Statement of reasons*, May 2013, p. 136.

[1409]   The CCP 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. CCP, *Response to AER draft determination for TasNetworks and TasNetworks' revised revenue proposal*, 18 February 2015, p. 4; CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, 16 February 2015, p. 7; CCP, *Submission: AER draft TransGrid determination TransGrid revised revenue proposal*, 6 February 2015, p. 13; CCP, *Response to AER draft determination for re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 24; CCP, *Submission to*

comes from TasNetworks and Directlink's revised proposals which accept the Guideline approach and our draft decisions.[1410] The top of the NSP range comes from Jemena Gas Networks' (JGNs') revised proposal, which applies an MRP of 8.17 per cent.[1411]

Figure 3.23 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.[1412]

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 February 2015) range from 7.4 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 consistent with the baseline estimate of 6.0 per cent.

- Since our draft decisions in November 2014, the increase in MRP estimates derived from the DGM has largely been the result of a decrease in the risk free

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AER: Responding to NSW draft determinations and revised proposals from electricity distribution networks, 2 January 2015, p. 46; CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16; CCIQ, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 20.

[1410] TasNetworks, *Revised revenue proposal*, January 2015, p. 5. Directlink, *Revised revenue proposal*, January 2015, p. 11.

[1411] JGN, *Revised access arrangement proposal*, February 2015, pp. 30–31.

[1412] Figure 3.23 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.

rate. Other inputs to the DGM have remained relatively steady. Figure 3.24 shows movements in the key DGM inputs (dividend forecasts and share price) and risk free rate since our application for the November 2014 draft decisions. 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:

- o We use conditioning variables as a directional indicator for the MRP because of their potential to detect changing market conditions. These indicate either no change or an easing in the MRP, which is a different outcome to our DGM estimates of the MRP. We also consider survey evidence provides forward looking estimates of the MRP based on investor expectations.

- o 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.[1413] We also consider our, and other, DGMs may not accurately track changes in the return on equity for the market.[1414] See section B.5 of appendix B–DGM for a more detailed discussion of sources of potential upward bias in our, and other, DGMs.

- o 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 of appendix C–MRP). 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'.[1415] This is the benchmark rate against which other risky assets are priced to attract equity funds.

[1413] 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.

[1414] 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.

[1415] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 72.

Figure 3.24 Movements in DGM inputs and risk free rate
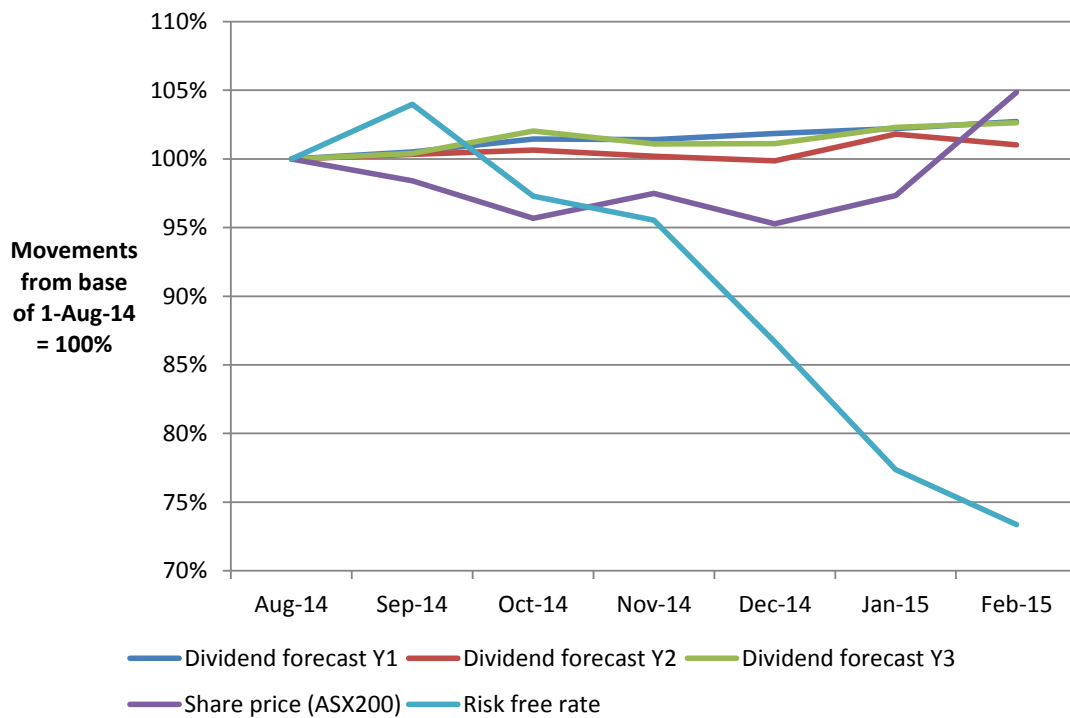
Source: AER analysis.

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.[1416] It also provides a balance between the views of services providers and other stakeholders.

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:[1417]

- Dividend yields have been close to their long term average since approximately April 2013, with no discernible trend (see Figure 3.19).

[1416] NER, cll. 6.5.2(f–g); NER, cll. 6A.6.2(f–g); NGR, rr. 87(6–7).

[1417] This information is as at 6 March 2015 (except for Australian corporate bond credit spreads, which is as at February 2015).

- Australian corporate bond credit spreads have been relatively steady over the last 12 months and now appear to be increasing slightly. The corporate bond spreads are above their pre-2007 levels but the swap spread is below its pre-2007 levels (see Figure 3.20). State government bond spreads appear to have increased slightly over the past 6 months but remain close to their pre-2007 levels (see Figure 3.21).

- Implied volatility has generally been below its long term average since around January 2013, with no discernible trend (see Figure 3.22).

We note similar patterns in other forward looking financial market indicators. For example:[1418]

- Figure 3.25 shows that Australian corporate bond yields have decreased significantly since about 2011, moving closely with CGS yields.

- Figure 3.26 shows Australian forward price-earnings ratios since 2003. The RBA, in its statement of monetary policy stated 'valuations of Australian equities, as measured by forward price-earnings ratios, have increased since the previous Statement to be above their decade averages for all sectors'.[1419] The RBA also noted that Australian equity prices have increased by 7 per cent since the start of 2015.

Figure 3.25 Australian corporate bond yields and spreads
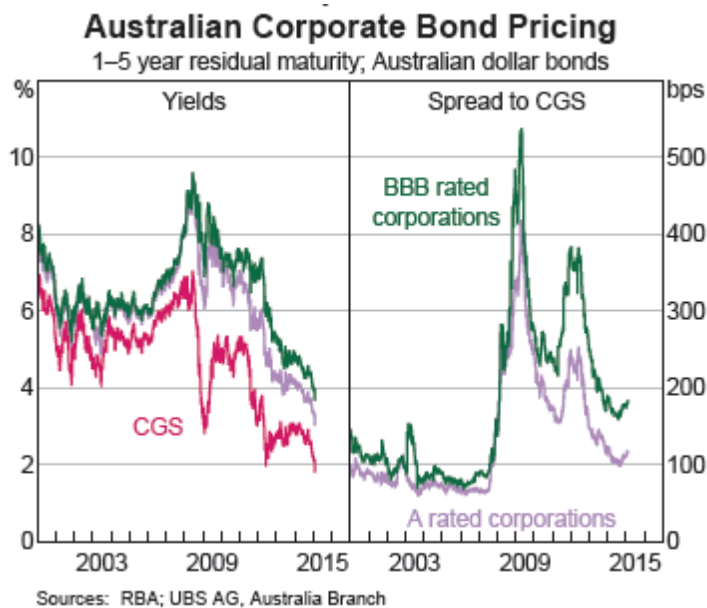
Source: RBA, *Statement of monetary policy*, February 2015, p. 56.

[1418] This information is as at February 2015.

[1419] RBA, *Statement of monetary policy*, February 2015, p. 59.

Figure 3.26 Australian forward price-earnings ratios
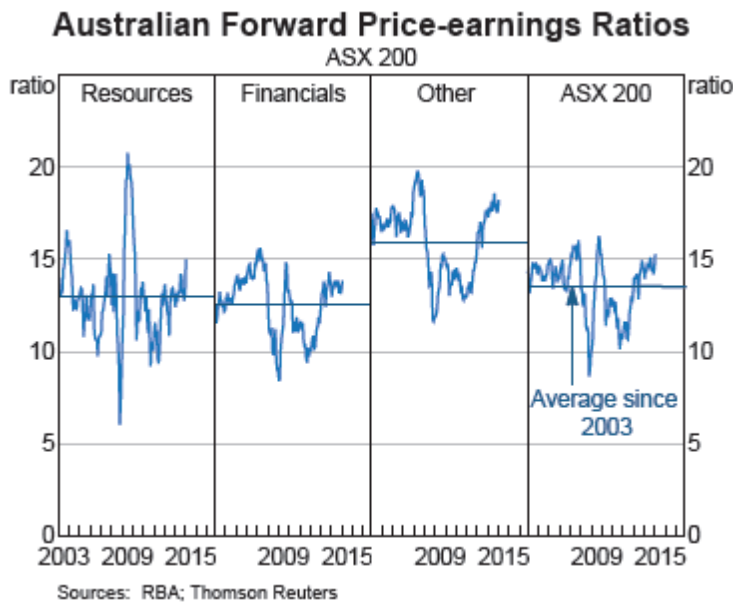
Australian Forward Price-earnings Ratios
ASX 200

Sources: RBA; Thomson Reuters

Source: RBA, *Statement of monetary policy*, February 2015, p. 59.

In steps one and two of our foundation model approach (see section 3.4.1), we note DGM estimates can reflect changes in market conditions. We also note conditioning variables have the potential to indicate changes in market conditions, even though it is difficult to derive a specific MRP estimate from this information. These two sources of evidence are not in line with each other.

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 (2014) survey does not indicate an increasing MRP expectation (see section C.3).

Together, the other information we rely on in estimating the MRP is consistent with our baseline estimate of the MRP 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.[1420] 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.[1421] They also advised that DGMs may incorrectly track changes in the return on equity.[1422] They provided the following reasons for these views:

- Analyst forecasts are well understood to be upward biased.[1423]

- DGMs use dividends as a proxy for free cash flow to equity, which is the share of the operating cash flow available for owners.[1424] However, there are a number of problems with this approach:

  o 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. McKenzie and Partington consider this may be less of a problem at the market level, but it is not guaranteed, particularly in times of crisis.[1425]

  o 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 the dividend. 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

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[1420] 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.

[1421] 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, p. 59.

[1422] 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.

[1423] 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.

[1424] 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.

[1425] 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.

> Partington consider there is likely to be an asymmetry in the effects because of the greater reluctance to cut dividends than increase dividends.[1426]

- 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.[1427] 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 are mindful 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.[1428] Lally observed that if DGMs do not incorporate a term structure, these 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).[1429] Lally stated that:[1430]

> 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'.[1431] 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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[1426] 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.

[1427] 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.

[1428] 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.

[1429] Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013, pp. 11–12.

[1430] Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013, pp. 11–12.

[1431] 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 his 2015 report, Partington supported our view.[1432] We are not satisfied that there is evidence of a widespread 'flight to quality' among investors in current market conditions. In fact, there is evidence to suggest investors may be engaging in a 'search for yield', which is not consistent with an increase in the MRP.

This is discussed in detail in section C.7 of this appendix.

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.[1433] For example:

- The NSW distribution network service providers proposed a long term historical MRP of 6.56 per cent (1883–2013 averaging period) based on CEG and NERA's 2015 reports.[1434]

- TransGrid did not propose a specific MRP estimate. Rather, it proposed an overall return on equity estimate based on NERA's analysis of various models and approaches. However, this included MRP estimates for different specifications of the SLCAPM and Black CAPM, which ranged from 6.5 (long-term SLCAPM) to 7.46 per cent (Wright approach).[1435]

- The other service providers have relied on SFG's weighted average method to estimate the MRP, which produced MRP estimates from 7.57 to 8.17 per cent, depending on the time of estimation.[1436] SFG's weighted average method places

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[1432] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 71–74.

[1433] This is with the exception of TasNetworks and Directlink, who have accepted our Guideline position and draft decision estimate of the MRP. See: TasNetworks, *Revised revenue proposal*, January 2015, p. 5; Directlink, *Revised revenue proposal*, January 2015, p. 11.

[1434] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 5; NERA, *Historical estimates of the market risk premium*, February 2015, p. 42.

[1435] NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, pp. 87–88. (NERA, *Return on capital of a regulated electricity network*, May 2014)

[1436] The other service providers are ActewAGL, JGN, Energex, Ergon Energy and SA Power Networks (SAPN). SFG, *Updated estimate of the required return on equity: Draft report for Ergon*, 14 August 2014, p. 4; SFG, *Updated estimate of the required return on equity: Report for SA Power Networks*, 8 September 2014, p. 4; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014; SFG, *The required return on equity: Initial review of the AER draft decisions: Note for ActewAGL, Ausgrid, Essential Energy and Endeavour Energy*, 19

most reliance on MRP estimates from its own DGM construction (50 per cent). It also places reliance on to MRP estimates from historical excess returns (20 per cent), the Wright approach (20 per cent) and independent valuation reports (10 per cent).

Stakeholder submissions (excluding submissions by service providers) generally supported an MRP at or below 6.5 per cent (see

January 2015, p. 42 (SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015); SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 33.

Table 3-49 at the end of this appendix). For example:

- The Consumer Challenge Panel (CCP) and Energy Users Association of Australia (EUAA) recommended an MRP of 5.0 per cent, at the bottom of the range determined in the Guideline.[1437] This appears to be based on outcome-based considerations regarding the profitability 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 Service (SACOSS) recommended an MRP of 6.0 per cent.[1438] This is based on advice from the SA Centre for Economic Studies (SACES). SACES recommended the MRP be constructed using MRP estimates from historical excess returns (post-1988) and DGM evidence (using a long run averaging period).

- The Queensland Council of Social Service (QCOSS) recommended an MRP of 6.0 per cent.[1439] 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'. Engineroom considered the DGM model should not be used in estimating the MRP because it produces upward biased estimates.

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 report, SFG submitted that we have set a 'cap' for the MRP at 6.5 per cent based on our favoured subset of evidence (historical excess returns).[1440] It submitted we would not increase the MRP beyond this 'cap' even if all the other evidence

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[1437] CCP, *Submission: AER draft TransGrid determination TransGrid revised revenue proposal*, 6 February 2015, p. 11; EUAA, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 15. These submissions referred to previous submissions: CCP, Submission on the TransGrid revenue proposal, 8 August 2014; EUAA, Submission to the NSW distribution network service providers' regulatory proposals for 2014–19, 8 August 2014.

[1438] 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, pp. 7–11.

[1439] 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.

[1440] SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 22.

supported an MRP above it. 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. In this appendix, we also 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 rate of return objective.

Service providers and other stakeholders have also submitted that their recommended MRP estimates (which range from 5.0 to 8.17 per cent)[1441] contribute to achieving the allowed rate of return objective.[1442] 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.

[1441] This excludes the MRP estimate of 0.2 per cent proposed by the Alliance of Electricity Consumers. We consider this estimate to be unreasonably low and not supported with sufficient reasoning. The Alliance of Electricity Consumers 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, *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).

[1442] See, for example, CCP, *Response to AER draft determination for TasNetworks and TasNetworks' revised revenue proposal*, 18 February 2015, p. 4; TSBC, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, February 2015, p. 31; Origin, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 17; ActewAGL, Revised regulatory proposal, January 2015, p. 458; JGN, *Revised access arrangement proposal—Appendix 7.1: Return on equity response*, Febraury 2015, p. 4.

Table 3-49 Submissions on the MRP

Support MRP less than 6.5%	Support Guideline / November 2014 draft decisions (MRP of 6.5%)	Support service providers' proposals (MRP greater than 6.5%)
EUAA	AGL Energy	Citipower and Powercor
Alliance of Electricity Consumers	Origin Energy	Jemena Limited
QCOSS	Australian PV Institute	United Energy
Total Environment Centre (TEC)	Energy Consumers Coalition of SA (ECCSA)	Australian Gas Networks
SACOSS	Major Energy Users (MEU)	SA Power Networks (SAPN)
Bell Bay Aluminium	Australian Civil and Administrative Tribunal (ACAT)	AusNet Services
Tasmanian Small Business Council (TSBC)		Energy Networks Association (ENA)
CCP		Ergon Energy
UnitingCare Australia		TasNetworks
		RARE Infrastructure

Submissions to the SA/Qld proposals; Submissions to NSW/ACT/Tas revised proposals and AER draft decisions.[1443]

[1443] Supportive of the Guideline and November 2014 draft decision approach: AGL, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16; 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 the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 6; Australian PV Institute, *Submission to SA Power Networks' regulatory proposal for 2015–20*, December 2014, p. 5; 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. 13; MEU, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, February 2015, pp. 56–57; Origin, *Submission to TransGrid's revised revenue proposal and AER draft decision for 2014–19*, 6 February 2015, p. 5; ACAT, *Submission to ActewAGL's revised regulatory proposal and AER draft decision for 2014–19*, 20 February 2015, p. 1; AGL, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 3; Origin, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 2. Supportive of MRP less than 6.5 per cent: EUAA, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 14; Alliance of Electricity Consumers, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 6; QCOSS, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 73; TEC, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, February 2015, p. 20; SACOSS, *Submission to SA Power*

Note: The Chamber of Commerce and Industry Queensland (CCIQ) submitted a low MRP be used, preferably in the range of 5.0 to 7.5 per cent (see: CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16; CCIQ, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 20). The Queensland Farmers' Federation (QFF) supports the CCIQ's submission (see: QFF, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 11). The Energy Markets Reform Forum (EMRF) considered the AER has been conservative in setting the MRP. However, its recommendation was for the AER to adopt 'the midpoint of any range of point estimates where there might be doubt' and then apply an overall level of conservatism to the final assessment of the allowed revenue (see: EMRF, *Submission to TransGrid's revised revenue proposal and AER draft decision for 2014–19*, January 2015, pp. 11–12). For this decision, this approach leads to an MRP greater than 6.5 per cent.

Networks' regulatory proposal for 2015–20, January 2015, p. 19; UnitingCare, *Submission to SA Power Networks' regulatory proposal for 2015–20*, February 2015, p. 32; Bell Bay Aluminium, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, 6 February 2015, p. 1; TSBC, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, February 2015, p. 31; EUAA, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 17; CCP, *Response to AER draft determination for TasNetworks and TasNetworks' revised revenue proposal*, 18 February 2015, p. 4; CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, 16 February 2015, p. 7; CCP, *Submission: AER draft TransGrid determination TransGrid revised revenue proposal*, 6 February 2015, p. 13; CCP, *Response to AER draft determination for re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 24; CCP, *Submission to AER: Responding to NSW draft determinations and revised proposals from electricity distribution networks*, 2 January 2015, p. 46. Supportive of the service providers' proposals (excluding submissions by the service providers to their own review process): Citipower and Powercor, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 8; Jemena Limited, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 6; United Energy, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 8; Australian Gas Networks, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 7; SAPN, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 7; AusNet Services, *Submission to the ACT/NSW revised regulatory proposals and AER draft decisions for 2014–19*, 12 February 2015, p. 12; ENA, *Submission to the ACT/NSW revised regulatory proposals and AER draft decisions for 2014–19*, 13 February 2015, p. 15; Ergon Energy, *Submission to the ACT/NSW revised regulatory proposals and AER draft decisions for 2014–19*, 13 February 2015, p. 6; TasNetworks, *Submission to the ACT/NSW revised regulatory proposals and AER draft decisions for 2014–19*, 12 February 2015, p. 2; AusNet Services, *Submission to TransGrid's revised revenue proposal and AER draft decision for 2014–19*, 6 February 2015, p. 10; RARE Infrastructure, *Submission to the NSW distribution network service providers' revised regulatory proposals and AER draft decisions for 2014–19*, 13 February 2015, p. 2.

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).[1444] Because the SLCAPM works on the basis that investors can diversify away business–specific risk, only systematic risk is relevant for determining equity beta.[1445]

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.[1446]

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.[1447] 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.[1448] 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.

D.1   Conceptual analysis

The 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

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[1444] 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.

[1445] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp. 21–22

[1446] NER, cll. 6.5.2(c) and 6A.6.2(c); NGR, rule 87(3).

[1447] AER, *Rate of return guideline*, December 2013, p. 15.

[1448] The service providers who have submitted proposals are Ergon Energy, Energex and SA Power Networks (SAPN). The service providers who have submitted revised proposals are TransGrid, TasNetworks, Directlink, Ausgrid, Endeavour Energy, Essential Energy, ActewAGL and Jemena Gas Networks (JGN).

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 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.[1449] 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 recent reports.[1450] We addressed this type of conceptual analysis at length in the Guideline and our 2012 decision for the Roma to Brisbane pipeline, and this material remains relevant.[1451] However, given submissions received, we have reviewed the material before us.

Two key types of systematic risk are relevant for this conceptual assessment: business risk and financial risk.

D.1.1   Business risk

Business risk in this context is referring to the systematic risk exposure of the underlying business assets.[1452] It is generally accepted that the benchmark efficient entity has lower business risk than the market average firm.[1453] We consider that

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[1449] 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)

[1450] 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.

[1451] 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.

[1452] We note business risk in this context is only systematic/market risk and does not include firm specific risk that can be diversified away.

[1453] 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

business risk for the benchmark efficient entity will be very low for the following reasons:[1454]

- 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 with low price elasticity of demand.

- The structure of the regulatory regime insulates service providers from systematic risk. For example, this provides for revenue cap regulation, tariff variation mechanisms and cost pass through mechanisms. This 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.[1455] 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.[1456] 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 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).[1457]

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'.[1458] In their 2014 (and 2015) report, McKenzie and Partington reiterated this conclusion and cited a number of published academic articles to support their view.[1459] 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).

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.

[1454] 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.

[1455] 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.

[1456] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 7, 14.

[1457] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 6, 15.

[1458] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 14.

[1459] 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.

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.[1460] 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.[1461] 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 (to the extent that the business is able to pass on borrowing costs to consumers).[1462] 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'.[1463]

In its 2013 report, Frontier disaggregated financial risk (arising as a consequence of how the business's activities are funded) into five different subcategories.[1464] For each of the subcategories that contribute to financial risk, Frontier assessed the level of risk for regulated Australian energy network businesses relative to other businesses in the economy as:[1465]

- low risk—default risk, financial counterparty risk, and illiquidity risk (for large networks)

- medium risk—refinancing risk

[1460] 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.

[1461] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 7–13.

[1462] 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.

[1463] McKenzie and Partington, *Report to the AER: Risk, asset pricing models and WACC*, June 2013, pp. 11–12.

[1464] This report included both systematic and non-systematic risk, although only the former is relevant for the estimation of equity beta.

[1465] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 65.

- medium to high risk—interest rate reset risk, and illiquidity risk (for small networks).

Further, 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.[1466] Later in that report, Frontier acknowledges that our implementation of a trailing average approach would reduce interest rate reset risk.[1467]

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. We note McKenzie and Partington remain of the view that they expressed in 2012; that it is the intrinsic risk of the firm which is the key driver of systematic risk.[1468]

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 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 by:[1469]

> 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.

[1466] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 64.

[1467] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 74.

[1468] McKenzie, Partington, *Report to the AER, Part A: Return on equity,* October 2014, pp. 12–13; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 32.

[1469] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.

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.[1470]

We have also received a number of stakeholder submissions in 2014 that suggest regulated energy network service providers face very low levels of systematic risk.[1471] Origin Energy (Origin) considered an efficient benchmark cost of capital for these firms is more comparable to a corporate bond rate than that of a company like Origin.[1472] The Public Interest Advocacy Centre (PIAC) and Consumer Challenge Panel (CCP) submitted that Australian energy network service providers face a more stable business environment than the market as a whole, and are seen as a 'safe haven' in periods where economic volatility is high.[1473] The Energy Markets Reform Forum (EMRF) also submitted that:[1474]

> publically listed networks consistently state to investors that one of benefits of investing in the networks are that they are offer stable long–term positive cash flows and are subject to a stable regulatory environment.

We received similar submissions in 2015.[1475] 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'.[1476] 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.[1477]

[1470] 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.

[1471] Submissions in 2014 were on the proposals submitted as part of the NSW/ACT/Tas regulatory determination process.

[1472] Origin, *Submission to NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014, p. 7.

[1473] PIAC, *Submission to the NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014,
p. 77; CCP, *Jam tomorrow? Submission to the NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014, p. 14; CCP, *Jam tomorrow? – ACT version: Submission to ActewAGL's regulatory proposal for 2014–19*, August 2014, p. 10.

[1474] EMRF, *Submission to Jemena Gas Network's access arrangement proposal for 2015–20*, August 2014, p. 86.

[1475] Submissions in 2015 were on the proposals submitted as part of the Qld/SA electricity distribution regulatory determination process, and on the AER draft decisions and the revised proposals submitted as part of the NSW/ACT/Tas regulatory determination process. Submissions which consider Australian network service providers face low levels of risk were made by the CCIQ, EUAA, Alliance of Electricity Consumers, Cummings Economics, National Irrigators Council, SPA Consulting Engineers, Townsville Enterprise, Canegrowers, Canegrowers ISIS, Central Highlands Cotton Growers and Irrigators Association, Darling Downs Cotton Growers, ETU, Origin, QCOSS, Business SA, Central Irrigation Trust, COTA SA, SACOSS, SAFCA, UnitingCare, MEU, PIAC,

[1476] QCOSS, Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20, 30 January 2015, p. 71.

[1477] Origin, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 14.

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.

However, in its 2014 reports for several service providers, SFG Consulting (SFG) has stated that it is not possible to conceptualise which component of systematic risk dominates the other. It considers there are a number of problems with our conceptual analysis, including:[1478]

- 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.

- 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.[1479]

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:

[1478] 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).

[1479] 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.

$$\beta_E = \beta_A \left(1 + \frac{D}{E} \right)$$

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 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 is an incorrect assumption.[1480] 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:[1481]

> 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 industry average gearing 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.

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:[1482]

[1480] 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.

[1481] 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.

[1482] 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.

- US industry beta tables presented by Aswath Damodaran (Damodaran), Professor of Finance at New York University

- 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).[1483] 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'.[1484]

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.[1485] 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 3-50, 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).

[1483] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.

[1484] 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.

[1485] SFG, *Equity beta*, May 2014, p. 19; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 61.

Table 3-50   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.[1486] 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.[1487] 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

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[1486]   CEG, *Equity beta from US companies*, June 2013, p. 20; AER, *Equity beta issues paper*, October 2013, p. 34.

[1487]   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.[1488] 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:[1489]

- 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.[1490] SFG stated the Guideline material appears to suggest that leverage affects equity beta via the five financial risks set out in the 2013 Frontier report. This is a mischaracterisation of our view. We do not consider that leverage affects equity beta via the five financial risks set out in the 2013 Frontier report.[1491] Further, we did not make this claim in any of the Guideline documents. In the Guideline appendices, we considered the exact relationship between financial risk and financial leverage is not straightforward, and we continue to maintain this view.[1492]

In its 2015 report for several service providers, SFG again disagreed with our conceptual analysis. It submitted that:[1493]

[1488] SFG, *Equity beta*, May 2014, pp. 19–20; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 61–62.

[1489] 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.

[1490] SFG, *Equity beta*, May 2014, pp. 20–21; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 62–63.

[1491] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 65.

[1492] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 41.

[1493] 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) and 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). 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 SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015 and SFG, *The required return on equity for the benchmark efficient entity*, 12 March 2015. 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, as the reports are very similar.

- 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'.

- 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[1494]

- there are risks associated with incurring debt, such as default risk, financial counterparty risk, illiquidity risk, refinancing risk, interest rate reset risk (as mentioned in Frontier's 2013 report)[1495]

- these risks contribute to the financial risk of a firm.

Therefore, we do not agree with SFG's submission that leverage is a 'more accurate term' than financial risk.[1496] 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.[1497] 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.[1498]

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:

[1494] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

[1495] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 65.

[1496] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 41.

[1497] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 8–10.

[1498] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.

- 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 estimates suggest the benchmark efficient entity would have a beta close to the market average firm.[1499] We show the re-levered estimates because we consider SFG presented incorrect re-levered estimates in its 2014 reports.[1500]

- The evidence from the Schlueter and Sievers article does apply to utilities because the article is a cross–sectional study across all industries.[1501] Schlueter and Sievers' robustness test confirms their results. These results indicate that intrinsic risk is the main component of equity beta for all industries. We do not consider that Schlueter and Sievers' results are less meaningful because they use two sentences to explain their robustness test.[1502]

Disruptive technologies and regulatory risk

ActewAGL and SA Power Networks (SAPN) have also submitted that our conceptual analysis is incorrect because we have not accounted for the recent risks arising from disruptive technologies.[1503] They 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. ActewAGL and SAPN referenced a number of reports describing various disruptive technologies and their impact on the energy sector. We also received a number of submissions from service providers that supported this aspect of SAPN's proposal.[1504]

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 the following questions:

- Is the risk systematic?

[1499] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 45.

[1500] We discuss this above

[1501] 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.

[1502] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 45.

[1503] ActewAGL, *Revised regulatory proposal*, January 2015, pp. 451–456; SAPN, *Regulatory proposal*, October 2014, pp. 306–309.

[1504] We received very similar submissions from CitiPower and Powercor, Jemena Limited, SAPN, United Energy and Australian Gas Networks. See: Citipower and Powercor, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 3.

- If so, could the risk already be accounted for in equity beta?

We do not consider the risk arising from disruptive technologies can be reasonably classified as systematic risk. In his 2015 report, Partington supports this view.[1505] 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. Moreover, the reports and evidence submitted by the service providers do not refer to any effects of disruptive technologies on the systematic risk of Australian network service providers.

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.[1506] The service providers' submissions make it clear that the risks arising from disruptive technologies in the energy sector are already widely recognised. For example, ActewAGL submitted that UBS has been conducting research into solar PV, battery storage and electric vehicles for over two years.[1507] We recognise our empirical equity beta estimates are measured over a relatively long estimation period. However, we also consider estimates measured over the last five years. This is consistent with ActewAGL's submission that disruptive technologies have increased risk for Australian energy distribution businesses over the last five years.[1508]

Further, 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:[1509]

> 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.

SAPN questions 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. It considers these measures will not be

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[1505] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 77–78.
[1506] Origin Energy submitted a similar view. It stated that 'if the consequences of the environment risk raised by SAPN were a significant and quantifiable threat, the market would have already incorporated these risks into the pricing of publicly listed network stocks'. See: Origin, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 13
[1507] ActewAGL, *Revised regulatory proposal*, January 2015, p. 453.
[1508] ActewAGL, *Revised regulatory proposal*, January 2015, p. 451.
[1509] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 77.

appropriate in a situation where 'an endless spiral of disconnections commences'.[1510] However, increasing the allowed rate of return (through equity beta) also increases costs to consumers, and as such we consider the same assumption applies.[1511]

ActewAGL also submitted that there has been a 'step change' increase in regulatory risk which requires compensation through an increase in the equity beta.[1512] We are not satisfied that ActewAGL has provided sufficient evidence to support its conclusion. Further, we are not satisfied ActewAGL has provided sufficient evidence to establish that any such risk is systematic. We consider our approach to estimating the equity beta sufficiently captures the systematic risk of the benchmark efficient entity.

Comparative systematic risks of gas and electricity networks

We consider the systematic risks between gas, electricity, transmission and distribution networks are sufficiently similar as to justify one benchmark. We considered this matter in detail during the Guideline development process, and this material remains relevant.[1513]

Jemena Gas Networks (JGN) submitted that gas distribution businesses are more risk exposed than electricity network businesses. Therefore, it considers applying an equity beta for a single benchmark efficient entity is likely to be highly conservative.[1514]

JGN set out a number of risks where it considered gas networks were more risk exposed. These are:[1515]

- demand risk

- sensitivity to other risk factors (that is, other factors that can influence demand)

- fuel of choice risk (consumers can substitute away from gas)

- wholesale price risk (wholesale gas prices are expected to rise, increasing demand uncertainty)

- supply shortfall risk (potential for supply shortfalls which increases demand uncertainty).

[1510] SAPN, *Regulatory proposal*, October 2014, p. 308.

[1511] 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.

[1512] ActewAGL, *Revised regulatory proposal*, January 2015, pp. 456–457.

[1513] AER, *Explanatory statement: Rate of return guideline (appendices)*, December 2013, pp. 36–38; AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 42–46.

[1514] JGN, *Revised access arrangement proposal—Appendix 7.1: Return on equity response*, February 2015, pp. 21–22.

[1515] JGN, *Revised access arrangement proposal—Appendix 7.1: Return on equity response*, February 2015, pp. 21–22.

JGN also submitted a report by HoustonKemp Economists (HoustonKemp), which discussed competition from alternative fuels in detail.[1516]

We disagree with JGN's view. We will respond to this issue in detail in our final decision for JGN. However, we note the following:

- We are not satisfied JGN has provided sufficient evidence to establish that the risks described are systematic risks.

- Both gas and electricity service providers face limited competition risk by virtue of being regulated natural monopolies. Generally, competition risks for regulated networks are low. Such networks are usually regulated because they are natural monopolies.

- We consider the regulatory framework for gas and electricity service providers are similar. The main difference is in the control mechanism that applies to their regulated services. Gas service providers are subject to a price cap, whereas electricity service providers are subject to a revenue cap. However, these are reset approximately every five years and gas service providers can mitigate the risk of forecast error by restructuring tariffs to offset demand volatility.

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). Therefore, we use our conceptual analysis as a cross check on the results of our empirical analysis, although we note we consider the empirical analysis alone is sufficient to support an equity beta point estimate of 0.7.

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 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.[1517] 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

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[1516] HoustonKemp, *Implications for Jemena Gas Networks (NSW) of increasing competition in the consumer energy market: A report for Jemena Gas Networks*, 27 February 2015 (HoustonKemp, *Implications for Jemena Gas Networks (NSW) of increasing competition in the consumer energy market*, 27 February 2015).

[1517] Henry, *Estimating β*, April 2009; Henry, *Estimating β: An update*, April 2014.

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 3-54). 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.[1518] 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'.[1519] 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 3-51 sets out the details of these nine firms. For its 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.[1520]

[1518] 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.

[1519] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 8, 33–36, 44–45.

[1520] 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

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.[1521] 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).[1522] We note that Envestra Ltd was delisted on 17 October 2014.[1523]

Table 3-51 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 Fund (HDF)	December 2004– November 2012	Gas
Spark Infrastructure Group (SKI)	March 2007[1524] – present	Electricity Gas
SP AusNet (SPN)[1525]	December 2005 – present	Electricity

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.

[1521] 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.

[1522] Henry, *Estimating β: An update*, April 2014, p. 12.

[1523] See:
http://www.asx.com.au/asx/statistics/announcements.do?by=asxCode&asxCode=ENV&timeframe=Y&year=2014.

[1524] 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.

[1525] 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.

Firm (symbol)	Time/trading period	Sectors
		Gas

While we consider the firms in Table 3-51 are comparable to the benchmark efficient entity, they also provide some non–regulated electricity and/or gas services. Examples of this include:

- Approximately 23 per cent of APA Group's revenue in the 2014 financial year (excluding pass–through revenue) was subject to prices determined under full regulation. APA generates most of the remaining 77 per cent of its revenue from contracts which have set terms, including negotiated pricing for the life of the contract.[1526]

- DUET Group's assets receive some unregulated revenue—Dampier Bunbury Pipeline (3 per cent unregulated), United Energy (8 per cent unregulated), Multinet Gas (7 per cent unregulated) in the 2014 financial year.[1527]

- Approximately 87 per cent of SP AusNet's (now AusNet Services) revenues are regulated, as at 30 May 2014.[1528]

- 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.[1529]

- 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.[1530]

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

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[1526] APA Group, *Innovating today transforming tomorrow: APA Group annual report 2014*, p. 2.

[1527] DUET Group, *Annual report 2014*, p. 5.

[1528] SP AusNet, *Statutory annual report 2014*, June 2014, p. 25.

[1529] 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.

[1530] GasNet, *Infrastructure for generations: GasNet Australia Group annual report 2005*, p. 29.

comparators are reasonable.[1531] 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.[1532]

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.

- We discuss equity beta estimates in the context of our foundation model, which is the domestic SLCAPM.[1533] 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.[1534] 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.[1535]

- 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.[1536] They engage in energy generation, wholesale and retail of energy, as well as other activities distinct from

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[1531] 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.

[1532] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, pp. 15, 69, 77, 86.

[1533] 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.

[1534] This is the case unless the equity betas are estimated using an international CAPM framework.

[1535] 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.

[1536] 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.

energy distribution and transmission. Some of the firms even engage in telecommunications, real estate development and manufacturing activities.[1537] 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.[1538]

- 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.

These factors are discussed in more detail in the Guideline and 2009 WACC review.[1539] 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.[1540]

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:[1541]

[1537] CEG, *Information on equity beta from US companies*, June 2013, pp. 47–68.

[1538] 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.

[1539] 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.

[1540] SFG, *Equity beta*, May 2014, p. 2; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 82.

[1541] 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.

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.[1542] 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.[1543] It considered our reasoning for 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.[1544] 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.[1545]

SFG has also questioned our consideration that geography and weather may influence the equity beta of a similar business operating in different countries.[1546] 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

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[1542] 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.

[1543] 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 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.

[1544] SFG, *Equity beta*, May 2014, p. 34; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 74.

[1545] 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.

[1546] SFG, *Equity beta*, May 2014, p. 33; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 73.

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 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.[1547] 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.[1548] 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.[1549] These stock market

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[1547] AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, p. 60.

[1548] SFG, *Equity beta*, May 2014, pp. 33–34; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 73–74.

[1549] 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

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.[1550] 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:[1551]

$$\beta_i = \frac{cov(r_i, r_m)}{var(r_m)}$$

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.[1552] 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

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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.

[1550] 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.

[1551] 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.

[1552] 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.

oranges' because they are measured relative to different domestic markets.[1553] He stated:[1554]

> 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.[1555] 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.

- We also note that the use of 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.[1556]

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.[1557] 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.[1558] 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.[1559] However, a larger dataset is not an end in itself. Decreasing the dispersion of estimates by increasing the size of the

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[1553] Handley, *Advice on the return on equity*, October 2014, p. 23.

[1554] Handley, *Advice on the return on equity*, October 2014, p. 23.

[1555] 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.

[1556] Handley, *Advice on the return on equity*, October 2014, pp. 23–24.

[1557] 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.

[1558] 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.

[1559] SFG, *Equity beta*, May 2014, p. 13.

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.[1560] The weekly returns for each firm are regressed against the weekly returns on the market over a period of time (the estimation period).[1561] 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 period available, ENV) observations.[1562] 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.[1563] 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 3-54 and section D.2.3).

In its 2015 reports for several service providers, SFG has again submitted that we should include the sample of 56 US energy firms in our comparator set of Australian energy network firms.[1564] It did not directly respond to any of the concerns we raised above.[1565] 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

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[1560] Henry, *Estimating β: An update*, April 2014.

[1561] 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.

[1562] Henry, *Estimating β: An update*, April 2014, pp. 17, 21.

[1563] NER, cll. 6.5.2(c) and 6A.6.2(c); NGR, rule 87(3).

[1564] 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*, 13 February 2015, p. 20.

[1565] 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.

international comparators in our Australian comparator set, for the reasons set out above.[1566]

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.[1567] CEG suggested that equity beta estimates based on our Australian comparator set does not best meet this objective because:

- 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 2014 from the CCP and other stakeholders that do not support the inclusion of international energy firms in our domestic comparator set.[1568] The PIAC and the EMRF submitted that the different samples of Australian and US equity beta estimates suggest SFG is attempting to combine two different population distributions.[1569] They considered SFG's merger of the two into a single average equity beta estimate, based on an arbitrary weighting of Australian and US firms, is dubious.

[1566] 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).

[1567] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–34.

[1568] CCP, *Jam tomorrow? Submission to the NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014, pp. 16–17; CCP, *Jam tomorrow?—ACT version: Submission to ActewAGL's regulatory proposal for 2014–19*, August 2014, p. 13; PIAC, *Submission to the NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014, pp. 78–79; PIAC, *Submission to Jemena Gas Network's access arrangement proposal for 2015–20*, August 2014, pp. 5–6; EMRF, *Submission to Jemena Gas Network's access arrangement proposal for 2015–20, August 2014*, p. 88.

[1569] PIAC, *Submission to the NSW distribution network service providers' regulatory proposals for 2014–19*, August 2014, pp. 78–79; EMRF, *Submission to Jemena Gas Network's access arrangement proposal for 2015–20, August 2014*, p. 88.

They also questioned SFG's exclusive use of US firms, without having considered energy network firms from other countries.

We received similar submissions in 2015. Origin supported our decision to use a comparator set of Australian energy network firms.[1570] It considered international comparators should not be used to the extent that the risks faced by these firms are not directly comparable to Australian conditions. PIAC considered a comparator set that included 56 US energy firms is not consistent with the conceptual model of the benchmark firm.[1571] QCOSS submitted similar views to PIAC and EMRF's 2014 submissions, and noted that US stocks are subject to very different operating and market conditions.[1572]

Based on the available evidence and after consideration of SFG and CEG's submissions, we maintain our view from the Guideline and November 2014 draft decisions.[1573] 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 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 (Table 3-54 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.

[1570] Origin, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, pp. 14–15.

[1571] PIAC, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 44.

[1572] QCOSS, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 78.

[1573] 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.

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.[1574]

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').[1575]

The LAD estimation method reduces the influence of extreme observations (or potential data outliers) on its estimates.[1576] 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.[1577]

In its 2014 report, SFG submitted that the LAD estimation method produces systematically downward biased equity beta estimates and should not be used.[1578] 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.[1579] For the in–sample market index used by the

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[1574]   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.

[1575]   AER, *Review of the WACC parameters: Final decision*, May 2009, pp. 267–271.

[1576]   Greene, *Econometric analysis*, Pearson Education (Prentice Hall): Fifth edition, 2003, p. 448.

[1577]   ERA, *Rate of return guideline explanatory statement*, December 2013, p. 179.

[1578]   SFG, *Equity beta*, May 2014, p. 12.

[1579]   Brooks, Diamond, Gray, Hall, *Comparison of OLS and LAD regression techniques for estimating beta*, June 2013, pp. 9–10.

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.[1580] 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'.[1581]

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).

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:[1582]

- the longest period available (which Henry recommends in his 2014 report)

- the period after the 'technology bubble' and before the global financial crisis (GFC)[1583]

- the last five years of available data.

[1580] Brooks, Diamond, Gray, Hall, *Comparison of OLS and LAD regression techniques for estimating beta*, June 2013, p. 10.

[1581] Henry, *Estimating β: an update*, April 2014, p. 62.

[1582] Henry, *Estimating β: An update*, April 2014, pp. 11–12, 63. Henry uses data up to 28 June 2013.

[1583] 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.

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.[1584] 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'.[1585] 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 adjustment to Australian equity beta estimates of between 0.1 to 0.3 is arbitrary and not based upon sufficiently robust analysis.[1586] This is because it appears to be based on visual inspection of two graphs.[1587] 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.[1588] We rely more on equity beta estimates

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[1584] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–34, 46–58.

[1585] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 76–77.

[1586] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 57–58.

[1587] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 57–58.

[1588] 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.

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.[1589]

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).[1590] SFG referenced a report by CEG which was submitted to the ERA in 2013.[1591] 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.[1592] 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'.[1593]

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.[1594] 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.[1595] This is well

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[1589] Henry, *Estimating β: An update*, April 2014, pp. 9–10.

[1590] SFG, *Equity beta*, May 2014, pp. 29–31; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 69–71.

[1591] CEG, *Regression estimates of equity beta*, September 2013, pp. 25–27.

[1592] 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.

[1593] SFG, *Regression based estimates of risk parameters for the benchmark firm*, June 2013, p. 5.

[1594] 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.

[1595] 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

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.[1596] 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.[1597] 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.[1598]

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, 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:[1599]

- 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

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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).

[1596] 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.

[1597] SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, p. 15, footnote 28.

[1598] 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.

[1599] 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.

- 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.[1600] 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.[1601]

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

[1600] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 29–30.

[1601] 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 Energex*, 28 August 2014, pp. 70–71, figure 9; CEG, *AER equity beta issues paper: International comparators*, appendix A, October 2013, pp. 41–45.

o β_a is the un-levered asset beta, and

o $\frac{D}{E}$ 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 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 2014 from the EMRF, Major Energy Users (MEU), UnitingCare Australia (UnitingCare) and Norske Skog Paper Mills, which considered Henry's 2014 report indicates we should choose an equity beta estimate closer to the median of the individual firm estimates.[1602] We received a number of similar submissions in 2015.[1603] We do not consider there is evidence in Henry's 2014 report that indicates a

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[1602] EMRF, *Submission to TransGrid's revenue proposal for 2014–19, July 2014, pp. 31–31;* EMRF, *Submission to the NSW distribution network service providers' regulatory proposals for 2014–19, July 2014, p. 35*; Norske Skog Paper Mills, *Submission to TransGrid's revenue proposal for 2014–19*, August 2014, p. 8; MEU, *Submission to TasNetworks' revenue proposal for 2014–19*, August 2014, pp. 33–34; UnitingCare, *Submission to the NSW distribution network service providers' regulatory proposals for 2014–19, September 2014, p. 20;* UnitingCare, *Submission to ActewAGL's regulatory proposal for 2014–19, September 2014, p. 20.*

[1603] 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; TSBC, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, February 2015, p. 28.

preference for median equity beta estimates over average equity beta estimates. The median is also not the most common value in a sample (as some of these submissions have stated), it is the middle value of a sample.[1604] 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:[1605]

- 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.[1606] 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.[1607] SFG considered that this means Henry's 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.[1608] 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

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[1604] The most common value in a sample is referred to as the mode.
[1605] Henry, *Estimating β: An update*, April 2014, pp. 34–36.
[1606] Henry, *Estimating β: An update*, April 2014, p. 52.
[1607] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 30–31.
[1608] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 31.

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.[1609] In the 2009 WACC review we stated:[1610]

> 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.[1611] 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.[1612]

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.[1613] 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 parameter of interest before seeing the data.[1614] 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

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[1609] 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.

[1610] AER, *Review of WACC parameters: Final decision*, May 2009, p. 243.

[1611] SFG, *Equity beta*, May 2014, p. 11.

[1612] 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.

[1613] Vasicek, *A note on using cross-sectional information in bayesian estimation of security betas*, Journal of Finance 28(5), December 1973, p. 1233.

[1614] 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.

the US market, which has a mean of 1.0.[1615] 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.[1616] 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:[1617]

> 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.[1618] This leads the authors to their conclusion that 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.

[1615] 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.

[1616] SFG, *Equity beta*, May 2014, p. 10.

[1617] Vasicek, *A note on using cross-sectional information in bayesian estimation of security betas*, Journal of Finance 28(5), December 1973, p. 1237.

[1618] 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.

- 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.[1619]

In its 2015 report, SFG has again proposed we apply a Vasicek adjustment to our equity beta estimates.[1620] 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:[1621]

> 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.[1622] 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)

- 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)

[1619] SFG, *Regression-based estimates of risk parameters*, June 2013, p. 6.

[1620] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 31.

[1621] Partington, *Report to the AER: Return on equity (updated),* April 2015, pp. 33–34.

[1622] Henry, *Estimating β: An update*, April 2014, p. 9.

- do not apply a Blume or Vasicek adjustment.[1623]

We consider the equity beta estimates presented in Henry's empirical analysis support a range of 0.4 to 0.7. Table 3-52 and Table 3-53 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.[1624]

- 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.[1625]

Table 3-52   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 3-53   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
Equal weighted					
Longest available period[a]	0.46	0.52	0.50	0.48	0.39
longest available period (excl. tech	0.49	0.52	0.55	0.53	0.45

[1623]   Henry does not apply a Blume or Vasicek adjustment of any of his estimates, as specified in our terms of reference.

[1624]   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.

[1625]   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
boom and GFC)					
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'.[1626] The results are as follows:[1627]

- the re-levered LAD estimates range from 0.38 to 0.58 and the raw LAD estimates range from 0.31 to 0.60.[1628]

- the OLS estimates using monthly return intervals range from 0.37 to 0.58.[1629]

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

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[1626]   Henry, *Estimating β: An update*, April 2014, p. 62.

[1627]   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.

[1628]   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.

[1629]   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.

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'.[1630] 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.

Figure 3.27 Equity beta estimates from Henry's 2014 report (average of individual firm estimates and fixed weight portfolio estimates)
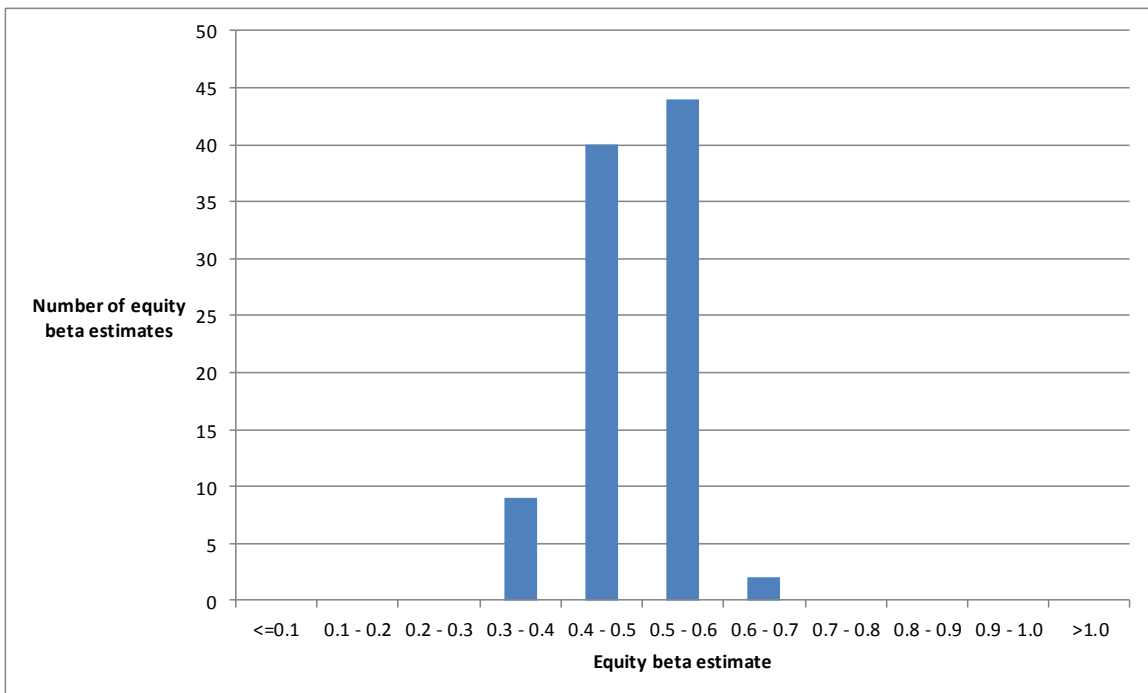
Source: AER analysis; Henry, *Estimating β: An update*, April 2014.

[1630] 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.

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.[1631] 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.[1632]

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 1.0.[1633] 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':[1634]

- 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.[1635]

SFG and the CCP used individual firm estimates to support their views.[1636] We consider the most useful empirical estimates are averages of individual firm estimates

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[1631] SFG, *Equity beta*, May 2014, pp. 2–3; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 68–71.

[1632] 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.

[1633] 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.

[1634] SFG, *Equity beta*, May 2014, p. 3; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 68–71.

[1635] 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.

[1636] 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.

and fixed weight portfolio estimates, and these estimates range from 0.4 to 0.7 under almost every regression permutation considered, including:[1637]

- 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.[1638]

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.[1639] 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.[1640] Table 3-54 sets out empirical studies from 2002 that show equity 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.[1641] 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.[1642] 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.[1643] 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.[1644]

[1637] 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.

[1638] SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 2, 13.

[1639] This range includes averages of individual firm estimates and fixed weight portfolio estimates. See: Henry, *Estimating β*, April 2009.

[1640] ERA, *Rate of return guideline explanatory statement*, December 2013, p. 171.

[1641] This is excluding time varying portfolios and Vasicek/Blume adjustments. See Table 3-54. 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).

[1642] SFG, *Equity beta*, May 2014, p. 40; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, p. 82.

[1643] SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, p. 19.

[1644] This includes all individual firm estimates (OLS, LAD, weekly returns, monthly returns, all estimation periods). Henry, *Estimating β: An update*, April 2014, p. 27.

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.[1645] 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.[1646] We have had regard to these submissions and maintain our view for the reasons set out above. We also note Partington's statement that:[1647]

> 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.

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.[1648]

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 3-54. 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

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[1645] 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. Moreover, 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.

[1646] 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).

[1647] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 22.

[1648] 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.

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 3-54 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,

Source	Time period	Individual firm averages	Fixed portfolios	Varying portfolios[a]	Summary of regression permutations
					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.[1649]

(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

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[1649]   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.

energy network firms in its peer group.[1650] 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.[1651] We set out our reasons for averaging over 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.[1652]

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.[1653] The studies we consider in this decision present equity beta estimates that range from 0.3 to 1.0.[1654] These studies are discussed below:

[1650]   Grant Samuel and Associates, *Letter—Grant Samuel response to AER draft decision*, 12 January 2015, p. 8.

[1651]   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 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.

[1652]   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.

[1653]   AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 64–67.

[1654]   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.

- 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.[1655] 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.[1656] The resulting OLS equity beta estimates are as follows:[1657]

  - 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
    - 0.91 for the average equity beta of an equal–weighted index.[1658]

- 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.[1659] 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:[1660]

  - raw:
    - 0.59 as at January 2015
  - re-levered to 60 per cent gearing:[1661]
    - 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

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[1655] CEG, *Information on equity beta from US companies*, June 2013, p. 7.

[1656] SFG, *Regression-based estimates of risk parameters*, June 2013, p. 6.

[1657] 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.

[1658] 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.

[1659] '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/.

[1660] 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/.

[1661] We have de-levered and re-levered the raw equity beta estimates from Damodaran's data.

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:[1662]

- o 0.45 using one year of daily data (10 May 2011 to 9 May 2012)
- o 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.[1663] 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.[1664] We 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.[1665]

- 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.[1666] PwC's June 2014 report presents the following raw equity beta estimates for two New Zealand energy network firms as at 31 December 2013:[1667]

- o raw:

  - ▪ 0.6 for the average of individual firm estimates

- o re-levered to 60 per cent gearing:[1668]

[1662] 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.

[1663] 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.

[1664] 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. 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.

[1665] 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.

[1666] See: http://www.pwc.co.nz/appreciating-value/pwc-wacc-formula/

[1667] 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.

[1668] We have de-levered and re-levered the raw equity beta estimates from the data in PwC's report.

- 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.[1669] The resulting average equity beta estimates are:[1670]

  - 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:[1671]

    - 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.[1672] 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.[1673] 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

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[1669] See: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 37.

[1670] The Brattle Group, *The WACC for the Dutch TSOs, DSOs, water companies and the Dutch pilotage organisation*, March 2013, pp. 16–18.

[1671] We have de-levered and re-levered the raw equity beta estimates from the data in Brattle Group's report.

[1672] 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.

[1673] 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.

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:[1674]

- 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

- 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

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[1674] 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).

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.[1675] We consider this issue highlights the limitations of using international empirical estimates to estimate the equity beta for an Australian benchmark efficient entity.

- We consider the international empirical estimates in a holistic manner, keeping in mind that there are inherent uncertainties when relating foreign estimates to Australian conditions. The reports we consider above are from reputable sources.[1676] 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:

  o 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.[1677]

  o 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.[1678]

  o 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.[1679] 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.

[1675] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 74–75.

[1676] 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).

[1677] 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.

[1678] 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.

[1679] 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.

- 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.[1680] Evidence (including equity beta estimates) was provided by a number of experts that were sponsored by utilities and other stakeholders.

- 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).[1681] 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.[1682]

In its 2015 report for several service providers, CEG made similar submissions to SFG.[1683] 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.[1684] 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.[1685] However, we consider both the raw and re-levered estimates.

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'.[1686] 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.

[1680] 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.

[1681] SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 14.

[1682] 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.

[1683] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 34–38

[1684] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 37.

[1685] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 37–38.

[1686] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 76.

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 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.[1687]

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.[1688] 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).

[1687]   AER, *Explanatory statement to the rate of return guideline (appendices)*, December 2013, pp. 68–73.

[1688]   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.

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.[1689] 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 theory underlying the Black CAPM does not necessarily support an uplift to the equity beta estimate used in the SLCAPM.[1690]

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.[1691]

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.[1692] 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.[1693] This is discussed further in section D.5.3.

[1689] 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.

[1690] 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.

[1691] 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 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.

[1692] 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'.

[1693] 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.

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:[1694]

- 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).

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.[1695]

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:[1696]

[1694] 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*, 13 February 2015, p. 19.

[1695] 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.

[1696] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 71.

we do not consider that the consultants' estimates of the Black model provide a basis for assessment of the magnitude of the beta adjustment.

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 received extensive support for the Guideline approach and application in stakeholder submissions.[1697]

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:[1698]

> the majority of evidence presented in this report, across all estimators, firms and portfolios, and all sample periods considered,

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[1697] Submissions supporting the Guideline approach and/or November 2014 draft decisions, which applied the Guideline approach. 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; MEU, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, February 2015, pp. 56–57; Origin, *Submission to TransGrid's revised revenue proposal and AER draft decision for 2014–19*, 6 February 2015, pp. 5–6; ACAT, *Submission to ActewAGL's revised regulatory proposal and AER draft decision for 2014–19*, 20 February 2015, p. 1; AGL, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 3; ERAA, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 3; Origin, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, pp. 2, 14–15.

[1698] Henry, *Estimating β: An update*, April 2014, p. 63.

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.[1699] 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)

- 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).

In its 2014 report for the NSW distribution network service providers, CEG proposed an equity beta range 0.82 to 0.94.[1700] The lower bound is based on SFG's empirical analysis using a comparator set of Australian and US energy firms and the upper bound is based on SFG's dividend growth model (DGM) estimate of relative risk ratios.[1701] CEG and SFG (in their 2014 reports) consider the equity beta range proposed in the Guideline:[1702]

[1699] 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.

[1700] CEG, *WACC estimates*, May 2014, pp. 6–7.

[1701] CEG, *WACC estimates*, May 2014, pp. 6–7, 10, 19; SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013; 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, pp. 57, 59.

[1702] SFG, *Equity beta*, May 2014, pp. 25–27; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 66–68; CEG, *WACC estimates*, May 2014, 6–11.

1. is arbitrary and meaningless, as it does not encompass the range of individual firm estimates

2. is based on one source of unreliable evidence (Australian empirical analysis), which pre-emptively dilutes or eliminates the impact of other relevant evidence

3. does not account for 'low beta bias' in the SLCAPM.

In regards to CEG and SFG's view that our range is arbitrary and meaningless, our equity beta range is based on averages of individual firm estimates and fixed weight portfolio estimates in Henry's 2014 report and other empirical studies (see sections D.2.3 and D.2.4). It does not represent the range of individual firm equity beta estimates. We note that SFG also presents its empirical equity beta estimates as averages of individual firm estimates and equal–weighted index estimates.[1703]

CEG and SFG's second and third points are interconnected with our selection of the equity beta point estimate. Therefore, we discuss these points in section D.5.3.

In its 2015 reports for several service providers, SFG again submitted that our range is based on one source of unreliable evidence (Australian empirical analysis), which pre-emptively dilutes or eliminates the impact of other relevant evidence.[1704] We do not agree with this submission, for the reasons discussed in section D.5.3.

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.[1705] 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.

[1703]   SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 13–15.

[1704]   SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 6–9, 26–28; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 27; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, p. 19.

[1705]   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).

However, we do not consider the theory underlying the Black CAPM warrants a specific uplift or adjustment to the equity beta point estimate.[1706] 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 are mindful of 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.[1707] 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.[1708]

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 our previous regulatory determinations.[1709] 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

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[1706] 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.

[1707] 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.

[1708] AER, *Explanatory statement: Rate of return guideline*, December 2013, p. 51.

[1709] Since 2010, 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.

point estimate was set too high.[1710] For example, UnitingCare Australia submitted that:[1711]

> As with MRP, we believe that the range in values for β lie on a continuum between low figures that serve the best interests of consumers, and higher figures that will serve the best interests of investors and owners, but that will come at the expense of affordability. Again, we recommend the AER act in the best interests of consumers and select at the lower end of the range. Such a choice would be consistent with relatively low risk businesses in a relatively benign capital market, which is the current situation..

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).[1712]

[1710] CCP, *Response to AER draft determination for TasNetworks and TasNetworks' revised revenue proposal*, 18 February 2015, p. 4; CCP, *Response to AER draft determination for TransGrid and TransGrid's revised revenue proposal*, 16 February 2015, p. 7; CCP, *Submission: AER draft TransGrid determination TransGrid revised revenue proposal*, 6 February 2015, p. 13; CCP, *Response to AER draft determination for re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 24; CCP, *Submission to AER: Responding to NSW draft determinations and revised proposals from electricity distribution networks*, 2 January 2015, p. 46; CCIQ, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 16; EUAA, *Submission to Energex's regulatory proposal for 2015–20*, 30 January 2015, p. 14; Alliance of Electricity Consumers, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 6; CCIQ, *Submission to Ergon Energy's regulatory proposal for 2015–20*, 30 January 2015, p. 20; QCOSS, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, 30 January 2015, p. 73; TEC, *Submission to the Queensland distribution network service providers' regulatory proposal for 2015–20*, February 2015, p. 20; ECCSA, *Submission to SA Power Networks' regulatory proposal for 2015–20*, December 2014, p. 79; EUAA, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2014, p. 14; 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; UnitingCare, *Submission to SA Power Networks' regulatory proposal for 2015–20*, February 2015, p. 33; TSBC, *Submission to TasNetworks' revised revenue proposal and AER draft decision for 2014–19*, February 2015, p. 30; EMRF, *Submission to TransGrid's revised revenue proposal and AER draft decision for 2014–19*, January 2015, pp. 11–12 (the EMRF's recommendation was for the AER to adopt 'the midpoint of any range of point estimates where there might be doubt' and then apply an overall level of conservatism to the final assessment of the allowed revenue); EUAA, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 17; PIAC, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 44.

[1711] UnitingCare, *Submission to SA Power Networks' regulatory proposal for 2015–20*, February 2015, p. 33.

[1712] For example, the service providers' consultants suggest 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). See: NERA, *Return on capital of a regulated electricity network*, May 2014, p. 44; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 94–95; CEG, *WACC estimates*, p. 11. We also received the following submissions supporting an equity beta above 0.7 (excluding submissions by the service providers to their own review process): Citipower and Powercor, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 1; Jemena Limited, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 1; United Energy, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 1; Australian Gas Networks, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 1; SAPN, *Submission to first round of regulatory determinations under the new rules*, 6 February 2015, p. 1; ENA, *Submission to the ACT/NSW revised*

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.[1713] 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 RPP.[1714]

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regulatory proposals and AER draft decisions for 2014–19, 13 February 2015, p. 15; Ergon Energy, *Submission to the ACT/NSW revised regulatory proposals and AER draft decisions for 2014–19*, 13 February 2015, pp. 5–6; Ergon Energy, *Submission to TasNetworks' revised revenue proposal and AER draft decisions for 2014–19*, 13 February 2015, pp. 5–6; Ergon Energy, *Submission to TransGrid's revised revenue proposal and AER draft decisions for 2014–19*, 13 February 2015, pp. 5–6; TasNetworks, *Submission to the ACT/NSW revised regulatory proposals and AER draft decisions for 2014–19*, 12 February 2015, p. 2; Spark Infrastructure, *Submission to the NSW distribution network service providers' revised regulatory proposals and AER draft decisions for 2014–19*, 13 February 2015, p. 4.

[1713] 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.

[1714] 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
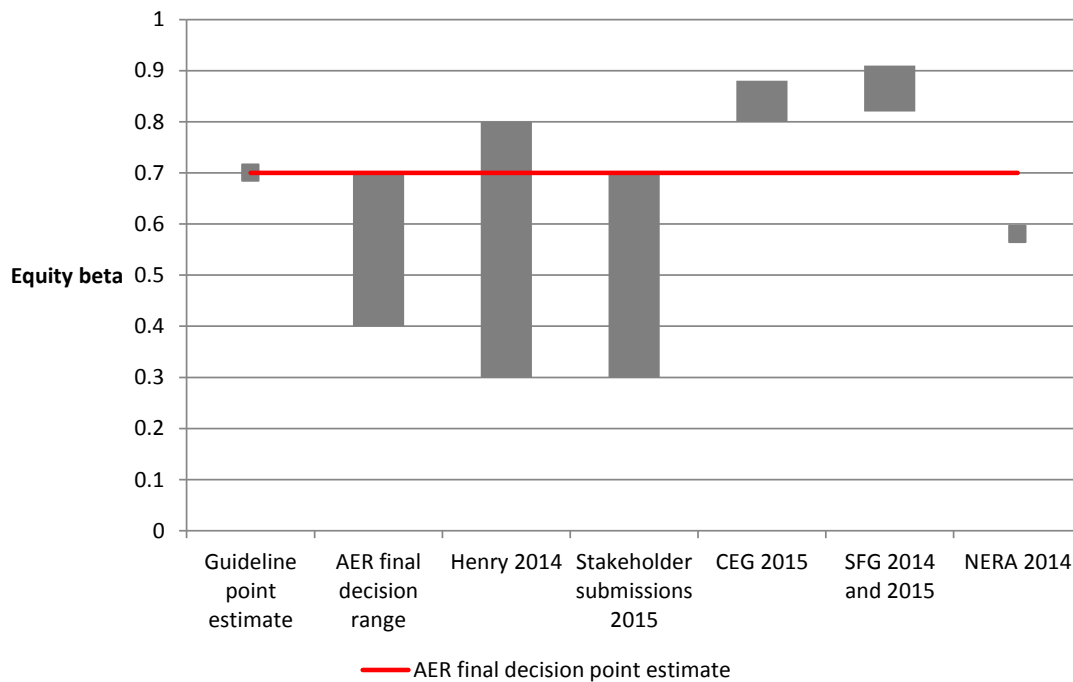
Source: AER analysis[1715]

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 Alliance of Electricity Consumers' submission and the upper bound is based on Origin's submissions. 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). The NERA 2014 point estimate is

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[1715]   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; Alliance of Electricity Consumers, *Submission to Ergon Energy's 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; Origin, *Submission to SA Power Networks' regulatory proposal for 2015–20*, 30 January 2015, p. 13; Origin, *Submission to the NSW distribution network service providers' revised regulatory proposals and the AER draft decisions for 2014–19*, 13 February 2015, p. 15; NERA, *Return on capital of a regulated electricity network*, May 2014, p. 79; 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*, 13 February 2015, p. 20; SFG, *The required return on equity for the benchmark efficient entity*, 12 March 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.

based on an equity beta of 0.58, which NERA used for its preferred specification of the SLCAPM (although NERA uses multiple models to estimate the return on equity).

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.[1716]

We do not agree with SFG's view. During the Guideline process we stated:[1717]

> 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 RRP in our November draft decisions.[1718]

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 and limitations. 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, many service providers (and their consultants) submitted that our equity beta point estimate has been set too low. They consider our approach to estimating the equity beta (and the return on equity) dilutes or eliminates the impact of relevant information. This relevant information includes international empirical evidence and other models that the service

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[1716]　SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, pp. 24–25; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, pp. 26–27.

[1717]　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.

[1718]　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 RRP.

providers consider can correct for possible biases in the SLCAPM.[1719] These service providers have proposed various alternative approaches to estimating the equity beta. These approaches place more reliance on the information we use to inform our point estimate and/or introduce new information, which in every case leads to the selection of a higher equity beta range and point estimate. Table 3-55 summarises the approaches adopted by the service providers and the corresponding consultant reports they have submitted.

Table 3-55 Service providers' proposed approaches to estimating the return on equity and equity beta

Service provider	Proposal	Revised proposal	Consultant reports
SAPN, Ergon Energy	Return on equity: layered approach—prefers multiple model approach, otherwise use alternative foundation model approach	N/A[1720]	SFG[1721]
	Equity beta: depends on return on equity approach—Australian and US empirical estimates (for multiple model approach), or multiple model approach (for alternative foundation model approach)		
Energex	Return on equity: alternative foundation model approach	N/A[1722]	SFG[1723]
	Equity beta: multiple model approach		

[1719] The service providers' consultants have suggested 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). See: NERA, *Return on capital of a regulated electricity network*, May 2014, p. 44; SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 94–95; SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014, pp. 83–86; CEG, *WACC estimates*, p. 11.

[1720] During the submissions process for the NSW/ACT/Tas service providers revised proposals and the AER November 2014 draft decisions, Ergon Energy submitted a number of consultant reports, including SFG, *Beta and the Black capital asset pricing model*, 13 February 2015 and SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015. SFG's 2015 Beta and the Black CAPM report recommended using empirical evidence from the Black CAPM to adjust the equity beta for the SLCAPM if our foundation model approach is adopted. This report did not refer to the other models submitted in Ergon Energy's initial proposal on equity beta (the FFM and SFG's construction of the DGM).

[1721] SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014. SAPN also submitted SFG, *Equity beta*, May 2014.

[1722] Energex submitted the same reports as Ergon Energy during its submission process, and also submitted SFG, *The required return on equity: Initial review of the AER draft decisions—Report for Energex*, 30 January 2015.

[1723] SFG, *Estimating the required return on equity: Report for Energex*, 28 August 2014.

Service provider	Proposal	Revised proposal	Consultant reports
JGN, ActewAGL	Return on equity: layered approach—prefers multiple model approach, otherwise use alternative foundation model approach Equity beta: depends on return on equity approach—Australian and US empirical estimates (for multiple model approach), or multiple model approach (for alternative foundation model approach)	JGN—maintain layered approach[1724] ActewAGL—maintain layered approach, but only use Black CAPM to adjust equity beta under alternative foundation model approach[1725]	SFG[1726]
NSW DNSPs	Return on equity: multiple model approach for range, historical CAPM for point estimate Equity beta: multiple model approach for range, Australian and US empirical estimates for point estimate	Return on equity: appears to be the same as proposal[1727] Equity beta: no range specified, Australian and US empirical estimates for point estimate[1728]	CEG, SFG[1729]

[1724] In its revised proposal, JGN reiterated the layered approach from its initial proposal. However, JGN also submitted SFG's 2015 Beta and the Black CAPM report, which recommended using empirical evidence from the Black CAPM to adjust the equity beta for the SLCAPM if our foundation model approach is adopted. This report did not refer to the other models submitted in JGN's initial proposal on equity beta (the FFM and SFG's construction of the DGM). See: JGN, Revised access arrangement proposal, February 2015, p. 14; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35.

[1725] ActewAGL did not directly refer to any alternative foundation model approach in its revised proposal. However, it submitted an equity beta range of 0.82–0.91 and submitted SFG's 2015 Beta and the Black CAPM report, which recommended using empirical evidence from the Black CAPM to adjust the equity beta for the SLCAPM to 0.91 if our foundation model approach is adopted. See: ActewAGL, *Revised regulatory proposal*, January 2015, p. 450; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35.

[1726] Submissions made post draft decision: SFG, *Beta and the Black capital asset pricing model*, 13 February 2015; SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015. ActewAGL also submitted SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015.

[1727] However, there are some inconsistencies between the NSW DNSPs' revised proposals and SFG's 2015 report, which estimates the MRP and return on equity using the NSW DNSPs' proposed risk free rate averaging period. SFG used a weighted average method to determine its MRP and return on equity estimates, which is different to the approach applied in the NSW DNSPs' revised proposals. See: SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, pp. 42–43; Ausgrid, *Revised regulatory proposal*, January 2015, p. 188.

[1728] However, the NSW DNSPs also submitted SFG's 2015 Beta and the Black CAPM report, which recommended using empirical evidence from the Black CAPM to adjust the equity beta if our foundation model approach is adopted (SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35).

[1729] Submissions made post draft decision: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015; SFG, *The required return on equity for the benchmark efficient entity*, 12 March 2015; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015.

Service provider	Proposal	Revised proposal	Consultant reports
TransGrid	Return on equity: multiple model approach Equity beta: Australian empirical estimates	Same as proposal	NERA[1730]
TasNetworks, Directlink	Guideline approach	Draft decision approach	

Source: Proposals, revised proposals and consultant reports submitted by the service providers.

In their 2014 reports, SFG, CEG and NERA (the consultants) all submitted that they disagreed with our approach to estimating the equity beta. In summary:

- SFG submitted that we use a multi–stage approach that pre-emptively dilutes or eliminates the impact of other relevant evidence.[1731] It notes the other information we consider suggests a point estimate above the top of our range. SFG also submitted that if we do not use a multiple model approach to estimate the return on equity, we should use the models to estimate the equity beta for the SLCAPM.[1732] It considered our foundation model approach to estimating the return on equity (with an equity beta of 0.7) does not sufficiently correct for biases in the SLCAPM.[1733]

- CEG submitted that our approach does not give sufficient consideration to international empirical estimates of equity beta.[1734] CEG considered we should include a sample of 56 US energy firms in our domestic comparator set to increase the reliability of our equity beta estimates. CEG also submitted that our approach does not account for 'low beta bias' in the SLCAPM. It considered that to account for this we should give greater consideration to the Black CAPM or estimate beta using a different methodology.

- NERA submitted that, under our foundation model approach to estimating the return on equity, we have made an arbitrary and insufficient adjustment to equity beta to correct for biases in the SLCAPM.[1735]

[1730] NERA, *Return on capital of a regulated electricity network*, May 2014. TransGrid maintained the approach and reasoning from its initial revenue proposal in its revised revenue proposal.

[1731] 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.

[1732] SFG used four models: the SLCAPM, Black CAPM, FFM and its own construction of the DGM.

[1733] SFG considers the SLCAPM produces downward biased estimates of low beta stocks (stocks with an equity beta less than 1.0). This is what it refers to as 'low beta bias'. SFG also considers the SLCAPM underestimates the return on equity for high book-to-market stocks. See: SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 94–95

[1734] CEG, *WACC estimates*, May 2014, pp. 7–20.

[1735] NERA, *Return on capital of a regulated electricity network*, May 2014, pp. v–vi, 44, 64, 68–69.

We consider the consultants' key views on our approach to selecting the equity beta range and point estimate can be summarised as follows:

- We use a multi–stage approach that pre-emptively dilutes or eliminates the impact of other relevant evidence. The other relevant information suggests a point estimate above our range.

- Under the foundation model approach to estimating the return on equity, our estimate of equity beta does not sufficiently account for possible biases in the SLCAPM. The 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 disagree with the views expressed by the consultants and explain our reasoning below.

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 approach applied by SFG does not give appropriate consideration to the merits and limitations of the available information.

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).[1736] 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) actual 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 provided a detailed response to NERA's submissions on this matter in our draft decision for TransGrid.[1737]

[1736] 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 A.3.3). 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 A.3.2).

[1737] AER, *Draft decision: TransGrid transmission determination 2015–16 to 2017–18—Attachment 3: Rate of return*, November 2014, pp. 271–273.

Under its alternative 'foundation model' approach, SFG used empirical evidence from the SLCAPM, Black CAPM, FFM and its own construction of the DGM to estimate the equity beta.[1738] It 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, we should do the same in accounting for evidence of a value premium (FFM) and contemporaneous evidence from DGMs (SFG's DGM construction).[1739] In response to this, we note that 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 discuss 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 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.[1740] 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.

In their 2015 reports, SFG and CEG again submitted that they do not agree with our approach to estimating the equity beta. Their views can be summarised as follows:

- CEG submitted that that our approach does not give sufficient consideration to international empirical estimates of equity beta. CEG considered we should include a sample of 56 US energy firms in our domestic comparator set to increase the reliability of our equity beta estimates.[1741] However, CEG did not mention 'low beta bias' in the SLCAPM.

- SFG submitted that we use a multi–stage approach that pre-emptively dilutes or eliminates the impact of other relevant evidence. SFG considered that we use 'primary' and 'secondary' sources of evidence to estimate equity beta. It submitted that the way we consider the 'secondary' sources of evidence means that they will never be persuasive enough to change the range implied by the 'primary' evidence. It considered that this effectively imposes a binding constraint of 0.4 to 0.7 on the equity beta point estimate. SFG's preferred approach is to use a multiple model

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[1738] 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.

[1739] 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.

[1740] SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, May 2014, pp. 56–57.

[1741] CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, pp. 33–34.

approach to estimate the return on equity, and use a comparator set of Australian and US energy firms to empirically estimate the equity beta for the SLCAPM.[1742] However, it considered that if the foundation model approach is to be adopted, empirical evidence from the Black CAPM should be used to adjust the equity beta estimate for use in the SLCAPM.

We again disagree with these views. We explained our reasoning for why we give different roles to different sources of relevant material above (and in steps one and two of section 3.4.1). We also explain why we do not include the sample of 56 US energy firms in our domestic comparator set in section D.2.1.

We also do not consider we have imposed a binding constraint on the equity beta point estimate. We use Australian empirical estimates to determine the equity beta range because we have the most confidence in this source of evidence (see steps one and two of section 3.4.1). We consider it is reasonable to expect that if there was a substantial and sustained increase in the equity beta for the benchmark efficient entity, then this would be reflected in the Australian empirical estimates we consider. We note that we consider different estimation periods in our analysis, so we do not rely solely on the longest historical estimation period. Also, as discussed above (and in steps one and two of section 3.4.1), we consider the theoretical principles underpinning the Black CAPM when estimating equity beta but do not consider its empirical implementation.

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 and limitations. Based on the available evidence and submissions, we are 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.

Additional issues—asymmetric risk

Additionally, in its proposal ActewAGL submitted that our comparator set of listed Australian energy network firms appears to face asymmetrical market risk. This means that the firms may be more exposed to market conditions during 'bad' (or down-market) times than during 'good' (or up-market) times. ActewAGL considers that investors will be aware of this and demand a higher return on equity to compensate for bearing higher exposure to down-market risk than up-market risk. ActewAGL submitted that:[1743]

> the return on equity implied by the single, symmetric equity beta model used by the AER, and its regression based beta estimate of 0.4 to 0.7, will typically

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[1742] 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*, 13 February 2015, p. 19; SFG, *The required return on equity: Initial review of the AER draft decisions*, 19 January 2015, p. 27.

[1743] ActewAGL, *Regulatory proposal*, 2 June 2014 (resubmitted 10 July 2014), p. 264.

undercompensate investors for the true risks which they bear and the required rate of return.

ActewAGL bases this consideration on a single diagram which appears to plot the returns of an equal weighted portfolio of five Australian energy network firms against the returns of a market index (ASX300). The diagram also shows an 'asymmetric fit' line, which may be based on two OLS regressions, one over the down-market part of the sample and the other over the up-market part of the sample. This would result in two different equity beta estimates, one for 'bad' (or down-market) times and one for 'good' (or up-market) times. However, we are not certain we have correctly interpreted ActewAGL's approach, as ActewAGL has not provided us with an explanation of how the asymmetric fit line has been derived, or even what the horizontal and vertical axes measure. There is also no mention of this issue in the consultant reports submitted with ActewAGL's proposal. Even if ActewAGL's approach is consistent with our understanding of split sample beta estimates, its proposal:

- does not establish the statistical significance of the equity betas estimated in the split sample, and whether the difference between the equity beta estimates is statistically significant

- does not cite any published empirical research in which their approach has been used, which means we do not know if it's a is a commonly accepted method

- does not cite an asset pricing model in which returns are determined by two distinct equity betas that correspond to up-market and down-market returns

- does not make any references to theoretical research supporting its claim that 'investors will demand a higher return on equity in order to compensate for the risk of down-market exposure that does not carry a corresponding up-side'.[1744]

For the above reasons, we did not accept ActewAGL's proposal that we adjust our equity beta estimate to account for asymmetrical risk in our November 2014 draft decision.

In its revised proposal, ActewAGL reiterated its views regarding asymmetric risk. The only evidence presented in its revised proposal is the following statement:[1745]

> ActewAGL Distribution also continues to consider that the equity beta is subject to asymmetrical risk. This point was raised in its regulatory proposal for the subsequent regulatory period and ActewAGL Distribution does not consider that the AER has provided any evidence to the contrary.

We disagree with this view and maintain our view from the draft decision. In his 2015 report, Partington considered this issue. He determined that there is no way to determine the joint and individual significance of the estimates of the regression equation ActewAGL may have used because neither parameter estimates nor

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[1744] ActewAGL, *Regulatory proposal*, 2 June 2014 (resubmitted 10 July 2014), p. 264.

[1745] ActewAGL, *Revised regulatory proposal*, January 2015, p. 458.

standard errors are provided. He was unable to assess ActewAGL's submission that our comparator set of listed Australian energy network firms appears to face asymmetrical market risk because of the 'scant information provided'.[1746] However, Partington stated that:[1747]

> We note that Henry (2008, 2009, 2014) estimates a range of models consistent with (6) and finds no evidence of serial correlation in the residuals from these models. This is consistent with the view that there are no omitted variables such as Dt or Dt × RMt in those models and we take this evidence as suggesting that there is no such asymmetry.

Based on the available evidence and submissions, we do not accept ActewAGL's proposal that we adjust our equity beta estimate to account for asymmetrical risk.

[1746] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 21–22.
[1747] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 21–22.

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.[1748]

Using the full beta range and data up to the 2014 calendar year end, return on equity estimates fall within a range of 5.53 to 9.66 per cent. Using only the beta point estimate from the top of the range, return on equity estimates fall within a range of 7.77 to 9.66 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 2.55 per cent, based on a 20 day averaging period commencing 9 February 2015 (see discussion on the risk free rate under step three).

Table 3-56 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 3-56   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

[1748]   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: $1+i=(1+r)\times(1+\pi)$ where r denotes the real return, i denotes the nominal return and π denotes the inflation rate

Essential Energy proposed an expected return on the market informed by CEG's estimate of the Wright approach.[1749] We agree with the following aspects of CEG's estimate under the Wright approach:

- Using a prevailing risk free rate averaged over 20 businesses days, 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 CEG's approach because:

- CEG only applied the Wright approach to estimate the return on the market. Table 3-5 and Table 3-14 set out why we use the Wright approach at the return on equity level. To do so, we apply an equity beta point estimate of 0.7 from a 0.4 to 0.7 range. In a concurrent determination process, SFG submitted that we should apply our equity beta point estimate of 0.7 instead of the range of 0.4 to 0.7.[1750] 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 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.

[1749]   CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, p. 26.

[1750]   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, p. 31-32.

- We do not apply NERA's (2013) adjustment.[1751] As a result, CEG proposes a different estimate of historical market returns to us.[1752] 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 CEG estimates the return on the market under the Wright approach as a point estimate using the longest time period available.[1753] We estimate a range under the Wright approach from the different averaging periods in Table 3-56. This recognises the estimated return on the market will vary depending on the time period used.[1754] 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 Essential Energy 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 5.53 to 9.66 per cent using the full beta range. Using only the beta point estimate, the return on equity estimates fall within a range of 7.77 to 9.66 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[1755]

- Essential Energy's 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 1.92 per cent.[1756] 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). Figure 3.29 shows the current and historical debt risk premium and our foundation model equity risk premium. Essential Energy proposed an equity risk premium of 5.38 per cent.

[1751] NERA, *The market, size and value premiums*, June 2013.

[1752] CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, p. 27.

[1753] CEG, *WACC estimates: A report for NSW DNSPs*, May 2014, p. 26.

[1754] AER, *Explanatory statement: Rate of return guideline (appendices)*, December 2013, pp. 26–27.

[1755] 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).

[1756] Based on the RBA's monthly data (statistical table F3) for 28 February 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.

Figure 3.29 Comparison of equity and debt premiums
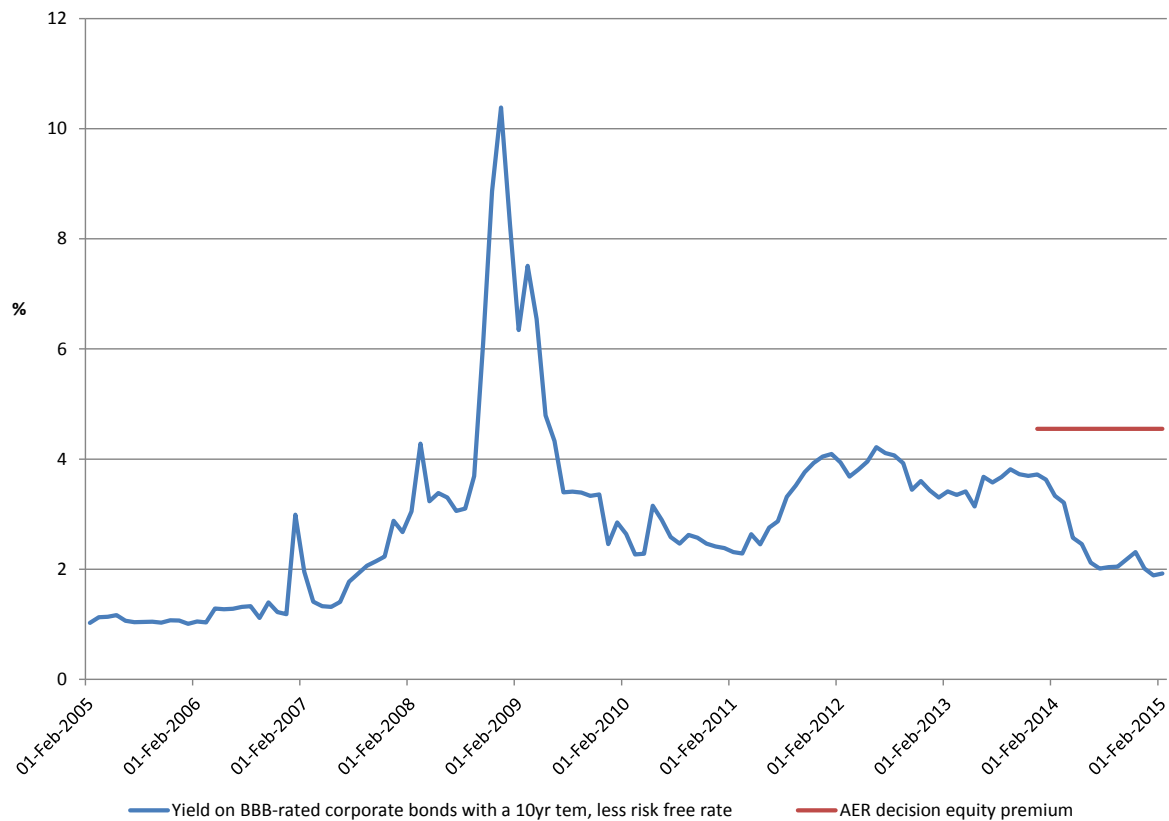
Source: AER analysis, RBA F3 and F16 interest rates statistics

We do not consider that the current difference of about 260 basis points between the equity risk premium allowed in our final decision and debt risk premiums[1757] 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.[1758]

[1757] 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.

[1758] 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.

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 3-57 outlines the range of return on equity and equity risk premium estimates from relevant independent valuation reports. However, we note that Table 3-57 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.[1759]

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).

- 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 3.30.[1760] Our

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[1759] 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.

[1760] The range of 2.1 to 4.8 extends from the minimum lower bound to the maximum upper bound of the valuers' ranges.

rate of return for Essential Energy of 6.68 per cent[1761] provides a total risk premium of about 4.1 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 3-57 is based on only 18 independent valuation reports spanning a period going back to 1991.[1762] 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.

Figure 3.30 Total risk premium from relevant expert reports over time

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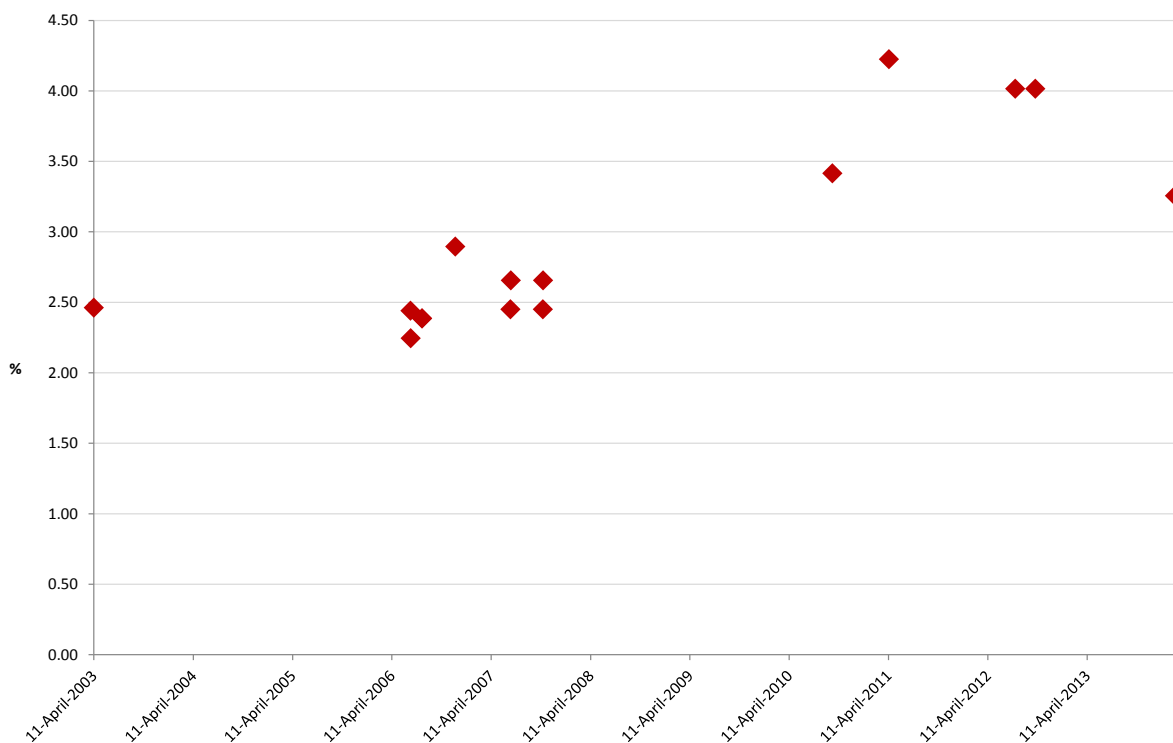
[1761] Based on the return on debt for 2015–16.

[1762] 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 3-20 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.

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 3-57   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 recent 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.[1763] Although we have concerns with the applicability of these uplifts to the allowed rate of return objective the equity risk premium range in three of the four scenarios[1764] is below our foundation model premium of 4.55 per cent.

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

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[1763] 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.

[1764] Without any adjustment for dividend imputation.

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: [1765]

> 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".[1766] 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.[1767] Grant Samuel's submission states "to the extent the risk free rate played a role, it was relatively minor".[1768] 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.

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.[1769] 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.[1770]

[1765] 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.

[1766] Grant Samuel & Associates Pty Ltd, *Australian Energy Regulator - Draft Decision*, 12 January 2015, p. 8.

[1767] Grant Samuel & Associates Pty Ltd, *Australian Energy Regulator - Draft Decision*, 12 January 2015, p. 6.

[1768] Grant Samuel & Associates Pty Ltd, *Australian Energy Regulator - Draft Decision*, 12 January 2015, p. 8.

[1769] 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.

[1770] NERA submitted that Grant Samuel's final estimate of the equity risk premium, adjusted for dividend imputation, ranges from 6.3 per cent to 6.4 per cent (calculated as the return on equity range of 9.5 per cent to 9.6 per cent less Grant Samuel's risk free rate estimate of 4.2 per cent) [NERA, *Return on capital of a regulated electricity network*, May 2014, p. 112]. This is based on NERA's assumption of the whole amount of Grant Samuel's discretionary uplift applying to the return on equity. 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 consider there remains uncertainty about allocating uplift between debt and equity. Also, we do not consider that NERA's method for imputation adjustment is the most appropriate (if any adjustment is required). After adjusting for these factors, we find Grant Samuel's final equity risk premium to range becomes 4.9 per cent to 6.3 per cent.

Incenta Economic Consulting, in a report recently prepared for TransGrid, reviewed independent valuation reports recently released and submitted that:[1771]

- 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 3-57 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.[1772] 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.[1773] 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.[1774] Section E.7 of Appendix E 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.[1775]

E.4   Broker reports

Table 3-58 shows the estimates of return on equity and premium above the risk free rate from broker reports between 1 October 2014 and 6 March 2015. 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

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[1772]   See Appendix E.6. 'Return on equity estimates from other practitioners' for more detail.

[1774]   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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 35.

[1775]   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.).

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 3-58   Recent broker reports

		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, Morgan Stanley, and Macquarie Bank that include a valuation for AusNet Services, Spark Infrastructure, APA Group, 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 Essential Energy 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 equity estimates, we have compared recent broker estimates to those we observed in our November 2014 draft decisions. Our analysis in our November 2014 draft decisions examined broker reports from August 2014 to September 2014.

Directionally, the range of equity risk premium estimates from broker reports has widened, at both its lower and upper bounds, since our review of broker reports in our November 2014 draft decisions,[1776] as shown in Table 3-59.[1777]

Table 3-59   Broker reports considered in November 2014 draft decisions

		Return on equity	Equity risk premium
Broker estimate—no imputation adjustment	Minimum	8.5	3.5
Broker estimate—no imputation	Maximum	9.9	4.9

[1776]   See: AER, *Draft decision: TransGrid transmission determination 2015–16 to 2017–18*, Attachment 3 - Rate of Return, November 2014, pp.142–143.

[1777]   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.

		Return on equity	Equity risk premium
adjustment			
Broker estimate—adjusted for imputation	Minimum	9.1	4.1
Broker estimate—adjusted for imputation	Maximum	10.6	5.6

Source: AER analysis of broker reports by Credit Suisse, JP Morgan, and Macquarie Bank that include a valuation for AusNet Services, Spark Infrastructure, APA Group, and/or DUET Group.

E.5   Other regulators' decisions

Table 3-60 shows the estimates of return on equity and premium above the risk free rate from other regulators' decisions (dated between May 2013 and June 2014) that were examined in our November 2014 draft decisions.[1778] 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, 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 3-60   Return on equity estimates from other regulators' decisions considered during our November 2014 draft decisions

Regulator	Decision	Date	Nominal vanilla return on equity	Equity risk premium
ERAWA	Draft decision: ATCO Gas	Oct 2014	6.80	3.85
ACCC	Final decision: State Water	Jun 2014	8.18	4.20
NTUC	Final decision: PWC Networks	Apr	8.31	4.20

[1778]   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.

Regulator	Decision	Date	Nominal vanilla return on equity	Equity risk premium
		2014		
ESCV	Final decision: Greater Metropolitan Water Businesses	Jun 2013	6.98–7.67	3.90
IPART	Final decision: Hunter Water Corporation	Jun 2013	7.56–10.2	3.30–6.08
ESCOSA	Final decision: SA Water	May 2013	8.05	4.8

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.

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 November 2014 draft decisions, as shown in Table 3-61.[1779]

Table 3-61 Return on equity estimates from recent decisions of other regulators

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	Feb	6.54	4.16

[1779] 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
	2015-20	2015		
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	3.27
ERA	Revised draft decision: Review of the method for estimating the weighted average cost of capital for the regulated railway networks (Public Transport Authority)	Nov 2014	8.05	4.72
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.

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 Essential Energy. 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.

TransGrid proposed using Grant Samuel's independent valuation of Envestra to directly inform the return on equity range.[1780] We do not consider that TransGrid's proposed role of valuation reports contributes to the achievement of the allowed rate of return objective given the limitations mentioned above. ActewAGL, Jemena Gas Networks, Energex, Ergon Energy, and SA Power Networks proposed using broker and valuation reports to inform estimates of the MRP.[1781] We note that consideration of the 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

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[1780] TransGrid, *Revenue Proposal*, 2014/15–2018/19, p. 189.

[1781] Energex, *2015-20 regulatory proposal*, October 2014, p. 162; Ergon Energy, *Regulatory proposal 2015 to 2020*, October 2014, pp. 132–133; SA Power Networks, *Regulatory proposal 2015-20*, October 2014, p. 318; Jemena Gas Networks, *2015-20 access arrangement information*, attachment 9.03, 5 June 2014, p. 17. In support of its proposal ActewAGL referred to a report prepared by SFG Consulting [ActewAGL, *Regulatory proposal*, (resubmitted 10 July 2014), p. 252]. For details, see: SFG Consulting, *The required return on equity for regulated gas and electricity network businesses*, Report for Jemena Gas Networks, ActewAGL Distribution, Ergon, and TasNetworks, 27 May 2014, p. 5–8, 74–79.

component of the overall return on equity). Detailed assessment of the proposed approaches is also outlined below.

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:[1782]

> 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.[1783] We note that one of Grant Samuel's uplift scenarios was based on brokers' rate of return estimates.[1784] 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.

[1782] Grant Thornton, *Polymetals Mining Ltd: Independent expert report and financial services guide*, 31 May 2013, p. 101.

[1783] Grant Samuel & Associates, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 5.

[1784] 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.[1785]

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 brokers 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.[1786] 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:[1787]

> While the return on Australian Government bonds has declined, we do not consider there is sufficient evidence to suggest that investors have reduced

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[1785] 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.

[1786] 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.

[1787] Deloitte, *RHG Limited: Independent Expert's Report and Financial Services Guide*, 5 November 2013, p. 62.

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:[1788]

> 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 period are addressed in the determination of capex, opex, and depreciation allowances for the subsequent regulatory control 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.

An area of concern for broker and valuation reports is around accounting for dividend imputation. All of the valuation reports for comparator firms since 1999,[1789] and all the

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[1788] Grant Samuel, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 5.

recent broker reports,[1790] 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,[1791] 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"[1792] 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".[1793] Grant Samuel refers to Australian studies of the market risk premium that both include and exclude the impact of dividend imputation.[1794] 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.[1795]

As noted by McKenzie and Partington, the full set of assumptions should be laid out before appropriate adjustments can be fully understood.[1796] We consider that there is insufficient information to support any precise adjustment for dividend imputation, reducing the comparability of broker and valuation estimates.

In response to our November 2014 draft decisions, Grant Samuel submitted:[1797]

> 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

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[1789] See Table 3.20 of AER, *Draft decision: TransGrid transmission determination 2015–16 to 2017–18*, November 2014.

[1790] Equity markets research reports by JP Morgan, Macquarie, and Credit Suisse distributed to clients between 15 July 2014 and 30 September 2014.

[1791] NER cl.6.5.2(d)(2) , NER cl.6A.6.2(d)(2), NGR r.87(2)(4)(b).

[1792] 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.

[1793] 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.

[1794] 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.

[1795] 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.

[1796] 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.

[1797] Grant Samuel, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 5.

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.[1798]

For example, Grant Samuel in its report for DUET Group stated that it came to its beta estimate after:[1799]

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, as proposed by TransGrid, could be to effectively double-count the importance provided to the material in a way that is potentially misleading.

[1798] 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].

[1799] 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.

TransGrid's proposed role for the Envestra valuation report

TransGrid proposed using information from the single most recent independent valuation report: Grant Samuel's valuation of Envestra. TransGrid directly used the return on equity estimate from the Envestra valuation as one of four return on equity estimates that comprise TransGrid's proposed return on equity range.

We agree that the Grant Samuel valuation of Envestra is the most relevant individual valuation, as it is the most recent valuation for a business that we regulate. But we do not agree that significant reliance should be placed on the return on equity estimate from a single valuation report, or that it should be used to directly inform the allowed return on equity (for example, by being used in forming a return on equity range). Relying on evidence from a single valuation report materially increases the risk of introducing bias into the return on equity estimation process. As noted by McKenzie & Partington:[1800]

> Expertise, legal requirements and ethical behaviour on the part of expert valuers, increases the probability that expert reports would give unbiased estimates, but this is not guaranteed. Even when deliberate bias is eliminated, systematic errors in analysis can still give biased estimates.

We also consider that the limitations set out above of using valuation reports to determine a regulatory return on equity allowance remain present in relation to the Grant Samuel valuation of Envestra. In particular:

- The return on equity estimate is no longer timely, prevailing conditions in the market for funds have moved significantly since Grant Samuel's report.[1801]

- Grant Samuel's uplift to its initial SLCAPM return on equity estimate when deriving a final rate of return reflect the different purpose of an independent valuation report compared to a regulatory return on equity allowance. One of Grant Samuel's considerations contributing to the uplift is its view that the risk free rate at the time was abnormally low.[1802] While there is limited information in the Grant Samuel report, we consider the matter raised by Grant Samuel highlights the perpetuity timeframe required for a valuation used to inform a proposed take-over. Grant Samuel's valuation required estimating cash flows in perpetuity, and consequently its return on equity estimate needed to reflect expectations over the same timeframe. An uplift to account for an abnormally low prevailing risk free rate is consonant with an expectation for the risk free rate to revert to long-term trend over

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[1800] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 63.

[1801] Grant Samuel's independent expert report for Envestra is dated 3 March 2014 but the SLCAPM parameters estimated by Grant Samuel appear to have been estimated on 28 February 2014. As shown in the reasons for final decision section, the risk free rate has decreased significantly in recent months.

[1802] In response to our November 2014 draft decisions, Grant Samuel submitted that its considerations of DGM estimates and risk premium issues were the 'primary' considerations for its uplift in its valuation report for Envestra Ltd. We note that the extent to which the uplift is influenced by Grant Samuel's risk free rate considerations remains ambiguous.

the relevant timeframe (perpetuity). Conversely, our return on equity estimate must have regard to the prevailing conditions in the market for equity funds. Given our purpose, it is less clear that Grant Samuel's uplifts and final return on equity estimate contributes to the achievement of the allowed rate of return objective.

- Grant Samuel's valuation range would have resulted in a transaction multiple of between about 1.34 and 1.46 times Envestra's RAB.[1803] A RAB multiple greater than one may indicate that the valuer and/or investors expect Envestra to achieve cash flows in excess of regulatory allowances. It is not clear that incorporating such expectations into our return on equity estimate is consistent with the allowed rate of return objective.

- There is not full transparency on how Grant Samuel came to its estimates, which can create difficulties for integrating Grant Samuel's estimates with our foundation model estimate or estimates from other stakeholders. This issue is especially pertinent for any adjustment for dividend imputation. Grant Samuel's rate of return estimate does not make any explicit adjustment for dividend imputation.[1804] TransGrid increased Grant Samuel's return on equity estimates to account for dividend imputation.[1805] However, we are uncertain whether or not an adjustment is or is not required based on Grant Samuel's MRP estimate, or the appropriate form of any adjustment.[1806]

ActewAGL's, JGN's, Energex's, Ergon Energy's, and SA Power Networks' proposed role for valuation reports

Energex, Ergon Energy, SA Power Networks, ActewAGL, and Jemena Gas Networks all proposed using independent valuation reports to inform estimates of market risk premium.[1807] In its report prepared for these NSPs, SFG states:[1808]

[1803] 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]. We also 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 [Grant Samuel, *Grant Samuel Response to AER Draft Decision*, January 2015, p. 6].

[1804] 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. 90.

[1805] TransGrid, *Revenue Proposal*, 2014/15–2018/19, p. 190.

[1806] If Grant Samuel's return on equity estimate for Envestra is to be adjusted to account for dividend imputation based on the information available in the valuation report, we do not support the adjustment used by NERA and TransGrid. Rather, we consider that a more appropriate adjustment method is to adjust the Grant Samuel's market risk premium estimate by the approach used to adjust for dividend imputation in our DGM.

[1807] Energex, *2015-20 regulatory proposal*, October 2014, p. 162; Ergon Energy, *Regulatory proposal 2015 to 2020*, October 2014, pp. 132–133; SA Power Networks, *Regulatory proposal 2015-20*, October 2014, p. 318; Jemena Gas Networks, *2015-20 access arrangement information*, attachment 9.03, 5 June 2014, p. 17. In support of its proposal ActewAGL referred to a report prepared by SFG Consulting [ActewAGL, *Regulatory proposal*, (resubmitted 10 July 2014), p. 252].

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:[1809]

> 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).

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).

[1808] 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.

[1809] 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.

E.7 Incenta's review of valuation reports

In a report for Essential Energy, Incenta Economic Consulting (Incenta) analysed return on equity estimates from valuation reports dated between 10 October 2012 and 31 January 2015.[1810] 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;[1811] 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.[1812]

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".[1813] Our November 2014 draft decisions noted that there are limitations to the SLCAPM.[1814] We also noted the prevalence of the SLCAPM in recent valuation reports.[1815] In all the reports we examined,[1816] only one did not use the SLCAPM. All 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. 10 reports noted the theory size premiums associated with the Fama-French

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[1810] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015.

[1811] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, pp. 31–32.

[1812] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 35.

[1813] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 18.

[1814] AER, Draft Decision: ActewAGL, Attachment 3, November 2014, pp. 159-167.

[1815] AER, Draft decision: ActewAGL, Attachment 3, November 2014, pp. 165, 177.

[1816] 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.

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.[1817] 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".[1818]

We note that there is mixed evidence of any relationship between risk free rate and equity risk premium.[1819] 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 state that "making reliable inference in a sample of 13 observations is extremely difficult", and "the inference in the report is highly speculative at best".[1820]

Figure 3.31 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 3.31, 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 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.

[1817] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 18.

[1818] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 19.

[1819] 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.

[1820] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 28.

Figure 3.31 Correlation between equity risk premium and risk free rate

◆ Equity risk premium for regulated utilities   ■ Debt risk premium (BBB+ rated corporate bonds with a 10yr term less 10yr CGS)

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.[1821] 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:[1822]

> 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.

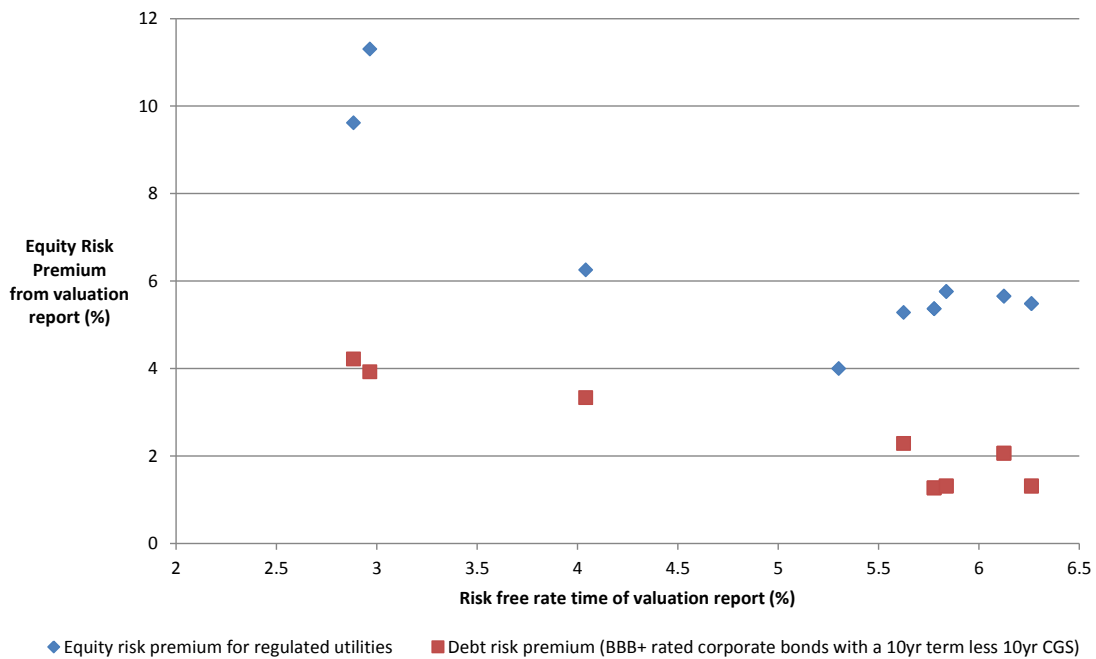[1821] Incenta Economic Consulting, Further update on the required return on equity from independent expert reports, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusGrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 33.

[1822] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 64.

Figure 3.32 shows the return on the market estimated in valuation reports dated between 10 April 2013 and 28 February 2015.[1823] Overall, Figure 3.32 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.[1824]

Figure 3.32 Market return from valuation reports
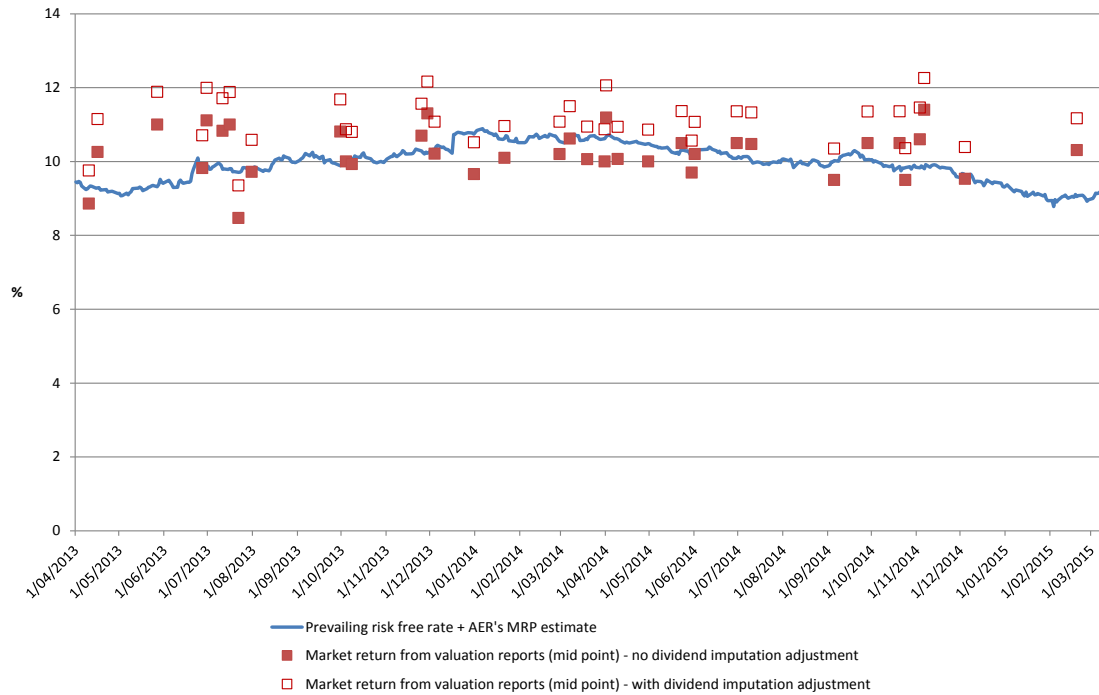
Source: AER analysis of data sourced from the Thomson Reuters Connect 4 database

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

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[1823] 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].

[1824] 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.).

equity beta.[1825] 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[1826]–that Grant Samuel is well-respected within the industry.

- There were 24 valuation reports[1827] 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.[1828]

  - 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 3.33.


[1825] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 31.

[1826] 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, Essential Energy, Powercor, SA Power Networks, and United Energy, February 2015, p. 18.

[1827] 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.

[1828] 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 3.33 Correlation between valuer's uplift and equity beta
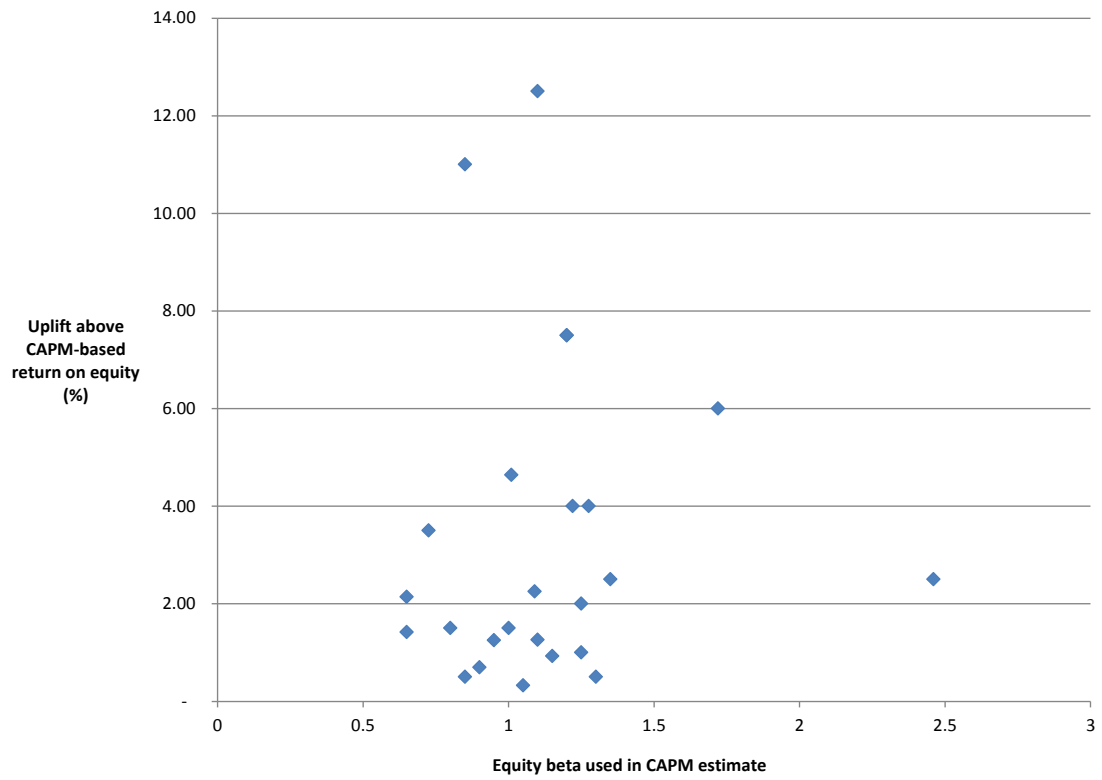
Source: AER analysis of data sourced from the Thomson Reuters Connect 4 database

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 3-62 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 3-62 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 RoE 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 RoE 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 RoE 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
Imputation credit adjustment (AER, Brailsford et al)	Adjust the MRP estimate under the DGM and historical excess returns

Material (step one)	Role (step 2)
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

Material received and reviewed since the draft decision

In determining our return on equity estimate for the benchmark efficient entity we have reviewed the material submitted by service providers and other stakeholders'.[1829] This material was submitted in the current regulatory determinations.[1830]

Expert reports submitted by service providers

The following is a list of reports commissioned by the service providers:

- SFG Consulting:

[1829] 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

[1830] Current regulatory determinations are for the following eleven NSPs: final decisions for ActewAGL, Ausgrid, DirectLink (accepted our draft decision on return on equity), Endeavour Energy, Essential Energy, Jemena Gas Networks, TasNetworks (accepted our draft decision on return on equity), TransGrid; and draft decisions for Ergon Energy, Energex and SA Power Networks.

- o *The required return on equity: Initial review of AER draft decisions: Note for ActewAGL, AusGrid, Essential Energy and Endeavour Energy*, 19 January 2015;

- o *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

- o *The required return on equity for the benchmark efficient entity, A report for AusGrid, Endeavour Energy and Essential Energy,* 12 March 2015

- o *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

- o *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

- o *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 PowerNetworks and United Energy*, 13 February 2015

- o *Estimating the required return on equity, Report for Energex*, 28 August 2014

- o *Updated estimate of the required return on equity, Draft report for Ergon,* 14 August

- o *Updated estimate of the required return on equity, Report for SAPN,* 8 September 2014

- o *The required return on equity: Initial review of AER draft decisions, Report for Energex,* 30 January 2015

- NERA Economic Consulting:

- o *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

- o *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

- o *Memo: Revised estimates of the Market Risk Premium*, 14 November 2014

- Houston Kemp, *Economic review of ERA's Draft Decision, A report for Johnson Winter and Slatery*, 27 November 2014

- Incenta, *Further update on the required return on equity from Independent expert reports,* February 2015

- Grant Samuel, *Response to AER draft decisions*, 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

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 2105

- CCP Sub-Panel–Hugh Grant, AER draft TransGrid determination and TransGrid's revised revenue proposal, 6 February 2105

- CCP Sub-Panel, Response to AER draft TransGrid determination TransGrid's revised revenue proposal, February 2105

- CCP Sub-Panel, Response to AER draft TasNetworks determination and TasNetworks revised revenue proposal, February 2105

Submissions from stakeholders

The following stakeholders commented on Essential Energy's revised proposal and/or our return on equity draft decision:

- AGL, *Submission on NSW DNSPs draft decision*, 15 February 2015, p. 3.

- Australian Gas Networks, *Submission on NSW and ACT draft decisions*, 12 February 2015, pp. 3–8.

- Consumer Challenge Panel, *Submission on NSW DNSPs draft decisions*, 16 February 2015, p. 47.

- Cotton Australia, *Submission on draft decision and revised regulatory proposal*, 13 January 2015, pp. 9–10.

- Council of Social Service of NSW, *Submission on draft decision and revised regulatory proposal*, 13 February 2015, pp. 8–9.

- Energy Networks Association, *Submission on NSW and ACT draft decisions*, 13 February 2015, pp. 14–15.

- Energy Retailer's Association of Australia, *Submission on NSW DNSPs draft decision*, 13 February 2015, p. 3.

- Energy Markets Reform Forum, *Submission on NSW DNSPs draft decision and revised proposals*, 16 February 2015, pp. 27–38.

- Ethnic Communities' Council of NSW, *Submission on draft decisions*, 11 February 2015, pp. 1–2.

- Energy Users Association of Australia, *Submission on NSW DNSPs draft decisions*, 13 February 2015, pp. 11–17.

- Macquarie Cotton Growers Association, *Submission on Essential Energy draft decision*, 19 February 2015, pp. 2–3.

- Lower Namoi Cotton Growers Association, *Submission on Essential Energy draft decision*, 12 February 2015, pp. 2–3.

- NSW Irrigators' Council, *Submission on draft decision and revised regulatory proposal*, 13 February 2015, pp. 8–9.

- Origin, *Submission on NSW draft decisions*, 15 February 2015, pp. 13–19.

- Public Interest Advocacy Centre, *Submission on NSW DNSPs draft decisions*, 13 February 2015, pp. 33–47.

- RARE Infrastructure, *Submission on NSW DNSPs draft decisions*, 13 February 2015, pp. 1–2.

- Spark Infrastructure, *Submission on NSW DNSPs draft decisions*, 13 February 2015, pp. 2–4.

The following service providers commented on Essential Energy's revised proposal and/or our return on equity draft decision:

- AusNet Services, *Submission on NSW DNSPs draft decisions*, 12 February 2015, pp. 1–17.

- Citipower and Powercor, *Submission on NSW, ACT and TAS draft decisions*, 6 February 2015, pp. 3–11.

- Ergon Energy, *Submission on NSW and ACT draft decisions*, 13 February 2015, pp. 4–8.

- Jemena, *Submission on NSW, ACT and TAS draft decisions*, 6 February 2015, pp. 1–11.

- Networks NSW (Ausgrid, Endeavour Energy and Essential Energy), *Submission on NSW draft decisions*, 13 February 2015, pp. 1–6.

- Networks NSW (Ausgrid, Endeavour Energy and Essential Energy), *Submission on NSW DNSPs draft decisions*, 18 March 2015, pp. 1–2.

- Networks NSW (Ausgrid, Endeavour Energy and Essential Energy), *Submission on AER draft determination*, 18 March 2015, pp. 5– 9.

- SA Power Networks, *Submission on NSW, ACT and TAS draft decisions*, 6 February 2015, pp. 1–12.

- TasNetworks, *Submission on NSW and ACT draft decisions*, 12 February 2015, pp. 2–3.

- United Energy, *Submission on NSW, ACT and TAS draft decisions*, 6 February 2015, pp. 3–15.

We received submissions on 28 March 2015 for the Jemena Gas Networks' revised access arrangement determination process. Some requested consideration for the 30 April 2015 preliminary and final decisions for Ergon and all NSW and ACT network service providers, respectively. However, given the lateness of these submissions all parties are not able to give these meaningful consideration. Therefore, we did not consider them.

G   Return on debt approach

In attachment 3, we set out our final decision on the return on debt approach and the key reasons for that decision.[1831] In this appendix we provide more details to support our reasons for a gradual transition to the trailing average approach. In addition, we respond to service providers' proposals on the return on debt and issues raised in submissions by other stakeholders.

In response to our draft decision, the NSW service providers (TransGrid, Ausgrid, Endeavour Energy and Essential Energy) and ActewAGL submitted a large volume of material on the topic of how we move from the on-the-day approach to the trailing average approach. This material includes:

- the interpretation of the NER.

- the efficiency of different financing practices under the on-the-day approach.

- the economic and business environment prevailing at the time of the 2009–14 regulatory and revenue determinations.

This appendix is structured as follows:

- Section G.8: Matters associated with the interpretation of the NER—sets out our response to the NSW network service providers and ActewAGL's proposition that a transition as set out in the draft decision is not consistent with the NER.

- G.9 - Efficient financing practices of a benchmark efficient entity under the on-the-day approach—sets out financing practices we consider efficient under the on-the-day approach.

- G.10- Alternative debt financing practices under the on-the-day approach—sets out our response to the NSW service providers submission that there were multiple efficient financing strategies. It also discusses the relevance of actual financial practices and potential influence of government ownership.

- G.11- Efficiency of hedging under the on-the-day approach—sets out our response to the NSW service providers' submission that hedging was inefficient even for private businesses.

- G.12- Efficiency of hedging for the NSW network service providers—sets out our response to the NSW service providers' submission that hedging was not efficient for them.

- G.13- A transition on debt risk premium: factual errors—sets out our response to the NSW service providers' submission that the analysis on which we relied contains factual errors.

[1831] See section with heading 'Approach to estimating the return on debt'.

- G.14 - Other consideration—sets out our response to the NSW service providers' other claims that we group under a single heading.

- - Transitional arrangements—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:

- 'NSW distribution network service providers' to refer to Ausgrid, Endeavour Energy and Essential Energy.

- 'NSW service providers' to refer to the NSW distribution network service providers and TransGrid.

The NSW service providers and ActewAGL submitted reports from several consultants with their revised proposals. Directlink did not submit any consultant report on this topic. The consultants commissioned by the service providers are listed in the following table.

Table 3-63: Consultants commissioned by service providers on this topic

Service provider	Consultant	Comments
NSW distribution network service providers	CEG, Frontier, UBS	Each of the NSW distribution network service providers submitted the same report from CEG, Frontier and UBS.
TransGrid	Frontier, UBS, HoustonKemp	These reports from UBS and Frontier are similar to the UBS and Frontier reports submitted by the NSW distribution network service providers. The main difference is some of the numbers in the reports' analysis have been revised to be service provider specific.[1832]
ActewAGL	CEG	This CEG report is similar to that submitted by the NSW network service providers.[1833]
DirectLink	None	

Source: Service provider's revised proposals

G.8   Matters associated with the interpretation of the NER

[1832]   The other main difference is the UBS report for the NSW distribution network service providers contains additional confidential material on financiability not contained in the report for TransGrid. We address this material in the confidential financiability appendix attached to the NSW distribution network service providers' final decisions.

[1833]   References in this apppendix to CEG's report are to the version submitted by ActewAGL. However, our analysis of the CEG report submitted by ActewAGL is equally applicable to the version submitted by the NSW distribution network service providers.

This section addresses matters related to the interpretation of the rate of return and the return on debt provisions in the NER raised by the NSW service providers or ActewAGL in their revised proposal.

In their revised proposals, the NSW service providers and ActewAGL submitted that our decision to gradually transition from the on-the-day approach to the trailing average approach involves a misapplication of the NER. [1834] In particular:

- The NSW service providers submitted that our adoption of a single benchmark efficient entity is inconsistent with the amendments to the NER which, they considered require the adoption of multiple benchmark efficient entities. [1835] They submitted that the allowed rate of return objective recognises there are fundamental differences between benchmark efficient entities.[1836]

- The NSW service providers and ActewAGL submitted that our approach is not permissible under the NER because they considered it takes into account a multiple regulatory period perspective in considering the meaning of efficient financing costs.[1837] They considered that our gradual transition to the trailing average approach applied to the debt risk premium is inconsistent with the requirement that the rate of return be commensurate with efficient financing costs.[1838]They submitted that the efficient financing costs are determined with reference to the regulatory period under consideration. They stated that our approach is not justified under the rules because they considered it seeks to average out in the current period perceived windfall gains of a past regulatory period. [1839]

[1834] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.179.; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.201; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.220; ActewAGL, *Revised regulatory proposal, 2015 – 2019*, January 2015, pp.473–479.

[1835] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.221.

[1836] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.183; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.206; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.225.

[1837] The NSW network service providers raised this argument in respect of a transition applied to the debt risk premium component of the return on debt. However, ActewAGL submitted that the application of a transition to both the risk free rate and the debt risk premium incorporate a multiple regulatory perspective and this is inconsistent with the rules. Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.179; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.201; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.220; ActewAGL, *Revised regulatory proposal, 2015 – 2019*, January 2015, pp.473–479.

[1838] NER, cl. 6A.6.2(h) and cl. 6.5.2(h).

[1839] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.181; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.204; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.223; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.123–124.

We disagree with these submissions from the NSW service providers and ActewAGL. We explain our reasons in this section.

G.8.1 Single or multiple benchmark efficient entities

In the Guideline and the draft decision, we adopted a single benchmark efficient entity for the purposes of estimating the rate of return, including the return on debt. After considering various factors that may impact risks faced by different energy network service providers, we were satisfied that relevant risks are sufficiently similar between these network service providers.[1840]

In their revised proposals, the NSW distribution network service providers stated:[1841]

> The AER's approach of seeking to establish the characteristics of a single hypothetical efficient benchmark entity, and then analysing issues that might arise for that hypothetical entity, is inconsistent with the rationale for the amendments to the relevant rules.

They also stated: [1842]

> It is clear under the rules that there are differences between benchmark efficient entities. This is specifically recognised in the allowed rate of return objective, which refers to "a benchmark efficient entity with a similar degree of risk as that which applies to the Distribution Network Service Provider".

TransGrid suggested we adopt multiple benchmarks for the purpose of estimating the allowed return on debt - one for 'small' service providers and one for 'large' service providers, though it did not define the dividing line between what makes a service provider small or large.[1843]

We disagree. Our approach to a benchmark efficient entity is consistent with the requirements of the NER because:

- The NER do not mandate the use of multiple benchmarks, as suggested by the NSW service providers. Rather the NER permit the use of a single or multiple benchmarks, with the decision to be made by the AER based on the merits of the issue. This interpretation is reflected in the AEMC's final rules determination.

[1840] AER, Explanatory statement– Draft rate of return guideline, August 2013, chapter 3; AER, Explanatory statement– Final rate of return guideline, December 2013, chapter 3.

[1841] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.221.

[1842] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.183; Endeavour, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.206; Essential, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.225.

[1843] TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.118–119. TransGid did not explicitly refer to a mis-application of the rules.

- We did not arrive at the decision to adopt a single benchmark efficient entity lightly. We carried out a thorough assessment and consultation process. We formed our decision based on the merits of the issue.

- We have carefully assessed all the material before us, particularly in respect of whether there should be multiple benchmarks based on the size of the service provider. Our conclusion is that risks faced by energy network service providers are sufficiently similar to warrant only one benchmark across all energy network service providers. This is regardless of the sector (gas or electricity), the segment (distribution or transmission), ownership (government or private) and size (large or small). We do not consider that multiple benchmarks are warranted based on the evidence before us.

We discussed each of these points below.

The rules do not mandate multiple benchmarks

There is nothing in the NER to indicate that the regulator is requirement by the NER to use multiple benchmarks for the purpose of estimating the allowed rate of return. Similarly, nothing in the NER indicate the regulator must use a single benchmark.

The NER make provision to enable the use of either a single or multiple benchmarks, based on the weight of evidence. This implies that the regulator could adopt a single or multiple benchmarks for the purpose of estimating the return on debt. This is reflected in the AEMC's final determination. The AEMC stated:[1844]

> The regulator may decide there should be more than one definition of a benchmark efficient firm across electricity transmission, distribution and the gas sector.

Also, the AEMC expressed its view in respect of the specification of benchmark characteristics as follows:

> The Commission therefore agrees that a one-size-fits-all approach to setting a benchmark should not be considered a default position.[1845]

The NSW service providers and Frontier appear to mischaracterise the AEMC's view.[1846] Nothing in the AEMC quotes they selected indicates that the AEMC intended to mandate the use of multiple benchmarks.[1847] The AEMC's use of words like 'can',

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[1844] AEMC, *Final rule change determination*, 29 November 2012, p.iv.

[1845] AEMC, *Final rule change determination*, 29 November 2012, p.86.

[1846] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.221.; Frontier, TransGrid cost of debt transition, prepared for Ashurst, January 2015, pp.28–31; Frontier, Cost of debt transition for the NSW DNSPs, January 2015, pp.34–37.

[1847] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential, *Revised regulatory proposal, 1*

'could' and 'might' demonstrate this.[1848] We disagree that the AEMC's quotes should be read as extrinsic material requiring the adoption of multiple benchmarks. They simply highlight the ability under the NER to adopt different benchmarks depending on the weight of evidence.[1849]

Our decision to adopt a single benchmark for the purpose of estimating the rate of return is based on the merits of the issue. In the next section, we outline the process we followed in reaching this decision.

AER's process in the lead up to adopting a single benchmark

In their revised proposals, the NSW distribution network service providers stated:[1850]

> The AER's approach of seeking to establish the characteristics of a single hypothetical efficient benchmark entity, and then analysing issues that might arise for that hypothetical entity, is inconsistent with the rationale for the amendments to the relevant rules.

The NSW distribution network service providers have mischaracterised our position. We did not start with a presumption there was a single benchmark efficient entity, and then sought to establish the characteristics of such a benchmark. Rather, we considered the various factors that might cause the risk of providing regulated services to differ between service providers - such as market sector, segment of operation, ownership type and size. After considering these matters, we concluded that the relevant risks are sufficiently similar between different energy network service providers for there to be a single benchmark efficient entity. We disagree with any proposition that our decision to gradually transition to the trailing average approach is

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July 2014 – 30 June 2019, January 2015, p.221; Frontier, *TransGrid cost of debt transition, prepared for Ashurst*, January 2015, pp.28–31; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, pp.34–37.

[1848] The NSW network service providers and Frontier used the following quotes from the AEMC's final rules determination to support their view: (a) "efficient benchmark service providers may have different efficient debt management strategies"; (b) "debt management practices tend to differ according to the size of the business, the asset base of the business, and the ownership structure of the business"; (c) there was a problem with the "one-size-fits-all" approach under the existing rules, and that a one-size-fits-all approach should not be considered a default position; and (d) "the regulator could adopt more than one approach to estimating the return on debt having regard to different risk characteristics of benchmark efficient service providers". For more details, see Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.221.; Frontier, TransGrid cost of debt transition, prepared for Ashurst, January 2015, pp.28–31; Frontier, Cost of debt transition for the NSW DNSPs, January 2015, pp.34–37.

[1849] It is our position that even if AEMC had a firm view, this is not reflected in the wording of the NER. Therefore we consider that the NER permit, but do not mandate multiples benchmark efficient entities. Another example of an issue where the NER do not mandate a firm position is in respect of the methodology for estimating the return on debt. The NER state a range of methodologies and use the expression 'without limitation'. NER, cl. 6A.6.2 and cl. 6.5.2.

[1850] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.221.

inconsistent with the rationale of the NER amendments because we adopt a single benchmark.

We did not arrive at the conclusion to adopt a single benchmark efficient entity lightly. We arrived at this conclusion based on the merits of the issue, and following a rigorous assessment and consultation process described below.

During the guideline process, we reviewed and assessed evidence for and against the use of a single benchmark efficient entity for the purposes of estimating the rate of return:

- We commissioned expert advice on the assessment of risk when estimating the rate of return from both an economic consultancy (Frontier) and from expert finance academics (Professor McKenzie & Associate Professor Partington).[1851] We consulted with stakeholders including service providers and consumer representatives on the terms of reference for these reports. We supplied the draft consultant reports to stakeholders and invited comments. We also held a public forum for the experts to explain their draft reports to stakeholders and to enable stakeholders to raise comments directly with the experts. It is highly usual for the AER to consult on terms of references, release draft consultant reports and invite comments, or hold public forums on draft consultant reports. Prior to this, the AER had not undertaken such an extensive consultation process on a single rate of return matter.

- In the explanatory statement of the draft and final guideline, we analysed a range of risks facing regulated service providers.[1852] In doing this, we considered a number of factors that could influence risks facing a benchmark efficient entity, including:
  - market sector (electricity versus gas)
  - segment of operation (Transmission versus distribution)
  - ownership type (government versus private)
  - size of network service provider (large versus small).

- Based on the information before us and taking into account the above factors, we considered that the impact of these factors is not sufficiently significant to warrant the adoption of multiple benchmark efficient entities. In other words, we concluded regulated network service providers face broadly similar relevant risks regardless of their sector (electricity or gas), segment of operation (distribution or transmission), ownership type (government or private) or size (large or small). By relevant risks, we mean risks relevant to the rate of return.

- Different stakeholders had different views on this matter. For example:

[1851] Frontier; Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia: A report prepared for the AER, July 2013; McKenzie and Partington, Report to the AER: risk, asset pricing models and WACC, June 2013.

[1852] AER, Explanatory statement– Draft rate of return guideline, August 2013, chapter 3; AER, Explanatory statement– Final rate of return guideline, December 2013, chapter 3.

- The Major Energy Users Inc (MEU), the Council of Small Business Australia (COSBOA), and the Queensland Cane Growers Organisation submitted that we should have a separate benchmark entity for government-owned network service providers, reflecting the lower cost of debt which they face.[1853]

- APIA, APA Group and Envestra submitted that we take account differences between gas and electricity.[1854]

- However, the MEU submitted that gas and electricity and transmission and distribution should be subject to the same approach for setting the rate of return.[1855] PIAC stated that it agrees with using a single benchmark efficient entity to assess the rate of return across gas and electricity and transmission and distribution.[1856]

In the current determination process, the focus is on whether there should be a single or multiple benchmarks with respect to size because the NSW network service providers have raised size as a significant matter. Further to our analysis during the Guideline development process, in the current determination process:

- We commissioned expert advice on the extent size influences efficient financing practices from both an expert academic (Dr Lally) and from an expert financial market practitioner (Chairmont).[1857]

  - Lally's advice is that, under the on-the-day approach, size would not change a benchmark efficient entity's efficient financing practices.[1858]

  - Similarly, Chairmont stated that although size is important factor, it does not fundamentally change the financing practice of an efficient entity.[1859]

- We requested additional information from the NSW network service providers in respect of their actual debt financing practices and we carefully considered their actual circumstances. This information included the internal Board papers of the service providers, and advice they commissioned, in the context of deciding on their actual debt financing practices.

The process set out above demonstrates that in considering the definition of our benchmark efficient entity, including whether to adopt a single or multiple benchmarks, we considered potential differences in risks facing network service providers. The description above also demonstrates that we carried out our process on this matter in a

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[1853] MEU, *Submission to the draft guideline*, October 2013, pp. 8-10; COSBOA, *Submission to the draft guideline*, October 2013; Queensland Cane Growers Organisation, *Submission to the draft guideline*, October 2013, p. 5.

[1854] APIA, *Submission to the draft guideline*, October 2013, p. 11–12; APA Group, *Submission to the draft guideline*, October 2013, p.12; Envestra, *Submission to the draft guideline*, October 2013, p. 5.

[1855] MEU, *Submission to the draft guideline*, October 2013, p. 12.

[1856] PIAC, *Submission to the draft guideline*, October 2013, p. 10.

[1857] Lally, M. Transitional arrangement for cost of debt, November 2014; Lally, M., *Review of submissions on the cost of debt*, April 2015; Chairmont, Cost of debt transitional analysis, April 2015.

[1858] Lally, M., *Review of submissions on the cost of debt*, April 2015, p.3.

[1859] Chairmont, *Cost of debt Transitional analysis*, April 2015, p.8.

manner consistent with the words, rationale and spirit of the NER. We did not adopt a single benchmark as a default position.[1860]

In the following section we discuss the matter of size in more detail. Our assessment of the other factors that are likely to impact the degree of risk faced by a benchmark efficient entity is set out in chapter 3 of the explanatory statement of the draft rate of return guideline.

Different concepts of size–Individual service provider or corporate group

TransGrid suggested that we should adopt two benchmarks–one for 'small' service providers and one for 'large' service providers.[1861] We are not persuaded that the differences in size between service providers would sufficiently impact the risks faced by service providers for there to be multiple benchmarks.

However, even if we were persuaded to adopt different benchmarks based on size, it would be necessary to define the boundaries between different benchmarks. This is not a simple task. In the draft decision, we stated:[1862]

> In regard to size, we considered it is a fluid concept. We regulate a number of service providers, each with a different sized asset base. We were not persuaded the difference in size would impact the risks faced by a benchmark efficient entity. However, if we were to differentiate the rate of return on size, it is not clear how many benchmarks should be specified (for example: two benchmarks – big and small; three benchmarks – small, medium and big; etc.). It would also be difficult to establish an objective criterion to establish the 'border' between each benchmark, and that benchmark may also change over time. Further, we were satisfied that the overall risk level of the service providers we regulate was sufficiently similar not to warrant stratification based on size.

In relation to the NSW service providers, the risk based on size could be assessed in two ways. These are:

- 'large' which means the risk of a benchmark efficient entity with a debt portfolio the size of any one of the individual NSW service providers (the largest of which is Ausgrid which has a debt portfolio of $8.5 billion (nominal) as at the start 2014,[1863] or

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[1860] AEMC, AEMC, *Final rule change determination*, 29 November 2012, p.86.

[1861] TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.118-119.

[1862] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, p.124. *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, section 3.4.2. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

[1863] Ausgrid, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.182.

- 'super' which means the risk of a benchmark efficient entity with a debt portfolios the size of all the NSW network service providers collectively (which collectively have a debt portfolio of 19.5 billion as at 2014)[1864]

Based on the information before us, it is not clear to us whether the 'large' or 'super' size perspective is the preferable basis of assessment for the NSW service providers from either a legal or economic perspective. The NSW service providers did not suggest where to place the dividing line. There are elements suggesting that 'large' may be the relevant perspective as the basis of assessment. For example:

- We make a separate determination for each of the NSW network service providers.

- In the past each of these network service providers had a separate Board.

Similarly, other elements suggest that 'super' may represent the relevant perspective as the basis of assessment. For example:

- The NSW distribution network service providers now have a single joint Board which makes decisions regarding their financing practices and other matters (Networks NSW).[1865]

- In the past they received advice from, or outsourced their treasury management to, the same entity (TCorp).[1866]

- We have consistently rejected the concept of a 'standalone' network as the regulatory benchmark in favour of 'pure play' network (which means the benchmark efficient entity can own multiple networks as long they are regulated energy network service providers).[1867]

Given that it is not clear which one of these perspectives is preferable, we have considered both. This is reflected in our terms of reference to Chairmont. Further, Chairmont advised that the choice of perspective does not change its recommendation.[1868]

We now turn to address the concern raised by the NSW network service providers on whether a multiple regulatory period perspective is consistent with the rules.

G.8.2   Single or multiple regulatory period perspective

The issue of whether it is consistent with the NER to adopt a single or a multiple regulatory period perspective in respect of setting the return on debt (and therefore the

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[1864] Ausgrid, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.221; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, p.104 (60 per cent of opening RAB).

[1865] Ausgrid, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, pp.185–186.

[1866] This is demonstrated in additional documents provided by these businesses in this determination process.

[1867] AER, Explanatory statement– Final rate of return guideline, December 2013, p.10.

[1868] Chairmont, *Cost of debt transitional analysis*, April 2015, p.8.

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 a multiple regulatory period perspective is also a relevant consideration under the NER.

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, especially as applied to debt risk premium, because it is consistent with an economic principle that is key to the building block model in the NER. This principle requires that a benchmark efficient entity should receive revenue with a present value equal to the present value of its efficient costs.[1869] This principle is generally known as the NPV principle. We discuss this point below.

In their revised proposals, the NSW network service providers submitted that our approach is not justified under the NER.[1870] They considered it is retrospective.[1871]

We disagree. Under the rules, we must have regard to a number of factors when estimating the return on debt, including any impacts (including in relation to the cost of servicing debt across regulatory 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 period to the next.[1872] 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 periods–the cost of servicing debt. Therefore, 'any impacts' seem to include any other impact that stretches across regulatory periods. This would seem to include any over or under compensation that would result from changing the approach to setting the return on debt.

As set out in section 3.4.2, our gradual transition to the trailing average approach would provide a benchmark efficient entity with a reasonable opportunity to recover efficient financing costs over the life of the assets. For the base component, we consider the allowed and actual return on debt of a benchmark efficient entity would have broadly matched in each regulatory control period. This match arises because a benchmark efficient entity is and was able to undertake hedging arrangements under the on-the-day approach.[1873] However, in respect of the debt risk premium, when the

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[1869] We note that Lally defines this principle as requiring that the revenues resulting from regulatory policy, net of opex and taxes, should have a present value equal to the initial investment (efficient costs) in the regulated assets. The two definitions though worded differently refer to the same principle.

[1870] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.181; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.204; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.223; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.123-124.

[1871] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.181; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.204; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.223; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.123-124.

[1872] NER, cl,6.5.2(k)(4) and cl.6A.6.2(k)(4).

[1873] Lally, M., Transitional arrangements fro the cost of debt, November 2014, pp.16–17.

method for estimating the return on debt changes during the life of regulated assets, the NPV principle is unlikely to be met automatically.[1874] Any existing accumulated differences between the allowed and actual return on debt of a benchmark efficient entity would remain. The service provider will receive a 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, an immediate change from one return on debt approach to another could have undesirable consequences.

The possibility of a departure from the NPV principle should concern both regulated entities and consumers. Neither could know whether they would face a benefit or detriment. It may be that some stakeholders do not hold this concern in this case because they are aware, through hindsight, of how applying or not applying a transition would affect their interests.

Furthermore, we consider that our transition on the debt risk premium as set out in the draft decision is appropriate because it reflects the NPV principle which is embedded in the regulatory framework as set out in the reasoning below.

Legislative connection between the NPV principle and historical development of rules

Under the NER, we must use the building block model to calculate the revenues for distribution and transmission determinations.[1875] 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:[1876]

> 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.

[1874] 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 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 outcome is consistent with the NPV principle.

[1875] NER, cl. 6A.5 and cl. 6.4.

[1876] ACCC, *Statement of principles for the regulation of electricity transmission revenues*, 2004, p.5.

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, represents 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 opportunity to recover at least its efficient costs.[1877]

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:[1878]

> 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
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> - 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:[1879]

> 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.

In 2007, the MCE stated the following:

> 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.[1880]

[1877] NEL, s.7A(2).

[1878] AEMC, *National Electricity Amendment (Economic Regulation of Transmission Services) Rule*, 2006, pp.iv-v and p.34.

[1879] MCE, Legislative Package: Initial National Gas Rules, 2006, p.4.

[1880] 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.

…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.[1881]

G.9 Efficient financing practices of a benchmark efficient entity under the on-the-day approach

The NSW network service providers submitted a large volume of material on their view in respect of efficient financing practices under the on-the-day approach. Their view is contrary to ours. In the Guideline and the draft decision, we considered that 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.[1882] We maintain this view based on:

- The reasons set out in the Guideline[1883]

- Advice from Lally and Chairmont.[1884]

- Our findings from the review of internal documents submitted in confidence by the NSW network service providers.[1885]

In the draft decision we considered 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.[1886] We considered that for a benchmark efficient entity under the on-the-day approach, it would be efficient to:[1887]

   i.   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.

   ii. 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);

[1881] MCE, *Changes to the National Electricity Rules to establish a national regulatory framework for the economic regulation of electricity distribution – Explanatory Material*, 2007, p.13.

[1882] AER, Ausgrid draft decision, Attachment 3, p.115. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

[1883] AER, *Explanatory statement of the rate of return guideline*, December 2013, chapter 7; AER, *Explanatory statement: Draft rate of return guideline*, August 2013, chapter 6.

[1884] Chairmont, *Cost of debt transitional analysis*, April 2015; Lally, M., *Review of submissions on the cost of debt*, April, 2015.

[1885] We set out our review of these internal documents in a confidential appendix L.

[1886] AER, Ausgrid draft decision, Attachment 3, p.115. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

[1887] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, p.115. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

iii.   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).

We explained that:[1888]

- The staggering of debt under this strategy would have lowered refinancing risk, compared to if a benchmark efficient entity attempted to issue all its debt during the averaging period.

- This financing strategy would have resulted in the risk free rate component of a benchmark efficient entity's actual return on debt matching the on-the-day rate. However, the debt risk premium component each year would reflect the historical average of the debt risk premiums over the previous 10 years.

We are satisfied that the above financing practice was efficient because:[1889]

- Compared with the alternative possible debt financing strategies under the on-the-day approach, this strategy would have more effectively managed refinancing risk and interest rate risk, and also resulted in a lower expected actual return on debt.

- It is the financing strategy that was generally adopted by most private service providers under the on-the-day approach.

The NSW network service providers submitted that it was efficient for them to adopt staggered debt portfolio without interest rate swap overlay under the on-the-day approach. Comparing these businesses' financing strategy with that of a staggered debt portfolio with interest rate swap overlay, we concluded, in the draft decision that, both financing strategies would have led to a similar degree of refinancing risk.[1890] However, compared to NSW network service providers' financing strategy, adopting a staggered debt portfolio with interest rate swap overlay would have resulted in lower:

- interest rate risk—as interest rate risk would only have been borne on the debt risk premium component of the return on debt,[1891] rather than on the total return on debt.[1892]

- actual return on debt—as hedging using interest rate swaps has the impact of reducing the effective term of the debt. Longer term debt is typically more expensive than otherwise equivalent shorter term debt, due to the greater risks

[1888] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, pp115-116. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

[1889] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, p.116. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

[1890] This is because both strategies stagger borrowing such only a proportion of debt portfolio matures at a given time.

[1891] This is because aligning the base rate component of the return on debt to the allowed base rate through the use of interest rate swaps; effectively insulate the benchmark efficient entity's base rate from interest rate volatility over the regulatory period.

[1892] The debt risk premium component of the return on debt could not be hedged.

faced by the holders of long term debt; thus reducing the effective term would be expected to reduce the lower actual return on debt, on average.

Since the draft decision, we have reviewed the submissions of the NSW service providers and reassessed our position on the efficient practices of the benchmark efficient entity. We sought additional advice from Lally and Chairmont and asked them to consider the material submitted by the NSW service providers and other stakeholders. We also reviewed internal documents obtained from the NSW network service providers. After considering this material, our view is unchanged from the draft decision. We are not persuaded by the NSW network service providers' submission that a staggered debt portfolio (without interest rate swap overlay) was efficient under the on-the-day approach. Our view is supported by Chairmont, Lally and internal documents submitted in confidence by the NSW network service providers.

- Chairmont advice is that:[1893]

  Points (ii) and (iii) of AER's assumed EFP [efficient financing practices] under the old approach (in section 6.2.3) are in line with the practical EFP a corporate would employ. Point (ii) refers to raising debt on an effectively floating rate basis and point (iii) refers to paying fixed rate in 5 year swaps during the rate-set window near the start of a regulatory period.

  Point (i) is broadly correct, subject to the need for more flexible debt management described in sections 8.2 and 8.4, but underestimates the impact of the regulation itself on the behaviour of the company.

- Lally stated:

  …in respect of the on-the-day regime, the BEE [benchmark efficient entity] borrows for ten years, staggers the borrowing, and undertakes interest rate swap contracts to approximately align the base rate component of its cost of debt with the regulatory cycle.[1894]

- We set out our findings from the review of the NSW network service providers' internal documents in a confidential appendix L.

Based on the staggered debt portfolio with interest rate swap overlay's financing practice, a benchmark efficient entity at the 2009 regulatory and revenue determinations would have held a 10 year floating rate staggered debt portfolio with 5 year floating-to-fixed interest rate swap contracts entered into during or around the time of the averaging period. Lally and Chairmont agree with us on this view.[1895] Lally

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[1893] Chairmont, Cost of debt transitional analysis, April 2015, pp.31–32.

[1894] Lally, M., *Review of submissions on the cost of debt*, April 2015, p.9.

[1895] However, Chairmont noted that our position on the benchmark debt term is a simplification. Chairmont explained that the efficient refinancing profile would be to some extent closer to the revenue determination window than the 10 year term for a benchmark efficient entity. For more details, refer to: Lally, M., *Review of submissions on the cost of debt*, April 2015, pp.8–10; Chairmont, *Cost of debt transitional analysis*, April 2015, p.31–32.

and Chairmont's advice is that the benchmark efficient entity's 5 year interest rate swap contracts would have matured in mid–2014.

G.10 Alternative debt financing practices under the on-the-day approach

The NSW network service providers and their consultants submitted that there was more than one efficient financing practice under the-on-day approach.[1896] This is contrary to our view set out in section A.2. They suggested we consider the actual financing practices of actual network service providers.

CEG and Frontier submitted that the previous benchmark was unachievable[1897] and they suggested we consider actual financing practices of actual network service providers as efficient.[1898] They also suggested multiple benchmark efficient entities for the purpose of determining the return on debt.

We do not agree that the practices of the NSW service providers were efficient from the perspective of a benchmark efficient entity. The practices of the NSW businesses did not manage interest rate risk. Our view, as set out in the previous section, is that the efficient practices of the benchmark efficient entity would have been to simultaneously manage refinancing risk and interest rate risk. This view is supported by the advice provided by Lally and Chairmont. Further, confidential documents obtained from the NSW businesses are also relevant.[1899]

There may be reasons why the practices employed by the NSW businesses were appropriate in their particular circumstances. But these reasons seem to arise from the businesses' operation under government ownership and their arrangements through TCorp as the debt provider for the NSW government. These factors are not relevant to our consideration of the circumstances of the benchmark efficient entity.

We provide further details to our reasoning in the following sub–headings:

- Single or multiple efficient financing practices

- The relevance of actual financing practices.

[1896] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.180; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.202; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.221; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.118–119.; CEG, *Efficient debt financing costs*, January 2015, p.26; Frontier, TransGrid cost of debt transition, prepared for Ashurst, January 2015, pp.33–35; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, pp.39–41.

[1897] CEG, *Efficient debt financing costs*, January 2015, p.15; Frontier, *TransGrid cost of debt transition, prepared for Ashurst*, January 2015, pp.33–35; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, pp.39–41.

[1898] Frontier, *TransGrid cost of debt transition, prepared for Ashurst*, January 2015, pp.27–33; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, pp.33–39; CEG, *Efficient debt financing costs*, January 2015, p.52.

[1899] We discuss the content on this advice in a confidential appendix K.

G.10.1 Single or multiple efficient financing strategies

Contrary to the view set out in the revised proposals and relevant consultant reports, we consider that the question is not whether there was more than one efficient financing approach under the on-the-day approach. Rather, the question is which of the following financing practices better approximates the financing practices of a benchmark efficient entity:

- 10 year floating rate staggered debt portfolio with interest rate swap overlay, or

- 10 year fixed rate staggered debt portfolio with no interest rate swap overlay.

In the draft decision and in section G.9 of this appendix, we outlined a financing practice that was available to all network service providers. Chairmont and Lally agreed with us.[1900] In its critical review of efficient financing practices, Chairmont noted that the behaviour of a benchmark efficient entity with a similar degree risk as that of the NSW network service providers would be broadly similar to that described by us.[1901] For example, Chairmont stated:[1902]

> A large BEE [benchmark efficient entity] or super BEE would have a similar debt portfolio to a BEE.

For practical purposes it is necessary for the regulatory regime to abstract away from some of the complexity of the real world. In this respect, the regulatory regime must state a particular interest rate risk management strategy in order to estimate the stated strategy. We do not expect all efficient service providers will have adopted exactly the financing practices we have set out. For example, Chairmont noted that there could be variations in the precise strategy employed. On this basis, there may be multiple efficient strategies. However, the variations would have been minor. All efficient strategies would involve actively managing interest rate risk.

In addition, the NSW network service providers and their consultants seem to overstate the draft decision position by suggesting that we determined only one efficient financing strategy. We considered that a benchmark efficient entity would have:[1903]

- Borrowed 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

- borrowed using floating rate debt (or *to borrow*ed *fixed rate debt and convert*ed *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

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[1900] 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.

[1901] Chairmont, *Cost of debt Transitional analysis*, April 2015, pp.29–45.

[1902] Chairmont, *Cost of debt Transitional analysis*, April 2015, p.8.

[1903] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, p.115. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

- entered 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).

In the draft decision, we also considered that a benchmark efficient entity's debt portfolio would have a mix of bank debt, domestic bonds and foreign bonds with the mix changing over time.[1904] Therefore, we expect that efficient service providers might adopt either long or short term debt, different types of debt (bank debt/bonds; foreign/domestic); depending on market conditions and perceptions around whether particular debt products are 'cheap' or 'expensive'.

None of the privately-owned service providers have adopted precisely a 10 year floating rate portfolio with interest rate swaps, but they still support our transition path applied to the base rate because it provides a good approximation for the efficient industry norm. Similarly, none of the NSW network service providers adopted exactly the financing practices underlying their proposed return on debt (10 year fixed rate debt portfolio). For example:

- TransGrid's debt portfolio averages about 9 years (instead of 10) with the duration depending on whether prevailing rates were high or low compared with historical averages, and included a non-immaterial proportion of CPI-linked and floating rate debt.

Therefore, while we consider that variations in practices are likely to arise, we consider that these are relatively minor. These potential variations do not disturb our view that the approach we outlined in the draft decision is reflective of efficient practices. Nor do we consider that it is necessary to define more than one benchmark.

G.10.2 Relevance of actual financing practices

CEG and Frontier submitted that the previous benchmark was unachievable[1905] and they suggested we consider actual financing practices of the NSW network service providers as efficient. This view implies multiple benchmark efficient entities for the purpose of determining the return on debt.

We disagree. For the reasons set out earlier, we are satisfied that a gradual transition to the trailing average approach applied uniformly is consistent with the rules. Also, we are unable to reconcile CEG and Frontier's view with either the current or the previous advice from the NSW network service providers' consultants. Some elements of the current advice appear to conflict with others; and conflict with previous advice as set out below.

[1904] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, pp.141–143. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid, Directlink, Endeavour Energy, Essential Energy, and TasNetworks.

[1905] Frontier, *TransGrid cost of debt transition, prepared for Ashurst*, January 2015, pp.33–35; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, pp.39–41.; CEG, *Efficient debt financing costs*, January 2015, p.15.

Current advice

On the one hand CEG and Frontier suggested that we consider applying multiple benchmark efficient entities based on actual financing practices. On the other hand they seem to suggest some of these actual financing practices are not relevant. For example:

- Private network service providers managed interest rate mismatch risk by hedging the base rate component of the return on debt as set out in the draft decision. However, CEG and HoustonKemp submitted that hedging was more costly and more risky for these businesses.[1906] CEG and HoustonKemp suggested that actual practices of private network service providers were not efficient. We discuss this matter further below.

- The Queensland network service providers (Ergon Energy and Energex) refinanced their whole debt portfolio at the start of the regulatory period. However, Frontier suggested that the case of these businesses should not be taken into account. Frontier stated that this approach was possible because the debt requirements of these businesses' borrowing amounted to a relatively smaller proportion of total state borrowings.[1907] This suggests that the actual financing practice of these businesses is influenced by factors not relevant to a benchmark efficient entity (government ownership).

- ActewAGL is 100 per cent equity financed (no outstanding debt).[1908] CEG considered ActewAGL has no conceivable debt management strategy under the on-the-day approach. However, CEG also submitted it should be deemed to have adopted the trailing average and it considered no transition should apply to ActewAGL.[1909]

When brought together it is not clear how these views can be reconciled. Further, the current advice seems to be in conflict with previous advice from CEG.

Previous advice

In previous advice to the Joint Industry Association (JIA) in the context of debt term, CEG stated the view that government owned networks should not be used to determine financing practices of the benchmark because of differences caused by government versus private ownership. CEG stated:[1910]

> …observed GBE (government business enterprises) debt strategies cannot be viewed as the outworking of capital (debt and equity) market forces.

[1906] CEG, *Efficient debt financing costs*, January 2015, pp.2-3; HoustonKemp, *Response to the draft decision on the return on debt allowance*, Attachment Q of TransGrid's revised revenue proposal, January 2015, pp.11–13.

[1907] Frontier, *TransGrid cost of debt transition, prepared for Ashurst*, January 2015, p.35; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, p.41.

[1908] CEG, *Efficient debt financing costs*, January 2015, p.53.

[1909] CEG, *Efficient debt financing costs*, January 2015, p.53.

[1910] CEG, *Term of the risk free rate under the NER: A report for the Joint Industry Association*, January 2009, p.6.

CEG considered that the lender of government owned service providers is also their only shareholder. Accordingly, loans to government owned service providers are, effectively, loans from the shareholder to itself. From this perspective, a debt strategy within a government-owned service provider may not have any impact on the risk levels its shareholder faces because it is not possible for different debt strategies to transfer risk between debtors and shareholders when the only shareholder is the only debtor.

We made a similar point in the draft decision. However, the NSW network service providers or their consultants did not engage with our reasoning.

Influence of government ownership

In the draft decision, we considered that the financing practices of government owned businesses may not be useful to inform a benchmark efficient entity' efficient financing practice. We considered that their financing practices might be different from the efficient debt financing practices of a privately owned benchmark efficient entity because government owned service providers:[1911]

- may not be subject to normal market signals and incentives—they borrow via another government entity (such as the Queensland Treasury Corporation (QTC) or NSW TCorp) and are thereby partially shielded from market signals.

- face low bankruptcy and refinancing risk.

- might have historically been less aware of the full potential of the swaps market.

- are each part of a large portfolio of service providers held by their (state government) owners and may consider that there are natural hedges within the portfolio.

In their revised proposals, the NSW network service providers and their consultants extensively discussed these businesses' knowledge of the interest rate swap market. However, they did not equally address our views on the potential incentives facing government owned service providers. Chairmont observed that borrowing through another government entity, may affect government owned network service providers' decision making. Chairmont stated:[1912]

> There has been commentary around the efficiency or otherwise of the NSW government owned entities. It is our view that these organisations are professional, well-staffed and they appear to have a sound and robust decision making process; however there is one area that appears to impact on these organisations financing decisions and that is the role and relationship of TCorp. It is important to understand that state funding corporations act on behalf of the

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[1911] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, pp.292–294. Analogous reasons were includes in our November 2014 draft decisions for ActewAGL, TransGrid and Endeavour Energy, Essential Energy.

[1912] Chairmont, *Cost of debt transitional analysis*, April 2015, p.45.

state government and its related family entities and that its objectives may be different to that of a government NSP, and it may treat the government NSP debt and hedging requirements in a portfolio sense rather than looking at it through the 'eyes' of the NSP.

It may be the case that there are efficient financing practices at a combined level of state government or its funding body level; however these may differ to the practices of a private entity of an equivalent type and size to each of the NSW NSPs. So that there is no misunderstanding, the government ownership alone will not change the efficient financing practices for an NSP, as defined in the BEE and Super BEE questions above. If there are efficient financing practices at a state government funding body level they are not relevant to the cost of debt allowance mechanism.

G.11 Efficiency of hedging under the-on-day approach

We respond to the revised proposals in this section. Contrary to views set out by the NSW service providers and ActewAGL, we maintain that the use of interest rate swaps was an efficient practice under the on-the-day approach.

The NSW service providers, ActewAGL and their consultants suggested that the hedging approach adopted by private firms was either more costly or more risky than the trailing average approach they adopted. In particular:

- The NSW service providers and ActewAGL submitted that there is a negative correlation between the risk free rate and debt risk premium—they considered that locking in one component removes a natural hedge; resulting in limited or no reduction in the interest rate risk. They relied on advice from CEG and HoustonKemp.[1913] HoustonKemp cited six academic empirical studies to support this proposition. CEG used data from 2004 to 2013 to support the view that hedging would eliminate the natural hedge between the base rate and the debt risk premium.[1914]

- The NSW service providers submitted that hedging is imperfect—the NSW service providers and their consultants submitted that using interest rate swaps as set out in the draft decision would only provide a partial hedge because the debt risk premium component of the return on debt could not be hedged.[1915]

[1913] CEG, *Efficient debt financing costs*, January 2015, section 4.5; HoustonKemp, *Response to the draft decision on the return on debt allowance*, Attachment Q of TransGrid's revised revenue proposal, January 2015, pp.17–18.

[1914] CEG, *Efficient debt financing costs*, January 2015, pp.21–23.

[1915] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.186; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.210; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.228; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, p.119; UBS, *Analysis of liquidity of interest rate swaps*, Attachment R of TransGrid's revised revenue proposal, January 2015, pp.4-5; UBS, *Financeability - debt issuance and capital structure*, Attachment 1.12 of Ausgrid's revised regulatory proposal, January 2015, pp.3–4. The last UBS report was also submitted by Essential Energy and Endeavour Energy also submitted the same report.

- HoustonKemp and TransGrid considered that businesses that engaged in hedging had higher costs of debt than those that did not hedge—they submitted that a business that hedges the base rate will not have an incentive to minimise the total cost of debt.[1916] They used data from the Productivity Commission (PC) to show that network service providers that did not hedge have lower cost of debt relative to those that engaged in hedging.[1917]

- CEG submitted that hedging is an aggressive financing strategy—it considered that businesses that engaged in hedging might have done so because they were closer to financial distress. CEG also submitted that such businesses had a higher gearing than the benchmark.[1918]

We disagree. We are not persuaded that any of the above reasons or all of them taken together support a conclusion that hedging as set out in the draft decision was inefficient under the-on-day regulatory approach. Such a conclusion runs in opposition to the observed financing strategy adopted by most private networks. It is our view that private network service providers are subject to capital market disciplines which incentivise efficient practices. For example, they continuously face takeovers by other businesses with relatively lower marginal costs. Chairmont agreed with us. Chairmont stated:[1919]

> Private and listed companies, whether in heavily regulated industries or not, eventually end up with efficient capital structures, business models and operating costs, or they are driven out or taken over by those that have the correct set-up or bring new innovative solutions that either lower their marginal cost or bring value added aspects that can justify the higher price, e.g. Apple and the iPhone.

> While the provision of electricity network services in any one region does not have direct competition, there is competition for the ownership of those assets across the country and the return on capital for the owners. Accordingly, the private firms in the industry have to structure and conduct their businesses in a capital-efficient manner.

We set out our reasoning in more detail below.

[1916] TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, p.120; HoustonKemp, *Response to the draft decision on the return on debt allowance*, Attachment Q of TransGrid's revised revenue proposal, January 2015, p.17.

[1917] TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, p.122; HoustonKemp, *Response to the draft decision on the return on debt allowance*, Attachment Q of TransGrid's revise revenue proposal, January 2015, p.12.

[1918] CEG, *Efficient debt financing costs*, January 2015, p.22.

[1919] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.17.

G.11.1 Negative correlation between the risk free rate and the debt risk premium

We are not satisfied that the material presented by the NSW service providers or ActewAGL clearly establishes that there is a natural hedge between the risk free rate and debt risk premium. Further, if there is a correlation between these two variables, it must be sufficiently negative and stable for there to be a natural hedge between the risk free rate and the debt risk premium (e.g. a correlation coefficient close to 1). Lally agreed with this view. Lally stated:

> However, negative correlation would not be sufficient to support the conclusion that swapping was inefficient. It would have to be sufficiently negative to cause the risk from not swapping to be less than the risk from swapping, and HoustonKemp present no evidence on this matter.[1920]

In addition, the NSW network service providers' proposition of natural hedge between the risk free and the debt risk premium conflicts with other information they submitted to us in confidence.[1921]

Our review of the six empirical studies submitted by TransGrid to support this proposition confirmed a negative correlation as stated by HoustonKemp. However, this review also revealed that the explanatory power of the models employed to estimate the relationship between the two variables (represented by the r-square) is weak.[1922] For example one of these studies, Lepone and Wong (2009) stated:[1923]

> Overall interest rate variables explain a small portion of credit spread changes.

HoustonKemp acknowledged this limitation.[1924] However, neither the NSW network service providers nor CEG incorporated this key limitation in their reasoning.

Chairmont assessed this matter by looking at data from September 1999 to November 2013 but did not find conclusive evidence. Chairmont's data yields a correlation coefficient of -0.26.[1925] shows Chairmont's analysis. Chairmont concluded: [1926]

> The two components clearly have years when they are negatively correlated and years when they are not. The relationship does not provide a reasonable hedge.

[1920] Lally, M., *Review of submissions on the cost of debt*, January 2015, p.47.

[1921] We discuss this matter further in a confidential appendix K.

[1922] R-square values range from 0 to 1. A value of 1 indicates that a model has a strong explanatory power; the explanatory variable explains most of the independent variable. The reverse is true for a value of 0.

[1923] Lepone, A. and Wong, B, Determinants of credits spread changes: evidence from the Australian bond market, *Australasian Accounting Business and finance journal* 2009, volume 1, issue 2, p.36.

[1924] HoustonKemp, *Response to the draft decision on the return on debt allowance*, Attachment Q of TransGrid's revised revenue proposal, January 2015, p.19.

[1925] AER's calculations based on Chairmont's data.

[1926] Chairmont, *Cost of debt Transitional analysis*, April 2015, Appendix C.

Figure 3-34: Correlation analysis–risk free rate (swap) and debt risk premium (DRP)

Comparative Movement of Swap and DRP Rates
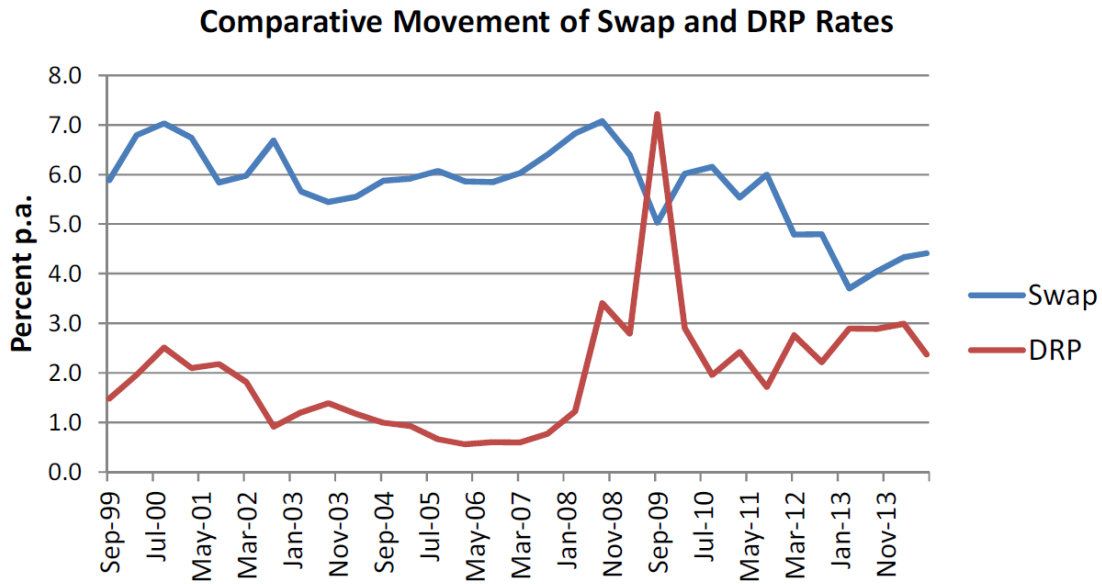
Source: Chairmont 2015, Appendix C.

Our consideration of CEG analysis

CEG submitted that the NSW network service providers' financing strategy matched the allowed return on debt under the on-the-day approach than that of staggering borrowing with interest rate swap overlay.[1927]

We disagree. CEG's analysis is flawed and its assumptions are incorrect. CEG assumed that the allowed return on debt under the on-the-day approach is reset monthly. This is incorrect because under the on-the-day approach we set the return allowance at the start of a regulatory period and reset it after five years. CEG compared three measures of debt costs:[1928]

- prevailing rates–10 year BBB cost of debt

- trailing average

- 5 year swap + trailing average debt risk premium.

CEG did not incorporate the allowed return on debt over the period of analysis. To be in a position to conclude that debt costs under the trailing average approach better match the regulatory allowance than that under the interest rate swap strategy, the analysis should include the appropriate measure of the return on debt under the on-the-day approach

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[1927] CEG, *Efficient debt financing costs*, January 2015, p.3.

[1928] CEG, *Efficient debt financing costs*, January 2015, pp.21–23.

G.11.2 Interest rate swaps provide an imperfect hedge

We consider that the correct question should be whether engaging in interest rate swaps efficiently managed interest rate risk under the on-the-day regulatory regime (not whether it provided a perfect hedge). While acknowledging that the hedging strategy applies only to the base rate component of the return on debt, Lally and Chairmont demonstrated that hedging under the on-the-day regulatory regime was efficient to manage interest rate risk.[1929] The NSW network service providers or their consultants did not provide evidence to the contrary apart from stating it would not have been efficient for these businesses to hedge at the 2009 revenue determination (we address this issue below). They did not carry out analysis to demonstrate that the risk arising from hedging (though imperfect) is higher than that resulting from not hedging at all.

Furthermore, Lally undertook analysis on this issue, using data from April 1953 to January 2015.[1930] Lally concluded:[1931]

> In summary, when a regulator uses an on-the-day policy with a one month window for setting the allowed rate, the use of interest rate swaps reduces the mismatch between the on-the-day allowance and the incurred costs of debt.

In addition, Chairmont considered that even though it might not have been possible to hedge fully with swaps within the allocated rate setting window:[1932]

> …the way to minimise the potential for adverse movement is to act as quickly as possible to hedge. UBS estimated that a 76 day period beyond the length of the rate-set window was required to close all of the swaps, whereby the amount open to risk would progressively reduce each day by the amount fixed that day. Had this policy of closing swaps as quickly as possible been adopted the average duration of the risk would have been 38 days, i.e. half of 76.

> The NSW NSPs chose to not fix any swaps outside of the window and instead continued with an annual 10 year fixed rate bond issuance strategy. This strategy meant that the open risk on fixed rates was only gradually closed across the following 5 years, or the average duration of the risk was 2.5 years, assuming an even staggered debt issuance strategy was adopted. Accordingly, the amount of fixed rate risk taken on by this staggered fixed debt approach was significantly more than the average 38 day open risk taken, if an immediate hedge strategy was used.

[1929] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, footnote 10, P.27; Chairmont, Cost of debt transitional analysis, April 2015, pp.44–45.

[1930] Lally's analysis draws upon US data, and in particular the US treasury constant maturity series for five and ten year bonds and the DRP series for BBB bonds. While Lally used data from the US on this occasion, we note that his evidence only added to the evidence set out in the draft decision based on Australian data. For more information, refer to: Lally, M., *Review of submissions on the cost of debt*, April 2015, pp.72–74.

[1931] Lally, M., *Review of submissions on the cost of debt*, April 2015, p.74.

[1932] Chairmont, *Cost of debt transitional analysis*, April 2015, pp.37–38.

The decision to adopt a strategy of gradual staggered issuance of fixed rate debt is consistent with behaviour where the regulatory cost of debt framework does not apply.

G.11.3 Low debt costs for network service providers that did not engage in hedging

As set out earlier, TransGrid and HoustonKemp used data from the Productivity Commission (PC) to show that network service providers that did not hedge have lower cost of debt relative to those that engaged in hedging.[1933]

We consider it misleading to use data from the PC to support this view because:

- The PC dataset only covers five years.[1934] To draw a meaningful conclusion on this matter such analysis should cover a longer period.

  o We reviewed the relevant section of the PC report that presented this data and found that the numbers are taken from the annual reports of the relevant network businesses and averaged over the five most recent years available. Given the PC final report was published in April 2013, with the draft report published in October 2012, it is reasonable to consider that the relevant numbers from the PC report covered the period 2007–08 to 2011–12.

- The PC's analysis does not compare like with like. In particular, it does not take into account different reset periods applying to the relevant businesses.

  o For some businesses the analysis period coincides with a full regulatory period (e.g. Powerlink). For others, it cuts across two regulatory periods (e.g. SP AusNet transmission, NSW network service providers, the Victorian distribution network service providers).

  o It means that this last set of businesses had their regulatory reset within the period of the PC's analysis, with some occurring at the height of the GFC.[1935]

    ▪ For the businesses that hedged the base rate over a five year regulatory period, they would have faced a higher cost because the risk free rate rose during that time. Whereas, those that incurred the trailing average rate would have continued to face lower rates.

    ▪ This situation will be reversed with the current market conditions where those who incur the trailing average rate will continue to face higher rates.

[1933] TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, p.122; HoustonKemp, *Response to the draft decision on the return on debt allowance*, Attachment Q of TransGrid's revise revenue proposal, January 2015, p.12.

[1934] Productivity Commission, *Electricity network regulatory frameworks report*, volume 1, April 2013, p.208.

[1935] For example, the Victorian distribution network service providers' determination occurred in 2007; that for the NSW network service providers occurred in 2009. The date's difference has implications for the averaging period.

- In summary, such a comparison should be based on longer series and compare like with like to produce a meaningful conclusion. This is because, empirically, the ten-year rate has been on average higher than the five-year rate over a long period. So, those who swapped would have lower costs on average over time.[1936]

Chairmont agreed with us. Comparing the staggered fixed debt strategy with the floating-to-fixed interest rate swap strategy, Chairmont recognised that the two strategies have different risk profiles and it considered that the outcome of such a comparison would vary from one regulatory period to another. Chairmont stated:[1937]

> The actual result by using fixed rate issues gave a lower cost of debt during most of the previous regulatory cycle, thus providing lower cost compared to the floating debt and swap strategy.

> The relativity will differ over time, where one method may be superior in a particular cycle and vice versa. The 2009-2014 period was a falling base rate environment leading to the fixed issuance strategy producing lower costs, whereas a rising base rate environment will see the fixed issuance strategy cause higher costs than fixing with a swap at the beginning of the term.

Chairmont added:[1938]

> …simply looking at the expense side without looking at the revenue side, i.e. allowance for the cost of debt, will give a misleading impression of 'cost minimisation' or 'lowest risk'.

In its report Chairmont included the following chart to illustrate its conclusion. The chart compares the regulatory allowance for the return on debt against the cost of debt under two different strategies: the approach employed by the NSW businesses and the approach we described in our draft decision.

- The red line is the regulatory allowance. It is held constant for 5 years commencing in 2009 consistent with the on-the-day approach. It is then reset in 2014 consistent with the expectation that the on-the-day approach would continue. In this case the regulatory allowance is lower in 2014 than it was in 2009, but it could have been higher if interest rates had increased.

- The green line is the cost of debt that would arise from employing a staggered floating rate with fixed swaps as described in our draft decision. Under this strategy the cost of debt is relatively stable until 2011 when it rises gradually. This gradual rise is due to the average debt risk premium of the portfolio gradually increasing.[1939]. In 2014, the cost of debt declines markedly as the fixed swaps

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[1936] Lally, M., *Review of submissions on the cost of debt*, April 2015, p.47.

[1937] Chairmont, *Cost of debt: transitional analysis*, April 2015, pp.44–45.

[1938] Chairmont, *Cost of debt: transitional analysis*, April 2015, pp.44–45.

[1939] Chairmont explained that this gradual increase reflects the inherent conflict between the 'on-the-day' approach and the sound risk management technique of issuing staggered debt. The on-the-day approach sets debt risk premium allowance at the start of the regulatory period and maintains it for five years whereas, network service providers

expire and the floating rate debt is reset to prevailing rates. Importantly, the cost of debt is lower than the regulatory allowance at all times and it closely mirrors the regulatory allowance when it is reset in 2014.

- The blue line is the cost of debt arising from the strategy employed by the NSW businesses. It shows a gradual decline over the period as the staggered portfolio is progressively updated with new debt. Until 2014, the cost of debt under this strategy is marginally lower than under the strategy employing swaps. This is because of the difference in the term. The NSW businesses' strategy used equal proportion from 1 to 10 year terms. As the yield curve was positively sloped during the rate setting window, the 10 year rate was higher than the average of the 1 to10 year.[1940] However, after 2014, the blue line is materially higher than either the regulatory allowance or the cost of debt under the swap strategy. This is because the strategy employed by the NSW businesses does not include any mechanism for matching the cost of debt to the regulatory allowance. Chairmont considered that this strategy is fully exposed to interest rate risk. Chairmont stated:[1941]

> The dramatic divergence in the two rates [blue line and green line] post-June 2014 displays the degree of risk left open by this [blue line] strategy. The revenue-side reduction from 8.82% to 6.51% starting in July 2014 is not offset by a corresponding drop in the cost side.

This analysis highlights the importance of considering debt strategies holistically including the total cost of debt as well as refinancing risk and interest rate risk.

Figure 3-35: Staggered Fixed Debt vs Staggered Floating Rate with Fixed Swap–September 2009 to June 2014
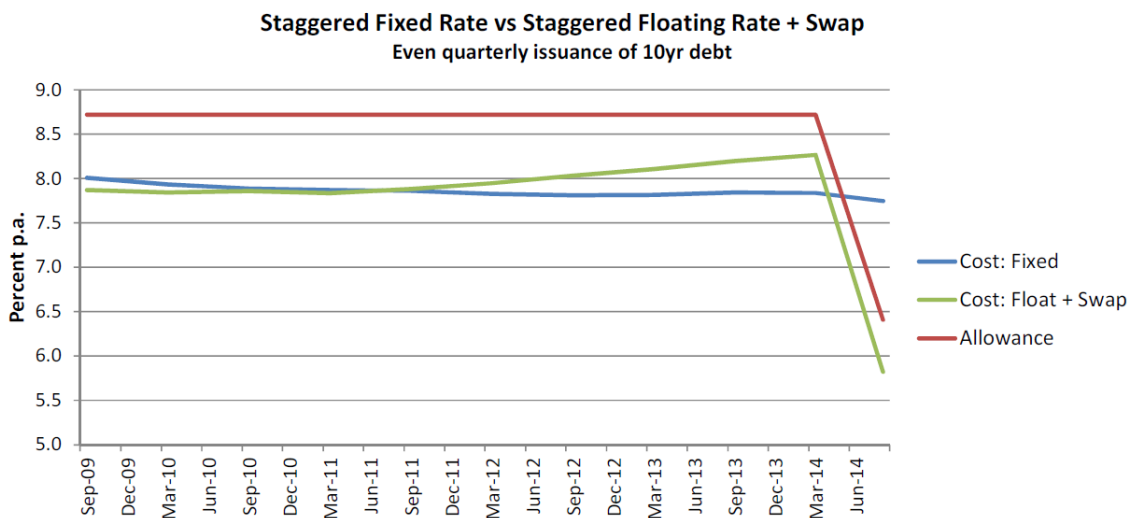
incur trailing average debt risk premium as they stagger debt issuance. For more details, please refer to:
Chairmont, *Cost of debt: transitional analysis*, April 2015, pp.43–44.

[1940]   Chairmont, *Cost of debt: transitional analysis*, April 2015, p.44.

[1941]   Chairmont, *Cost of debt: transitional analysis*, April 2015, p.45.

Source: Chairmont: Cost of debt transitional analysis, April 2015, p.44.

G.11.4 Hedging is an aggressive financing strategy

CEG submitted that hedging is an aggressive strategy.[1942] It considered that this strategy was implemented by heavily geared businesses that were also close to financial distress. CEG indicated the gearing of some private network service providers that hedged under the on-the day approach: Envestra has a gearing of 71 per cent, Spark Infrastructure, 67 per cent and SPAusNet, 63 per cent.[1943] CEG appear to imply that the NSW network service providers were not heavily geared relative to the benchmark (60 per cent).

The Annual reports of these businesses indicate a gearing ratio ranging from 66.8 to 80.8 per cent over the past years.[1944] Origin Energy (Origin)'s submission supported this view.[1945] In addition, information submitted in confidence support this view.

Rather than being an aggressive financing strategy, we consider that hedging is valuable as a tool for mitigating risk when professionally employed with appropriate safeguards. This view is supported by Chairmont. Chairmont stated:[1946]

> … the efficient company must manage both [interest rate and refinancing] risks simultaneously by considering their relative importance and usually striking a compromise between the two. Balancing the two risks is a constant exercise because of the dynamic markets and business environment.

Our view is that taken as a whole, it would have been inefficient for the benchmark efficient entity not to take action to manage its interest rate risk. Further, we find that the difficulties and expenses that have been put forward by the NSW businesses are overstated. While we accept that the benchmark efficient entity would have encountered a range of issues, these were not so significant that they outweighed the alternative of leaving interest rate risk unmanaged.

A corollary of the propositions put forward by the NSW businesses can be observed in respect of insurance:

- Obtaining insurance for a particular risk is more expensive than not obtaining insurance because a premium payment is required.

- The insurance may not perfectly offset the risk because of a policy excess or other exclusions.

[1942] CEG, *Efficient debt financing costs*, January 2015, p.27.

[1943] CEG, *Efficient debt financing costs*, January 2015, p.26.

[1944] Ausgrid 2013, *Annual Report 2012-2013*, p. 56; Endeavour Energy, *Annual Report 2012-13*, p. 62; Essential Energy, *Annual Report 2012-13*, p. 65; Ausgrid, *Annual Report 2008-2009*, p. 71; Essential Energy (previously Country Energy), *Annual Report 2008-2009*, p.106.

[1945] Origin, *Submission to the NSW electricity distributors' regulatory proposals*, February 2015, p.8.

[1946] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.28.

- It requires effort and planning to find and take out the relevant insurance.

Nevertheless, insurance is efficient in many circumstances. It shields the policy holder from the consequences of a particular risk, which could be large and cause financial distress. Whether the insurance is warranted depends on the trade-off between the expense and imperfection of the insurance and the magnitude and consequences of the risk.

G.12 Efficiency of hedging for the NSW network service providers

Contrary to the views reflected in the NSW network service providers' proposals, we consider that hedging as set out in the draft decision would have been efficient for a benchmark efficient entity with a similar degree of risk as that which applies to these businesses. This section sets out our reasoning.

The NSW network service providers submitted that hedging was inefficient for them because of:

- Their size—they considered they were too large to hedge.[1947] They submitted that the domestic interest swap market was not liquid enough to accommodate a large volume of interest rate swaps within a short averaging period. They relied on the UBS analysis to support this view.[1948]

- The global financial crisis (GFC)—they considered that the already illiquid domestic interest swap market was exacerbated around the 2009 determination because by high volatility in interest rate flowing from the GFC.[1949]

- The dispute over the averaging period—they considered that they could not retrospectively hedge given their averaging period was determined a year into the 2009–14 regulatory period.[1950]

[1947] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.184; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, pp.207–208; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, pp.226; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.122–123.

[1948] UBS, *Analysis of liquidity of interest rate swaps*, Attachment R of TransGrid's revised revenue proposal, January 2015, pp.2-4; UBS, *Financeability - debt issuance and capital structure*, Attachment 1.12 of Ausgrid's revised regulatory proposal, January 2015, pp.2–4. The last UBS report was also submitted by Essential Energy and Endeavour Energy also submitted the same report.

[1949] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.184; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, pp.207–208; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, pp.226; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.122–123; UBS, *Analysis of liquidity of interest rate swaps*, Attachment R of TransGrid's revised revenue proposal, January 2015, pp.2-4; UBS, *Financeability - debt issuance and capital structure*, Attachment 1.12 of Ausgrid's revised regulatory proposal, January 2015, pp.2–4. The last UBS report was also submitted by Essential Energy and Endeavour Energy also submitted the same report.

[1950] Ausgrid, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.184; Endeavour Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, pp.207–208; Essential Energy, *Revised regulatory proposal, 1 July 2014 – 30 June 2019*, January 2015, p.226; TransGrid, *Revised revenue proposal, 1*

Frontier, CEG, and HoustonKemp also supported these views.

We disagree. We are satisfied that a benchmark efficient entity with a similar degree of risk as that faced by the NSW network service providers would have managed its exposure to interest rate risk under the on-the-day regulatory regime. We consider that the reasons stated by these businesses for not hedging are not consistent with the financing practices of a benchmark efficient entity. Chairmont agreed with us. Chairmont stated:[1951]

> The other factors, e.g. GFC, size of transaction and size of entity, are about the market, regulatory or business environment. Although important to cost and timing around the rate set window in 2008-09, they did not fundamentally change the financing practice of an efficient entity and therefore do not impact on the portfolio to be transitioned in 2014.

We provide further details below.

G.12.1 Too large

As discussed in sections G.8 and G.9, we consider that the impact of size on risks facing service providers is not sufficiently significant to justify the adoption of different benchmarks. Chairmont supported this view. Chairmont assessed the reasonableness of applying our gradual transition to the trailing average approach uniformly. In particular, Chairmont examined whether a benchmark efficient entity with a similar sized debt portfolio to that of a 'large' or 'super' network service provider would have adopted a financing strategy different to that set out in the draft decision. Chairmont advised:[1952]

> In 2009 and at the height of the GFC, a Large and Super BEE would have encountered difficulty in transacting enough swaps in the rate setting window. Nonetheless, the lowest risk approach would have been to transact the swaps as soon as possible, even if it meant going outside the window.

Contrary to UBS, Chairmont's advice is that adopting a trailing average financing practice under the on-the-day regulatory regime was not the lowest risk approach.[1953]

We reviewed the information provided by the NSW businesses, particularly, UBS' analysis of the domestic interest rate swap market around the 2009 revenue determination. We do not agree with UBS' conclusions for the reasons set out below.

July 2014 – 30 June 2018, January 2015, pp.122–123; UBS, *Analysis of liquidity of interest rate swaps*, Attachment R of TransGrid's revised revenue proposal, January 2015, pp.2-4; UBS, *Financeability - debt issuance and capital structure*, Attachment 1.12 of Ausgrid's revised regulatory proposal, January 2015, pp.2–4. The last UBS report was also submitted by Essential Energy and Endeavour Energy also submitted the same report.

[1951] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.8.

[1952] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.8.

[1953] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.37.

First, UBS' analysis did not demonstrate that hedging in the manner set out in the draft decision was inefficient. While UBS provided an analysis of costs and risks for using swaps, it did not provide a similar analysis for not using interest rate swaps. Without analysing the two scenarios in parallel, it is not possible to conclude that it would have been inefficient for the NSW network service providers to use interest rate swaps. This observation also applies to Frontier, CEG and HoustonKemp who all concluded, based on UBS' analysis, that it would have been inefficient for these businesses to use interest rate swaps.

- Lally (2015) examined whether, under the on-the-day approach, there would be more or less risk to a business from not engaging in interest rate swap contracts versus doing so for the period April 1953 to January 2015.[1954] He concluded that compared to not using interest rate swaps, the use of interest rate swaps reduces the mismatch between the on-the-day allowance and the incurred costs of debt under the on-the-day regulatory regimes.[1955] Lally (2014) also demonstrated that the benefit of hedging is higher than the costs incurred. We agree with Lally in this regard.

- Chairmont also examined this issue and concluded:[1956]

    …simply looking at the expense side without looking at the revenue side, i.e. allowance for the cost of debt, will give a misleading impression of 'cost minimisation' or 'lowest risk'.

Second, UBS' analysis only demonstrated that hedging incurs transaction costs. This is not surprising. We discussed this matter in the 2009 WACC review, including whether to allow an explicit allowance to cover these costs.[1957] As set out in the draft decision, we explained our position in respect of transaction cost associated with interest rate swaps.[1958] Specifically, we determined that it was not appropriate to provide an explicit allowance to compensate a benchmark efficient entity for these costs.[1959] This is because we compensated network service providers 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 a benchmark efficient entity would have incurred a 5 year risk free rate due to hedging.

[1954] As noted earlier, Lally's analysis is based on US data.

[1955] Lally, M., *Review of submissions on the cost of debt*, January 2015, Appendix 2, pp.72–74.

[1956] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.45.

[1957] AER, *Electricity transmission and distribution network service providers Review of the weighted average cost of capital (WACC) parameters – final decision*, May 2009, p.168.

[1958] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, pp.295–297. Analogous reasons were includes in our November 2014 draft decisions for TransGrid, Endeavour Energy and Essential Energy.

[1959] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, pp.295–297. Analogous reasons were includes in our November 2014 draft decisions for TransGrid, Endeavour Energy and Essential Energy.

The NSW network service providers and their consultants did not engage with our reasoning on this matter in the draft decision.

Consideration of the domestic interest rate swap market's size

We are not persuaded that difficulties in respect of the interest rate swap market's depth at the time of the 2009 determination would have fundamentally changed the financing practice of a benchmark efficient entity. In the draft decision we considered that it would be difficult to assess the size of the domestic interest rate swap market because trades in this market occur over the counter (not on an exchange basis like shares).[1960] This makes such trades difficult to observe. Westpac agrees.[1961]

The RBA appears to support this view. RBA stated:[1962]

> Measuring the size of the Australian OTC (over the counter) derivatives market is complicated by the large amount of cross-border activity that takes place. Many transactions executed in Australia involve a counterparty located in Australia and a counterparty located offshore. Even where both executing counterparties are located in Australia, it is common for foreign-domiciled counterparties (such as large global dealers) to record the transaction on the books of an overseas branch or affiliate.

[1960] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, pp.294–295. Analogous reasons were includes in our November 2014 draft decisions for TransGrid, Endeavour Energy and Essential Energy.

[1961] Westpac, *Liquidity of the interest rate swaps market*, May 2014, p.4.

[1962] RBA, Report on the Australian OTC Derivatives Market, October 2012, chapter 4. http://www.rba.gov.au/payments-system/clearing-settlement/otc-derivatives/201210-otc-der-mkt-rep-au/australian-otc-derivatives-market-activity.html (Accessed on 6 November 2014)

G.12.2 Timing of the GFC

We are not persuaded that the GFC around the 2009 reset would have caused a benchmark efficient entity with a similar degree of risk to that faced by the NSW network service providers to deviate from the efficient financing practice as set out in the draft decision. To the extent that the NSW network service providers faced a difficult economic environment at the time of the 2009 determination because of the GFC, this also applied to other network service providers. Chairmont explained that efficient management practices take into account the economic environment in which a business operates as well as potential changes in the dynamics of that environment.[1963] All service providers had to deal with the GFC.

Chairmont considered that when conducting business in a difficult economic environment, acting swiftly and decisively is critical and part of efficient risk management. Based on the UBS' analysis, the NSW network service providers could have hedged their entire (nominal) portfolio over a period of 91 business days; off-loading the risk of future adverse movements in the base rate component of the return on debt. Chairmont's view is that a benchmark efficient entity with a similar degree of risk as that faced by the NSW network service providers would have transacted interest rate swaps as quickly as possible.[1964] Following its analysis of the behaviour of corporate businesses around the 2009 determination, Chairmont stated:[1965]

> In 2009 and at the height of the GFC, a Large and Super BEE would have encountered difficulty in transacting enough swaps in the rate setting window. Nonetheless, the lowest risk approach would have been to transact the swaps as soon as possible, even if it meant going outside the window.

Chairmont also stated:[1966]

> UBS argues that because the swaps could not be done within the rate–set window, they should not be done at all. Chairmont disagrees with UBS, because a Super BEE would adopt EFP so as to minimise interest rate risk even if it took 91 days to complete all swaps.

The NSW network service providers submitted evidence to demonstrate that the Australian Office of Financial Management (AOFM) required about six months to unwind approximately $15 billion of its domestic interest rate swaps around the 2009 determination.[1967] This evidence also demonstrates that there was some activity in the

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[1963] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.32–33.

[1964] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.8.

[1965] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.8.

[1966] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.37.

[1967] AOFM, *Letter to NSW Treasury Corporation*, 5 January 2015, pp.1–2; HoustonKemp and TransGrid acknowledged that it is more difficult to close interest s swaps agreements than to entering new ones. For more details, see: HoustonKemp, *Response to the draft decision on the return on debt allowance*, Attachment Q of TransGrid's revise revenue proposal, January 2015, p.16; TransGrid, *Revised revenue proposal, 1 July 2014 – 30 June 2018*, January 2015, pp.122.

market around that time. Lally demonstrated that hedging over up to five months would still have been efficient under the on-the-day regime.[1968]

It is possible that even if hedging opportunities existed, the NSW businesses may not have been aware of such opportunities. This is because they chose not to transact at all—they were not in the market, actively seeking to hedge. Lally (2014) questioned the choice of these businesses not to hedge at all.[1969] Lally considered that under the on-the-day approach, a partial hedge would have been better than not hedging at all. Evidence we discuss in a confidential appendix L supports this view.[1970]

Further considerations of the UBS analysis

We reviewed the UBS analysis. In doing so, we found irregularities in UBS' methodology and calculations. However, we note that correcting these irregularities does not change the outcome materially.

In examining the interest rate swap market liquidity in 2009, UBS focused on data for the wrong term to maturity: a term greater than but not including five years. For example, UBS focused on the bracket ranging '> 5 - 7 years' to '> 15 years' in the Australian financial management association (AFMA) report.[1971] We consider the correct approach is to consider the relevant data for the term to maturity of five years. This is because the draft decision determined that a benchmark efficient entity would engage in five year interest rate swaps. We confirmed with AFMA that the bracket range selected by UBS did not contain any data for interest rate swaps with five years to maturity.[1972]

Also, UBS used only part of the relevant data. . AFMA reported 2009 data on swaps outstanding under the following groups of counterparties of the survey participants: survey respondent, other banks, in-house transactions, traditional fund managers, hedge funds/CTA's, government, offshore central banks and other counterparty. However, UBS based its calculations on data from two groups: 'survey respondent' and 'other banks'. This is because UBS considered that these two groups accounted for more than 70 per cent of the responses. We do not agree with this approach. We consider that the ability for the five year interest rate market to absorb more corporate demand without a material price impact would depend upon the aggregate size of the market.[1973] Therefore, we consider UBS should have considered aggregate data over all the groups for which data is reported.

Furthermore, UBS did not use all publically available information. For example, to estimate the 2009 turnover for interest rate swaps of five years or greater maturity,

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[1968] Lally, M., *Review of submissions on the cost of debt*, April 2015, Appendix 2, pp..72–74.

[1969] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.28–29.

[1970] We discuss this matter further in a confidential appendix L.

[1971] AFMA, *Australian financial market report* 2008, p.28.

[1972] AFMA, Response to AER's correspondence of 18 February 2015, 20 February 2015.

[1973] Lally, M., *Review of submissions on the cost of debt*, April 2015, p.39.

UBS calculated the 2008 proportion of interest rate swaps outstanding for a term of five years or greater (14.4 per cent).[1974] UBS then multiplied that proportion by the total turnover in 2009 to determine turnover for interest rate swaps for a term to maturity of five years or greater ($862 million). In doing this UBS implicitly assumed that the turnover for interest rate swaps for the relevant term remained constant between 2008 and 2009. Interest rate swaps with term to maturity of 5 years in 2008 would have a remaining term of 4 years to maturity in 2009. We note that data needed to undertake these calculation for 2009 is publicly available on AFMA's website.[1975]

Finally, in calculating the daily turnover for the interest rate swaps in 2009, UBS did not account for public holidays. This approach imposed a downward bias on the estimated daily turnover of the market. To calculate the daily turnover divided the annual turnover by the number of week days in a year. Given that trading in the domestic market does not occur during public holidays, UBS should have subtracted the relevant number of public holidays from the total number of week days in the relevant year.

G.12.3 Dispute over the averaging period

The NSW network service providers and their consultants submitted that it was not possible to hedge while the averaging period around the 2009 determination was in dispute.[1976]

It is our view that if there was uncertainty about the averaging period at the 2009 determination, it was the actions of the NSW network service providers that led to the uncertainty. Our task is to determine the return on debt in reference to a benchmark efficient entity; not in reference to the NSW network service providers.

- 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 decision.

- In appealing our decision, these businesses nominated backward looking averaging period and their choice was upheld by the Tribunal.

[1974] UBS, *Analysis of liquidity of interest rate swaps*, Attachment R of TransGrid's revised revenue proposal, January 2015, p.2; UBS, *Financeability - Debt issuance and capital structure*, Attachment 1.12 of Ausgrid's revised regulatory proposal, January 2015, p.2 (Essential Energy and Endeavour Energy also submitted the same report).

[1975] AFMA, *Australian financial market report* 2009, 2009 Excel spreadsheet, sheet 'IR CC swap', table ' 2008-09 Cross-Currency and Interest Rate Swaps Outstanding at 31 May (AUD million)' http://www.afma.com.au/data/AFMR

[1976] UBS, *Analysis of liquidity of interest rate swaps*, Attachment R of TransGrid's revised revenue proposal, January 2015, pp.1–2; UBS, *Financeability - Debt issuance and capital structure*, Attachment 1.12 of Ausgrid's revised regulatory proposal, January 2015, pp.1–2 (Essential Energy and Endeavour Energy also submitted the same report); Ausgrid, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, pp.184–185; Essential Energy, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, pp.226–227; Endeavour Energy, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.208.

G.13   A transition on DRP: factual errors

In this section we respond to the revised proposals. CEG submitted that the analysis we relied on to apply a transition on the debt risk premium has errors.[1977] Also, HoustonKemp considered that this analysis is based on simplifying assumptions.[1978]

We disagree. Our task is to determine the return on debt in reference to a benchmark efficient entity. We do not determine the return on debt in reference to the NSW service providers. The analysis on which we relied to form our view on a transition applied to debt risk premium has a general perspective; that is, is it not confined to actual circumstances of specific network service providers. The following sub-sections consider each of the draft decision's aspects on which CEG and HoustonKemp allege there are errors.

G.13.1   No Windfall gains to the NSW service providers or ActewAGL

In the draft decision, we determined to apply a transition to the debt risk premium. We explained that this is necessary because a transition:

- Reduces potential windfall gains or losses to service providers or consumers from changing the regulatory regime

- Avoids practical problems with the use of historical data.

In respect of the windfall gains or losses, we relied on Dr Lally's analysis. Lally demonstrated that the immediate implementation of the trailing average approach would result in a one-off windfall gain or loss to service providers by locking-in accumulated benefits (losses) primarily flowing from the debt risk premium spikes observed over the GFC. Lally explained that these benefits (losses) would have otherwise eroded with time given the mean reverting characteristics of debt risk premium series if the on-the-day approach continued. Lally estimated that the network service providers on a regulatory cycle 2009 to 2014 would have a cumulative windfall gain of 9.53 per cent of their debt portfolio without any transition on debt risk premium.[1979]

CEG submitted that the analysis on which the AER relied to support a transition on DRP has a number of flaws and factual errors.[1980] In particular, CEG suggested that there are no windfall gains for the NSW network service providers because it considers Lally made a 'serious error'.[1981] CEG then undertook to correct the alleged error and to replicate Lally's analysis using a different dataset.

[1977]   CEG, *Efficient debt financing costs* (Attachment 7.01 of Ausgrid's revised proposal), January 2015, pp.34–38.

[1978]   HoustonKemp, *Response to the draft decision on the return on debt allowance* (Attachment Q of TransGrid's revised proposal), January 2015, pp.21–22.

[1979]   Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.20.

[1980]   CEG, Efficient debt financing costs, January 2015, p.33.

[1981]   CEG, Efficient debt financing costs, January 2015, p.33.

We disagree. The proposition that Lally's analysis makes a serious error is unfounded because:

- CEG appears to not compare like with like. CEG's averaging period is different from Lally's.

    - Lally based his calculation on an averaging period mid-year as close as possible to the start of the regulatory period consistent with our policy.

    - Whereas CEG applied the averaging period determined by the Tribunal for the NSW network service providers (18 August 2008 to 5 September 2008).[1982]

    - The correct approach would have been for CEG to compare its numbers with Lally's at the same point in time.

- CEG defined its measure of the debt risk premium relative to the 5 year swap rate. Whereas Lally's measure is relative to the 10 year CGS.

    - We note that Lally's calculations are based on data provided by CEG in its initial report (submitted as part of the businesses' regulatory proposal).[1983] CEG used this dataset in its initial report. At the time, it did not have an issue with the measure of the debt risk premium relative to 10 year CGS.

In addition, Lally revised his calculations adjusting for CEG's averaging period.[1984] Lally's revised analysis shows that the alleged 'error' falls away.[1985]

CEG's replication of Lally's analysis incorporated the inconsistencies noted above. Also, CEG inflated its calculations by adding 30bppa for transaction costs associated with interest rate swap contracts.[1986] This is inappropriate because such costs relate only to the base rate component of the return on debt. They are not relevant for calculations in respect the debt risk premium. Furthermore, CEG appears to use a dataset different to Lally's. However, CEG did not provide sufficient details for its data series and methodology to be verified.[1987]

Lally agreed with our observations. Lally stated:[1988]

> CEG (2015, section 5.3.2) analyses the windfall gain issue for businesses with cycles commencing in mid 2005, mid 2009, etc and this suggests that the accumulated windfall up to mid 2014 was -4.2% rather than the figure of 9.53% in Lally (2014a, Table 2). However, the details of CEG's analysis are

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[1982] We note that when applying this analysis to ActewAGL, CEG is careful to indicate the significance of the averaging period on the outcome. For more details, see CEG, *Efficient debt financing costs*, January 2015, p.37.

[1983] CEG, *Debt transition consistent with the NER and NEL* (Attachment 7.02 of Ausgrid revenue proposal), May 2014, p.20 (figure 1).

[1984] Lally maintained a measure of debt risk premium relative to 10 year CGS.

[1985] Lally, M., *Review of submissions on the cost of debt*, April 2015, section 9.6, pp.54–55.

[1986] CEG, Efficient debt financing costs, January 2015, p.35.

[1987] CEG, Efficient debt financing costs, January 2015, section 5.3.2.

[1988] Lally, M., *Review of submissions on the cost of debt*, April 2015, p.54.

insufficiently clear to check it at all points. Nevertheless, CEG's analysis incorporates within it the alleged DRP compensation of 2.03% for the 2009-2014 period referred to in the previous paragraph and therefore inherits all of the errors in that analysis as described. Furthermore, the figure of -4.2% includes an allowance of 0.30% for swap costs but these have no relevance to the DRP component of the cost of debt (they relate only to the base rate component).

ActewAGL

CEG submitted that the analysis on which the AER relied to support a transition on DRP has factual errors.[1989] CEG then undertook to correct the alleged error.

We disagree. The proposition that Lally's analysis makes a serious error is incorrect because:

- CEG appears to not compare like with like. CEG's averaging period is different from Lally's.

    o Lally based his calculation on an averaging period mid-year as close as possible to the start of the regulatory period consistent with our policy.

    o Whereas CEG applied ActewAGL's actual averaging period (20 business days to 5 September 2008).[1990]

    o The correct approach would have been for CEG to compare its numbers with Lally's at the same point in time.

- CEG defined its measure of the debt risk premium relative to 5 year swap rate. Whereas Lally's measure is relative to the 10 year CGS.

    o We note that Lally's calculations are based on data provided by CEG in its initial report (submitted as part of the businesses regulatory proposal).[1991] CEG used this dataset in its initial report. At the time, it did not raise an issue with the measure of the debt risk premium relative to 10 year CGS.

In addition, Lally revised his calculations adjusting for CEG's averaging period.[1992] Lally's revised analysis shows that the alleged 'error' falls away.[1993]

TransGrid

HoustonKemp submitted that Lally's (2014) analysis is flawed.[1994] HoustonKemp considered that Lally (2014) made the following simplifying assumptions:

[1989] CEG, *Efficient debt financing costs*, January 2015, p.37.

[1990] We note that when applying this analysis to ActewAGL, CEG is careful to indicate the significance of the averaging period on the outcome. For more details, see CEG, *Efficient debt financing costs*, January 2015, p.37.

[1991] CEG, *Debt transition consistent with the NER and NEL* (Attachment 7.02 of Ausgrid revenue proposal), May 2014, p.20 (figure 1).

[1992] Lally maintained a measure of debt risk premium relative to 10 year CGS.

[1993] Lally, M., *Review of submissions on the cost of debt*, April 2015, pp.54–55.

- The debt risk premium for all years of the period prior to mid-2007 was 1.3 per cent.

- The debt risk premium during the 2008 to 2015 period rises above 1.3 per cent due to the GFC and its effects.

- The debt risk premium for all years post mid-2017 will be 1.3 per cent.

HoustonKemp considered that Lally's analysis is inconsistent with TransGrid's debt risk premium allowance of 0.9 per cent over the regulatory period 2004–2009.[1995] HoustomKemp also considered Lally's analysis is inconsistent with the average incurred debt risk premium of 2.67 per cent over 2004–2009.[1996]

We disagree. HoustonKemp's comparison of TransGrid's actual circumstances with Lally's analysis is incorrect. The ACCC's final decision for the 2004–2009 period of 0.9 per cent for the debt risk premium was revoked by the AER based on a material error.[1997] The AER substituted TransGrid's debt risk premium allowance with 1.17 per cent.[1998]

Also, the benchmark debt risk premium incurred over the 2004–2009 period based on a BBB data series would overstate the costs of a benchmark firm at that time. In the case of TransGrid, the ACCC adopted a benchmark A credit rating for the benchmark firm.[1999]

Furthermore, HoustonKemp appears to mischaracterise Lally's analysis. The period 2004–2009 it referred to is different from mid-2007. Lally's analysis is based on data provided by CEG (2014).[2000] This dataset combined four series of BBB spreads to CGS for the period 1998–2014.[2001] Lally's calculations considered that businesses face a 10 year debt risk premium.[2002] Accordingly, Lally's debt risk premium calculations

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[1994] HoustonKemp, *Response to the draft decision on the return on debt allowance*, (Appendix Q of TransGrid's revised proposal), January 2015, p.21.

[1995] HoustonKemp, *Response to the draft decision on the return on debt allowance*, (Appendix Q of TransGrid's revised proposal), January 2015, p.21.

[1996] HoustonKemp, *Response to the draft decision on the return on debt allowance*, (Appendix Q of TransGrid's revised proposal), January 2015, p.21.

[1997] AER, *TransGrid 2004/05-2008/09 Revenue Cap: Application by TransGrid for Revocation and Substitution*, February 2007.
http://www.aer.gov.au/sites/default/files/Transgrid%20decision%20%2813%20February%202007%29.pdf

[1998] AER, *TransGrid 2004/05-2008/09 Revenue Cap: Application by TransGrid for Revocation and Substitution, February 2007*, p.4.
http://www.aer.gov.au/sites/default/files/Transgrid%20decision%20%2813%20February%202007%29.pdf

[1999] ACCC, *NSW and ACT Transmission Network Revenue Cap: TransGrid 2004–05 to 2008–09*, April 2005, pp.139–143.(http://www.aer.gov.au/sites/default/files/Decision%20-%20TransGrid%20%2827%20April%202005%29%20.pdf). It is not clear to us if HoustonKemp based its analysis on BBB third party data series.

[2000] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.18.

[2001] CEG, *Debt transition consistent with the NER and NEL*, (Attachment 7.02 of Ausgrid revenue proposal), May 2014, p.20.

[2002] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.18.

start in mid-2006.[2003] This does not imply that debt risk premium was 1.3 per cent for all years prior to mid-2007 as HoustonKemp suggested.

G.13.2 Forecast difference in trailing average and actual DRP

CEG stated that Lally's comparison of trailing average and actual debt risk premium is flawed because it is limited to one year;[2004] not the whole transition period (10 years).[2005] CEG submitted that when the analysis considers the whole transition period, it reveals the under compensation for the NSW distribution network service providers and ActewAGL.[2006] CEG considered this suggests Lally's conclusion is inadequate.

CEG provided an analysis showing under compensation over the transition period.[2007]

We are not persuaded that there would be under compensation on the total return on debt. We consider that a conclusion on whether a service provider is under compensated would depend on:

• How the debt risk premium is estimated–it is not clear to us how CEG estimated it.

• What happens with the base rate. CEG's analysis overlooked the over compensation flowing from the base rate because its analysis is limited to the debt risk premium component. We set the base rate allowance in reference to 10 year CGS, rather than 5 year swap rate. Chairmont indicated that, at the start of the 2014–15 regulatory period, the difference between the base rate allowance and the actual base rate would be significant. Chaimont estimated it to be approximately 70 bps.[2008]

• The period of analysis–Lally (2015) considered that the appropriate period to examine should start with the GFC-induced spike in the debt risk premium rather than just the ten-year transitional period to the new regime.[2009][2010] Lally (2014) demonstrated that consideration of this longer period supports a gradual transition to the trailing average approach.[2011] CEG's analysis ignored this period.

[2003] Lally, M., *Transitional arrangements for the cost of debt*, November 2014,, table 2 (column 2) p.19.

[2004] CEG, *Efficient debt financing costs*, January 2015, pp.37–41.

[2005] Lally estimated that the trailing average debt risk premium underpinning Ausgrid's cost of debt is 2.91%. He compares this with the prevailing debt risk premium in our initial averaging period in April 2014 (2.90%) and concludes that there is a 'trivial difference' of 0.01%. For more details, see: Lally, M *Transitional arrangements for the cost of debt*, November 2014, p.36.

[2006] CEG, *Efficient debt financing costs*, January 2015, pp.37–41.

[2007] CEG, *Efficient debt financing costs*, January 2015, pp.40 and 43.

[2008] Chairmont, *Cost of debt: transitional analysis*, April 2015, p.43.

[2009] We show in section G.14.5 that to examine this matter, there is no need to incorporate the pre-GFC preiod.

[2010] Lally, M., *Review of submissions on cost of debt*, April 2015, p.55.

[2011] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.35–36.

G.13.3 AER's transition could result in over compensation

CEG submitted that the AER's transition could easily result in over compensation.[2012] CEG submitted that this would be the case if there is another spike during the transition period. CEG considered that our consideration to implement a transition on the debt risk premium is dependent on Lally's premise that debt risk premium would revert to its pre–GFC level.

To assess CEG's claim, Lally provided an analysis of a scenario were spikes in debt risk premium would occur around 2018; this is in addition to the spikes experienced. This analysis shows that even if debt risk premium do revert to its pre–GFC level around 2018 as presumed in Lally's initial analysis, Lally's initial conclusions remain unchanged. Lally stated:[2013]

> CEG's example does not undercut anything in the analysis in Lally (2014a, Table 4).

G.14 Other considerations

This section set out our response arguments from the NSW service providers or ActewAGL which are not addressed in other sections. Such reasons could not be grouped under a single theme. As a result the content of different sub-sections is not necessarily related.

G.14.1 A transition imposes a windfall loss

The NSW distribution network service providers submitted that a transition will not provide them with a reasonable opportunity to recover their efficient debt financing costs for the period 2014–19.[2014] These businesses reproduced the analysis they initially provided in their revenue proposals, updating only for current interest rates.[2015]

We addressed this matter in the draft decision. However, the NSW network service providers did not engage with our reasoning. Our response it set out in section G.5 of Attachment 3 of the draft decision.[2016] We note that CEG attempted to engage with our

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[2012] CEG, *Efficient debt financing costs*, January 2015, pp.43–45.

[2013] Lally, M., *Review of submissions on the cost of debt*, April 2015, pp.55–57.

[2014] Ausgrid, Revised regulatory proposal, 1 July 2014 – 30 June 2019, January 2015, p.182; Essential Energy, *Revised regulatory proposal 1 July 2014 – 30 June 2019, January 2015*, p.224; Endeavour Energy, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.205.

[2015] Ausgrid, *Regulatory proposal*, May 2014, p.77; Essential Energy, *Regulatory proposal*, May 2014, p.100; Endeavour Energy, *Regulatory proposal*, May 2014, pp.114–115; NERA, Return on capital of a regulated electricity network: A report for Ashurst, May 2014, p.31. NERA carried out the analysis for TransGrid.

[2016] AER, *Draft decision–Ausgrid distribution determination–Attachment 3: Rate of return*, November 2014, p.291. Analogous reasons were includes in our November 2014 draft decisions for TransGrid, Endeavour Energy and Essential Energy.

reasoning by pointing out that the analysis on which we relied is flawed. Our response to CEG is set out in section G.13.2.

We are not persuaded that a gradual transition to the trailing average approach would under compensate a benchmark efficient entity. For the reasons set out in section 3.4.2, we are satisfied that the return on debt resulting from our approach would contribute to the achievement of the allowed rate of return objective. In particular, for:

- the base rate component of the return on debt, we are satisfied transitional arrangements minimise the potential mismatch between the allowed return on debt and actual cost of debt of a benchmark efficient entity over the next regulatory control period while the entity transitions its financing practices in line with the new regulatory approach.

- the debt risk premium component, we are satisfied that transitional arrangements addresses any impacts resulting from the change in methodology to estimate the return on debt.

G.14.2 A transition delays the imposition of the best approach

The NSW distribution network service providers submitted that a transition delays the imposition of the best approach to estimate the return on debt while prolonging the use of an inferior approach.[2017] They considered that a transition is unwarranted for service providers that currently adopt a staggered debt portfolio with no interest rate swaps.[2018] TransGrid also support this view.[2019]

We disagree. We set the return on debt allowance in reference to a benchmark efficient entity in the context of the prevailing regulatory regime (not in reference to actual network service providers). For the reasons set out in section 3.4.2 and those discussed earlier in this appendix, we are satisfied that a gradual transition closely matches a benchmark efficient entity's financing costs over the next regulatory control period as it transitions its financing practices to match the trailing average approach.

G.14.3 A transition would distort incentives for capex

CEG submitted that a transition on debt risk premium would not promote investment incentives. This is because CEG and Frontier considered it a clawback.[2020] CEG

[2017] Ausgrid, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.179; Essential Energy, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.220; Endeavour Energy, *Revised regulatory proposal 1 July 2014 – 30 June 2019*, January 2015, p.201.

[2018] Ausgrid, Revised regulatory proposal, 1 July 2014 – 30 June 2019, January 2015, 181; Essential Energy, Revised regulatory proposal, 1 July 2014 – 30 June 2019, January 2015, p.223; Endeavour Energy, Revised regulatory proposal, 1 July 2014 – 30 June 2019, January 2015, p.204.

[2019] TransGrid, *Revised revenue proposal 1 July 2014 – 30 June 2018*, January 2015, p.119.

[2020] CEG, *Efficient debt financing costs*, January 2015, pp.3–4; Frontier, *TransGrid cost of debt transition*, Attachment Q of TransGrid's revise revenue proposal, January 2015, pp.21–24; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, pp.26–30.

submitted that investors can never be sure of whether the compensation they are paid today will be clawed back tomorrow.[2021]

We disagree. As discussed in section 3.4.2, we satisfied that a transition on debt risk premium avoids the undesirable outcomes of changing the return on debt method. It allows the regulatory regime to account for differences between the return on debt estimate and the actual return on debt of a benchmark efficient entity, despite any change in method. It 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). This is consistent with the rules because:

- While the rules are concerned with individual regulatory control periods–a rate of return for a distribution or transmission network service provider is to be commensurate with efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the distribution or transmission network service provider;[2022]

- the rules simultaneously require consideration of the effects of the transition across regulatory control periods–we are required to have regard to 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 period to the next.[2023]

For these reasons we are not persuaded that a transition on debt risk premium is a clawback. Accordingly, we are not persuaded it would distort investment incentives.

G.14.4 Sample of private firms that hedged is small

CEG submitted that the evidence on which we relied to support the view that a staggered debt portfolio with interest rate swap overlay is a financing strategy adopted by most private firms is inconclusive.[2024] CEG considered that our sample size of four firms is not comparable to the size we use to determine equity beta.

We are satisfied that a staggered debt portfolio with interest rate swap overlay is an efficient financing strategy for a benchmark efficient entity subject to the on-the-day approach. In addition to the evidence set out in the draft decision, we further assessed this matter by commissioning Chairmont to critically review our reasoning. Chairmont considered that our approach represents a simplification of efficient financing practice under the on-the-day approach. However, it advised that that our approach is appropriate when size is taken into accounted.

[2021] CEG, *Efficient debt financing costs*, January 2015, pp.3–4.
[2022] NER, cl. 6A.6.2(c) and cl. 6.5.2(c).
[2023] NER, cl. 6A.6.2(k)(4) and cl. 6.5.2(k)(4).
[2024] CEG, *Efficient debt financing costs*, January 2015, p.26.

G.14.5 Transition should account for all period from the start of regulation

CEG, Frontier and HoustonKemp, submitted that if a transition on debt risk premium was designed to take account of the past over compensation problem, it should also account for under and over compensation back to the beginning of economic regulation.[2025]

We disagree. Frontier and HoustonKemp appear to mischaracterise Lally's analysis. The over compensation problem refer to cumulative gains up until the point at which the regime changes; that is mid-2014. Lally (2014) demonstrated that average debt risk premium was stable between 1997 and 2007. This is represented by a value of 1.3 per cent in 2006 and 2007.[2026] This stability is also observed from the data provided by CEG (2014).[2027] This shows that the volatility that may have occurred in earlier years was accounted for by 2007. CEG, HoustonKemp and Frontier agree with us that a benchmark efficient entity would incur a 10 year trailing average debt risk premium. A debt risk premium of 1.3 per cent in 2006 incorporates data for the period 1997–2006. Similarly, a debt risk premium of 1.3 per cent in 2007 incorporates data for the period 1998–2007. In this respect, Lally stated:[2028]

> The behaviour of the DRP prior to 1998 would not affect the analysis and therefore is irrelevant.

G.15 Form of transition

Our final decision is to estimate an on-the-day rate on debt for the first year of the 2014–19 regulatory period and gradually transition this rate to a trailing average approach over 10 years. This is consistent with the transitional arrangements in the draft decision. 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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[2025] CEG, *Efficient debt financing costs*, January 2015, p.33; HoustonKemp, Response to the draft decision on the return on debt allowance, Attachment Q of TransGrid's revise revenue proposal, January 2015, pp.21–22; Frontier, TransGrid cost of debt transition, Attachment Q of TransGrid's revise revenue proposal, January 2015, pp.22–23; Frontier, *Cost of debt transition for the NSW DNSPs*, January 2015, pp.27–28.

[2026] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, table 2, column 2, p.19.

[2027] CEG, *Debt transition consistent with the NER and NEL*, May 2014, figure 1, p.20.

[2028] Lally, M., *Review of submissions on the cost of debt*, April 2015, p.43.

- 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[2029]—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).[2030] 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.[2031] 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

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[2029] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.8–12.

[2030] 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 draft decision.

[2031] 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.[2032] 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.[2033]

- 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:[2034]

  > 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[2035]—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.

[2032] 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.

[2033] 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

[2034] Lally, M.. *Transitional arrangements for the cost of debt*, November 2014, p.12.

[2035] Lally also considered a similar transition path. For more details, refer to Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.6. 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.[2036] 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:[2037]

    …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.[2038]

- Both are more complex than variation B and variation C.[2039] 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.[2040] 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).[2041] 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).[2042]

[2036] Chairmont, *Cost of debt Transitional analysis*, April 2015, p.48; Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.13–14.

[2037] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.10.

[2038] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.7–11; Chairmont, *Cost of debt Transitional analysis*, April 2015, p.48.

[2039] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.10–11 and p.38; Chairmont, April 2015, p.8.

[2040] Lally, M., *Transitional arrangements for the cost of debt*, November 2014, p.38; Chairmont, Cost of debt Transitional analysis, April 2015, p.48.

[2041] We commissioned Chairmont after the publication of the draft decision for these businesses.

[2042] 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.[2043] 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.[2044] 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 xx summarises our assessment of different transition paths.

Table 3-64: 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	No Less than variation D	Yes	Yes	No More than variation A

[2043] Chaimont, Cost of debt Transitional analysis, April 2015, p.48; Lally, M., *Transitional arrangements for the cost of debt*, November 2014, pp.13–14.

[2044] 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)
base rate and the 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 draft decision. 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 out our positions and key reasons on implementing our return on debt approach. In this appendix, we provide further detail on why we apply a benchmark credit rating of BBB+ and use third party data series to calculate Essential Energy's return on debt allowance.

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. Some service providers and their consultants proposed a BBB+ credit rating.[2045] Some consumer groups and consultants also appeared supportive of maintaining a BBB+ credit rating.[2046] Other service providers and their consultants proposed a BBB credit rating, including Essential Energy.[2047] Whereas, consumer representatives generally submitted a credit rating of BBB+ would overcompensate network service providers.[2048] Some consumer groups advised the

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[2045]　TransGrid, *Revenue proposal*, May 2014, p. 178; Directlink, *Revenue proposal*, May 2014, p. 36; TasNetworks, *Tasmanian transmission revenue proposal,* May 2014, p. 108; Houston Kemp, *Response to the draft decision on the return on debt allowance*, January 2015, p. 4; NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 10.

[2046]　AGL, *SAPN regulatory proposal July 2015 to June 2010*, 30 January 2015, p. 14; APVI, *Submission to the AER on the issues paper on SAPN's regulatory proposal*, December 2014, p. 5; ECCSA, *AER SA electricity distribution revenue reset SAPN application: A response*, December 2014, pp. 74–75; Lally, *Implementation issues for the cost of debt*, November 2014, pp. 28–31; SACES, *Independent estimates of the WACC for SAPN: Report commissioned by the SACOSS*, January 2015, pp. 13–14; SACOSS, *Submission to AER on SAPN 2015–2020 regulatory proposal*, January 2015, p. 21.

[2047]　Ausgrid, *Regulatory proposal*, May 2014, pp. 70–71; AusNet Services, *Draft decisions NSW/ACT electricity distribution determination 2015–19*, February 2015, pp. 11–16; CEG, *WACC estimates*, May 2014, p. 64; CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, 24 May 2014, pp. 12–15; CitiPower/Powercor, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015;Endeavour Energy, *Regulatory proposal*, May 2014, pp. 104–105, Energex, *2015–20 regulatory proposal*, October 2014, p. 153; Ergon Energy, *Appendix C: Rate of return, Regulatory proposal*, October 2014, p. 123; Essential Energy, *Regulatory proposal*, May 2014, pp. 90–92; ActewAGL, *Regulatory proposal*, 2 June 2014 (resubmitted 10 July 2014), p. 255; JGN, *Access arrangement information*, 30 June 2014, p. 9; SAPN, *Regulatory proposal 2015–20*, October 2014, p. 305; United Energy, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015.

[2048]　ECC, *Submission concerning the TransGrid revised revenue proposal 2014–19*, 3 February 2015; EMRF, *AER review of NSW electricity transmission 2014*, July 2014, p. 28; EMRF, *AER review of NSW electricity distribution 2014*, July 2014, p. 33; EMRF, *NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal*, January 2015, p. 21; Norske Skog Albury Mill, *NSW Electricity Transmission Revenue Reset:*

BBB+ benchmark would particularly over-compensate the government owned serve providers.[2049] We are not satisfied these submissions provide reason to depart from our BBB+ benchmark credit rating. For instance, QCOSS submitted that a lower medium credit rating grade of BBB+ was inconsistent with the benchmark efficient entity.[2050] However, we would expect our empirical analysis of benchmark credit ratings to reflect this, given what ratings agencies take into account.[2051]

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)

- whether we should use a private credit rating benchmark for government owned service providers (raised by consumer representatives)

- whether credit ratings are a good indicator of the return on debt (raised by consumer representatives)

In the draft decision, we responded to service providers' proposals to exclude certain businesses from the comparator set used to estimate the industry median.[2052] Since we have not received further supporting information in the revised proposals, we do not restate our reasoning here.

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 government owned.[2053] This is made up of the following businesses:

Response to TransGrid's Application, p. 4; QCOSS, *Understanding the long term interests of electricity customers: Submission to the AER's Queensland electricity distribution determination 2015-2020*, 30 January 2015, pp. 75–76

[2049] Hugh Grant (CCP member), *CCP submission AER draft TransGrid determination, TransGrid revised revenue proposal*, 6 February 2015., pp. 12–13; ECC, *Submission concerning the NSW distribution networks revised revenue proposal 2014–19: Submission to the AER*, 11 February 2015, p. 2; EMRF, *NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal*, January 2015, p. 23; MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 55; TSBC, *Submission to the AER: TasNetworks transmission revenue reset — Draft determination & revised proposal*, February 2015, p. 32.

[2050] QCOSS, *Understanding the long term interests of electricity customers: Submission to the AER's Queensland electricity distribution determination 2015-2020*, 30 January 2015, pp. 75–76.

[2051] Credit rating agencies consider qualities that QCOSS submitted contribute to the low risk of the benchmark efficient entity. Specifically, ratings agencies consider factors including but not limited to market risk, cash flow certainty, the regulatory approach and gearing.

[2052] These were put forward in 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. For our response, see AER, *Draft decision: JGN access arrangement, Attachment 3*, November 2014, pp. 295–297.

[2053] That is, Ergon Energy Corp Ltd.

- 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 3-65 sets out these median credit ratings.

Table 3-65 Median credit rating for AER sample over different periods

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 (Standard and Poor's), AER analysis.

While Table 3-65 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

To support their proposals for a benchmark credit rating of BBB, service providers referred to material from Kanangra, JGN and/or CEG.[2054]

The Kanangra report was initially submitted by the ENA in 2013.[2055] When we received this report, we replicated its full sample analysis using a median credit rating approach. We found this gave a median Standard and Poor's credit rating of BBB+ with a positive outlook from 2008 when the 2013 data available at the time was included. Excluding 2013 data resulted in a median credit rating of A-.[2056] We consider this provides more support for our benchmark credit rating of BBB+ than for a credit rating of BBB.

In our draft decision, our calculations of median credit ratings reconciled with CEG's and JGN's calculations until 2013.[2057] However, it appeared that CEG's and JGN's calculations did not include all data up to the 2013 calendar year end, when several upgrades occurred.[2058] Therefore, the data for 2013 in our draft decision did not reconcile with these initial proposals. No revised empirical credit rating analysis from CEG was submitted with the revised proposals.

In this final decision, our calculations of median credit ratings reconcile with JGN's calculations in its revised proposal. In its revised proposal, JGN revised its analysis of United Energy Distribution from having no credit rating to having a credit rating of BBB.[2059] We agree with this revision and have amended our analysis accordingly.

We consider recent data.[2060] Table 3-66 sets out the median credit ratings across our comparator set since the 2006 calendar year end. These results differ from CEG's, which appear to end mid-2013. This is because:

- 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+

[2054] CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, May 2014, pp. 12–15; CEG, *WACC estimates*, May 2014, p. 64; JGN, *2015–20 Access arrangement information: Appendix 9.10 Return on debt proposal*, 30 June 2014, pp. 9–10; Kanangra, *Credit ratings for regulated energy network services businesses*, June 2014.

[2055] Kanangra, *Credit ratings for regulated energy network service providers*, June 2013.

[2056] AER, *Explanatory statement to the rate of return guideline*, 17 December 2013, pp. 156–157.

[2057] CEG, WACC estimates: A report for NSW DNSPs, May 2014, p. 64; CEG, Memorandum: Factors relevant to estimating a trailing average cost of debt, 24 May 2014, p. 13; JGN, Appendix 9.10: Return on debt proposal (public), 30 June 2014, p. 9.

[2058] For instance, ATCO moved up to A- on 18/12/2013, Envestra moved up to BBB+ on 11/8/2014, Powercor moved down to BBB+ on 18/12/2013, AusNet Services moved up to A- on 20/12/2013, SGSP moved up to BBB+ on 20/12/2013.

[2059] JGN, Appendix 7.10: Return on debt response (public), 27 February 2015, p. 9.

[2060] At the time of writing, this was data from 7 April 2015.

- 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 3-66   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+
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. Ergon Energy proposed the maximum horizon of historical credit rating analysis should be limited to five years.[2061] Energex proposed the credit rating be based on the most recent observations.[2062] ActewAGL, JGN and SAPN did not propose taking the median credit rating over a particular period.[2063] However, ActewAGL noted there had been a sustained drop in the median credit rating since 2009.[2064] Also, JGN indicated that considering median credit ratings over a longer time period is not appropriate, finding:[2065]

> Fundamental changes to the way energy is sourced and consumed mean that the risks faced by debt (and equity) holders have increased-which was reflected in recent downgrades and warnings by ratings agencies.

In response to these proposals, we note the following:

- In this final 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.

- Even if we were to only consider the most recent credit rating observations, we consider this information supports a BBB+ credit rating. There had been a range of downgrades in credit ratings from 2009 that led the median credit rating to fall from BBB+ to BBB. However, ratings agencies have since revised many of these estimates. Since the latter half of 2013, there has been a range of upgrades and the median is back to BBB+.[2066]

- We do not consider JGN has shown that previous credit rating revisions were linked to factors relevant to the benchmark efficient entity. We note credit ratings

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[2061] Ergon Energy, *Appendix C: Rate of return, Regulatory proposal*, October 2014, p. 140.

[2062] Energex, *2015–20 regulatory proposal*, October 2014, p. 167.

[2063] For example, see SAPN, *Regulatory proposal 2015–20*, October 2014, p. 338.

[2064] ActewAGL, p. 279; CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, 24 May 2014, p. 1.

[2065] JGN, *2015-20 Access Arrangement Information Appendix 9.10 Return on debt proposal*, 30 June 2014, p. 8.

[2066] The most recent ratings to be updated are: ATCO moved up to A- on 18/12/2013, Envestra moved up to BBB+ on 11/8/2014, Powercor moved down to BBB+ on 18/12/2013, AusNet Services moved up to A- on 20/12/2013, SGSP moved up to BBB+ on 20/12/2013.

agencies may revise ratings for a range of reasons, including firm-specific reasons.[2067]

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 allow for a generous return on debt allowance. Lally has also recognised this view, even though he considers the appropriate credit rating is BBB to BBB+.[2068] Various stakeholders have also recognised this view.[2069]

H.1.4 Private credit ratings and government firms

Some consumer groups submitted that applying a benchmark credit rating of BBB+ is generous to service providers that acquire debt from their parents with higher credit ratings.[2070] These proposals appear to primarily relate to government owned service providers. We do not agree with these proposals.

The Energy Markets Reform Forum (EMRF) supported applying the Guideline. However, the EMRF and Norske Skog submitted that a BBB+ credit rating provides a significant benefit to service providers that acquire credit from their owners who face better rates.[2071] The Tasmanian Small Business Council (TSBC) submitted that government businesses do not face the same degree of risk as the benchmark efficient entity. It submitted that, 'this is inconsistent with incentive regulation, which is supposed to ensure that network entities do not benefit from windfall gains but rather benefit from the pursuit of greater efficiencies'.[2072]

We apply a credit rating of BBB+ to all service providers, regardless of their ownership structure. The rules specify to take a benchmark approach to setting the allowed rate

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[2067] For instance, Envestra stated Standard and Poor's improved its credit rating in 2013 because of regulatory decisions and Envestra's reduced gearing. See Envestra, *Annual report 2013*, pp. 2, 6, 29. In 2013, Standard and Poor's lowered SGSP's credit rating following a change in ownership. See SGSP (Australia) Assets Pty Ltd, *Financial report for the year ended 31 March 2014*, p. 2.

[2068] Lally, *Implementation issues for the cost of debt*, November 2014, p. 4.

[2069] CCP, *Submission to AER: Responding to NSW draft determinations and revised proposals from electricity distribution networks*, February 2015, pp. 10–45; ECC, *Submission concerning the NSW distribution networks revised revenue proposal 2014–19: Submission to the AER*, 11 February 2015, p. 2; MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 55; SACES, *Independent estimates of the WACC for SAPN: Report commissioned by the SACOSS*, January 2015, pp. 13–14.

[2070] For example, Hugh Grant (CCP member), *CCP submission AER draft TransGrid determination, TransGrid revised revenue proposal*, 6 February 2015., pp. 12–13; ECC, *Submission concerning the NSW distribution networks revised revenue proposal 2014–19: Submission to the AER*, 11 February 2015, p. 2; MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 55.

[2071] EMRF, *AER review of NSW electricity transmission 2014*, July 2014, p. 28; EMRF, A*ER review of NSW electricity distribution 2014*, July 2014, p. 33; Norske Skog Albury Mill, *NSW Electricity Transmission Revenue Reset: Response to TransGrid's Application*, p. 4.

[2072] Tasmanian Small Business Council, *Submission to the AER: TasNetworks transmission revenue reset — Draft determination & revised proposal*, February 2015, p. 32.

of return.[2073] After careful analysis, we defined a benchmark efficient entity as, 'a pure play, regulated energy network business operating within Australia'.[2074] This definition of a benchmark efficient entity makes no assumption on ownership structure. In forming this position, we had regard to the following:

- In the Guideline, we considered systematic risks were likely to be similar between government owned and private service providers in providing standard control services.[2075]

- With respect to default risk, Klein has noted taxpayers underwrite the lower cost of debt for government-backed entities through the government's ultimate recourse to taxation. If governments were to compensate taxpayers for this risk, then there would be no capital cost advantage of government finance. The risk premium on government finance would, in principle, be no different to that of private investors.[2076] While the EMRF does not disagree with this, it submitted that using a private benchmark could only be efficient if the government returned the resulting the 'overpayment' to the taxpayer.[2077] One would expect this to hold if governments use the revenue from their investments to substitute revenue they would otherwise collect from taxpayers.

- The relevant issue is whether government ownership alters the risks of investing in and operating energy networks to provide standard control services. The AEMC has noted:[2078]

  The interest rates that State treasury corporations can secure reflect the credit rating of the relevant state government and not the service provider. If state-owned service providers were to access debt capital markets directly then they would face debt financing costs that reflect their stand-alone credit ratings. If such costs are not reflected in the regulatory framework then investment and resource allocation decisions may be distorted. The Commission considers that the most appropriate benchmark to use in the regulatory framework for all service providers, regardless of ownership, in general is the efficient private sector service provider.

H.1.5   Credit ratings as an indicator of the return on debt

Consumer groups submitted evidence suggesting credit ratings for utility bonds often poorly estimate the likely costs.[2079] In particular, lenders are willing to lend at lower rates because they value the stability of utility earnings.

[2073]   Specifically, the allowed rate of return must be commensurate with the efficient financing cost of a benchmark efficient entity. See NER cl. 6.5.2(c), 6A.6.2(c); NGR r. 87(3).

[2074]   See AER, *Explanatory statement to the rate of return guideline*, 17 December 2014, pp. 30–45.

[2075]   AER, *Explanatory statement to the rate of return guideline*, 17 December 2013, p. 44.

[2076]   Klein, M., 'The risk premium for evaluating public projects', *Oxford Review of Economic Policy*, Vol. 13, No. 4, pp. 29–42.

[2077]   EMRF*, NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal*, January 2015, p. 23.

[2078]   AEMC, *Rule determination: Economic Regulation of Network Service Providers*, 29 November 2012, p. v.

We consider there is merit in this submission. However, at this stage, we predominately base our approach to estimating the benchmark return on debt on a benchmark credit rating and term to maturity. This is because:

- We use third party data series to estimate the return on debt. We are satisfied there are important benefits with adopting this approach, rather than constructing our own series and yield curve (see section H.2). However, third party data service providers define their series on credit ratings and terms. To date, data service providers have not published a utility-specific data series.

- We recognise the credit rating and term to maturity are factors in determining the return on debt.[2080]

- Ideally, we could use a cohort of bonds that are comparable to those sourced by businesses similar to the benchmark efficient entity. However, for practical reasons, at this time we do not have a clear and unambiguous approach for factoring in these qualitative factors. In particular, we would need to achieve this whilst allowing for updating the annual revenue requirement through the automatic application of a formula.[2081]

Further, EMRF and MEU submitted our approach has an additional layer of conservatism because it assumes service providers only raise debt using corporate bonds.[2082] EMRF submitted this will overstate service providers' efficient costs because corporate bonds are a higher cost source of debt than what is available from other sources.[2083] We agree that this is a conservative aspect of our approach. However, Lally advised that the impact of this may be mitigated given bank debt constitutes only about 25% of the debt of regulated firms.[2084] Similarly, while PwC observed Australian listed regulated energy networks held an average of 27 per cent bank debt in 2012, it also noted:[2085]

> bank debt may be preferred at terms below 5 years because it is likely to be cheaper than bonds at those terms, while very little bank debt is issued for terms beyond 5 years because capital market sources (bonds) are cheaper at those terms to maturity.

[2079] CCP, *Jam Tomorrow? Submission regarding NSW DNSP regulatory proposals 2014-19*, August 2014, pp. 18, 26.; EMRF, *AER review of NSW electricity distribution 2014*, July 2014, p. 37; EMRF, *AER review of NSW electricity transmission 2014*, July 2014, p. 33;   EUAA, *Submission to TransGrid response to draft determination (2014 to 2019)*, 6 February 2015, p. 5; Hugh Grant (CCP member), *CCP submission AER draft TransGrid determination, TransGrid revised revenue proposal*, 6 February 2015, p. 12.

[2080] ERA, *Final Decision on proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline*, 31 October 2011, p. 143.

[2081] NER 6.5.2(l); 6A.6.2(l); NGR 87(12).

[2082] EMRF, *NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal*, January 2015, p. 22; MEU, *Tasmanian electricity transmission revenue reset, AER draft decision and TasNetworks revised proposal: A response*, February 2015, p. 22

[2083] EMRF, *NSW electricity transmission revenue reset: AER draft decision and TransGrid revised proposal*, January 2015, p. 22.

[2084] Lally, *Implementation issues for the cost of debt*, 20 November 2014, p. 3.

[2085] PwC, *A cost of debt estimation methodology for businesses regulated by the QCA*, June 2013, p. 57.

H.2 Use of third party data series

Our final 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 and applied in the draft decisions.[2086] The service provider proposals currently before proposed using third party data series to estimate the return on debt.[2087] However, some consumer groups did not support this approach. We discuss these submissions here.

The CCP raised concerns that the use of current third party data series would overstate the efficient financing costs of a benchmark efficient entity. The CCP suggested that actual borrowing costs are lower than what our rate of return allowance indicates. We are not satisfied with the information the CCP used to support this position. This is because the CCP referred to:

- Information from Lally, Chairmont and the Energy Users Rule Change Committee, which it had submitted to us previously.[2088] We have considered this information previously. However, we considered that using a third party data series was a practical necessity resulting from the choice to annually update the return on debt. We also considered that annually updating the return on debt would reduce the potential mismatch between the actual and allowed return on debt of the benchmark efficient entity.[2089] Further, in its latest report, Chairmont's analysis indicated that using a simple average of RBA and Bloomberg was a fair approach.[2090] Also, in his recent report on debt implementation, Lally advised:[2091]

  > the bonds of regulated energy network businesses would have lower average
  > liquidity than the bonds in the BVAL and RBA sets, and are also likely to have
  > lower than normal expected loss rates for bondholders in the event of default.
  > The first point would lead to the BVAL or RBA indexes underestimating the cost

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[2086] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 126–130; *AER, Draft decision: ActewAGL distribution determination, Attachment 3*, November 2014, p. 11; AER, *Draft decision: Ausgrid distribution determination, Attachment 3*, November 2014, p. 10 ('46'); 10 AER, *Draft decision: Directlink transmission determination, Attachment 3*, November 2014, p. 10; AER, *Draft decision: Endeavour Energy distribution determination, Attachment 3*, November 2014, p. 8; AER, *Draft decision: Essential Energy distribution determination, Attachment 3*, November 2014, p. AER, *Draft decision: TasNetworks transmission determination, Attachment 3*, November 2014, p. 11; AER, *Draft decision: TransGrid transmission determination, Attachment 3*, November 2014, p. 9.

[2087] ActewAGL, *Revised regulatory proposal*, January 2015, p, 428; Ausgrid, *Revised regulatory proposal and preliminary submission*, January 2015, p, 178; Directlink, *Revised revenue proposal*, January 2015, p, 13; Endeavour Energy, *Revised regulatory proposal*, January 2015, p, 200; Essential Energy, *Revised regulatory proposal*, January 2015, p, 219; JGN, 2*015–20 access arrangement: Response to the AER's draft decision and revised proposal, Appendix 7.10 — Return on debt response*, February 2015, p. 1; TasNetworks, *Revenue proposal*, May 2014, p. 108; TransGrid, *Revised revenue proposal*, January 2015, p. 116.

[2088] CCP, *Smelling the roses and escaping the rabbit holes: The value of looking at actual outcomes in deciding WACC*, July 2014, p. 12.

[2089] For example, see AER, *Draft decision: ActewAGL distribution determination, Attachment 3*, November 2014, p. 135/.

[2090] Chairmont, *Cost of debt: Transitional analysis*, 18 March 2015, pp. 67–68.

[2091] Lally, *Implementation issues for the cost of debt*, October 2014, p. 4.

of debt for regulated energy network businesses with the same credit ratings whilst the second point would lead to an overestimate. The net effect of these two points is not known.

- The opinion of 'major investment banks and equity analysts' that the long run average cost of debt was around five per cent.[2092] Before using this information, we would need to verify this number. However, the CCP submitted that it could not provide us this information because of confidentiality considerations. Therefore, it is difficult to verify the accuracy of this information. In addition, we would also need to ensure that this information is a like-for-like comparison to the regulatory benchmark. In particular, our return on debt approach is to adopt an on-the-day rate for the first regulatory year (and gradually transition this into a trailing average). The on-the-day rate reflects prevailing market conditions. Accordingly, it is not directly comparable to the long run average cost of debt stated by the CCP.

In submissions on the initial and revised regulatory proposals, consumer representatives proposed we develop our own data series, using either:

- A selection of benchmark bonds that target more features than the benchmark credit rating and benchmark debt term. In particular, consumer representatives submitted that the bonds included in the sample should reflect the industry of regulated utilities, given the view that the return on debt varies with the core business of firms.[2093]

- Service providers' actual borrowing costs.[2094]

The CCP submitted that considering actual costs would be valuable because:[2095]

> …the evidence from the actual yields on network bonds and the price paid for bank debt shows that network businesses' actual borrowing costs are much lower than implied by their credit ratings. This is because lenders recognise that networks are monopolies and…lenders are willing to lend money to network utilities at much lower rates than implied by their credit ratings.

We acknowledge the views of consumer representatives on this issue. We also share some of the concerns on relying heavily on credit ratings, and not industry, as the

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[2092] CCP, *Submission to AER on QLD/SA distributors' proposals*, January 2015, p. 10; CCP, *Response to the AER draft determination re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 23; CCP, *Responding to NSW draft determinations and revised proposals from electricity distribution networks*, February 2015, 45.

[2093] MEU, *Tasmanian Electricity Transmission Revenue Reset, TasNetworks Application: A response*, August 2014, pp. 34–35; EMRF, *AER review of NSW electricity transmission*, July 2014, pp. 32–34; Tasmanian Small Business Council, *Submission on TasNetworks revenue proposal*, 8 August 2014, p. 42.

[2094] CCP, *Smelling the roses and escaping the rabbit holes: the value of looking at actual outcomes in deciding WACC*, July 2014, p. 6.

[2095] CCP, *Submission to AER on QLD/SA distributors' proposals*, January 2015, p. 10; CCP, *Response to the AER draft determination re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 23; CCP, *Responding to NSW draft determinations and revised proposals from electricity distribution networks*, February 2015, 45.

measure of risk for estimating the return on debt of the benchmark efficient entity.[2096] As such, our preference would be to use a third party utilities data series, rather than broad BBB data series. For this reason, we would consider using such a series if it becomes available from Bloomberg or the RBA.

However, we consider that using a third party data series is a practical necessity resulting from the choice to annually update the return on debt. We have chosen to annually update the return on debt because this reduces the volatility of prices between regulatory periods (by introducing a small degree of price volatility within the regulatory period). And it also reduces the potential mismatch between the actual and allowed return on debt of the benchmark efficient entity. At the end of the Guideline development process, the majority of stakeholders (including both service providers and consumer representatives) supported annually updating the return on debt.[2097] In other words, calculating an index of actual borrowing costs might be feasible under an on-the-day approach, but it would be practically difficult to apply using a trailing average approach. And so there is a trade-off here.

Further, we do not apply a benchmark data series based on service providers' actual borrowing costs. In its submission, the CCP did not suggest precisely how we should use this data.[2098] In our recent draft decisions, we raised challenges in implementing this approach and specified that we would not apply this approach unless we had a sound idea of how to implement it well. [2099] In its submission to our draft decision for TasNetworks, the Tasmanian Small Business Council (TSBC) responded to the challenges we raised.[2100] After considering TSBC's submission, we are still satisfied with our position in the draft decision. This is for the following reasons:

- If we were to use historical actual debt costs to estimate future allowances, we would also want to account for changes in the financial environment since the historical period. We are unsure of how to best achieve this at this stage. We acknowledge TBSC's suggestion to seek expert advice on this matter. We accept it is possible to use historical costs to estimate future allowances. We also appreciate, like estimating many financial parameters, there will likely be difficulties with producing reliable estimates.

[2096] For example, Lally explains that there are a 'host of other factors' that affect the debt risk premium but not the credit rating. Lally, *Implementation issues with the cost of debt*, pp.32-34.

[2097] 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 SP AusNet 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.

[2098] CCP, *Smelling the roses and escaping the rabbit holes: the value of looking at actual outcomes in deciding WACC*, July 2013, p. 3.

[2099] See for example AER, *Draft decision ActewAGL distribution determination — Attachment 3: Rate of return*, November 2014, p. 136.

[2100] For TSBC's response, see TSBC, *Submission to the AER: TasNetworks transmission revenue reset — Draft determination & revised proposal*, February 2015, pp. 32–34.

- If we were to use current actual debt costs at the time of the reset or annual update, we would need detailed and timely data. We do not currently have access to this level of detailed data. Even if we did, we would need to consider how best to use this data to construct a 'current' benchmark return on debt. We acknowledge TSBC's suggestion to obtain relevant and timely information through regulatory information notices and other government sources. While there may be potential to use regulatory information notices in this way, we are not convinced this is a pragmatic option for the current resets that are before us.

- If we were to base the allowed return on debt on actual costs, we would need to consider how this might affect service providers' incentives to minimise their debt costs. Further, we would have to be careful to apply this approach consistently with the allowed rate of return objective, which refers to a benchmark.[2101] We recognise TSBC's view that developing an appropriate benchmark would negate blunting incentives. The CCP shared a similar view and likened this to establishing an allowance for operating expenditure based on a benchmark of actual costs.[2102] While we do not necessarily disagree, we also appreciate that developing an effective benchmark will have its challenges and may not be a pragmatic option for the currently open resets.

- If we were to base debt allowances on actual costs, we would have to carefully consider whether or not we should include the costs of government owned sector service providers, as the CCP proposed.[2103] We consider that data for government owned service providers may provide some insight for benchmarking purposes. However, we also recognise there may be limitations to using this information. This is because:

  o The AEMC has concluded an efficient private sector service provider is the most appropriate benchmark. [2104] Synergies Economic Consulting concurred with this view.[2105]

  o If we were to include the actual debt costs of government owned service providers in our benchmark, we would include debt guarantee fees. Excluding debt guarantee fees would not be consistent with setting a commercial rate of return. This is because these are intended to reflect a business's indicative, stand-alone credit rating or commercial status.[2106]

[2101] NER, cl. 6A.6.2(c), NER, cl. 6.5.2(c), and NGR, r. 87(3).

[2102] Bruce Mountain (CCP member), *CCP submission to AER on QLD/SA distributors' proposals*, January 2015, p. 10; CCP, *Response to the AER draft determination re: ActewAGL regulatory proposal 2014–19*, February 2015, p. 23.

[2103] CCP, *Smelling the roses and escaping the rabbit holes: the value of looking at actual outcomes in deciding WACC*, July 2013, p. 12.

[2104] AEMC, *Final rule change determination*, November 2012, p. 72.

[2105] Synergies, *Response to issues raised by the CCP: Report for Ergon Energy*, September 2014, pp. 15–16.

[2106] NSW Treasury, *Policy statement on the application of competitive neutrality: Policy & guidelines paper*, January 2002, p. 11; Queensland Government, N*CP implementation in Queensland: Competitive neutrality and Queensland government business activities*, July 1996, p. 24; ACT Department of Treasury, *Competitive neutrality in the ACT*, V. 2, October 2010, p. 10. We note that our interpretation of State government policy appears to differ from Origin Energy who submitted, 'for regulated utilities, the guarantee fee rate is determined using the debt tenor

Nevertheless, we acknowledge that debt guarantee fees are based on estimates and are not 'actual' costs determined by capital markets. For example, NSW TCorp uses a third party data series (RBA) to calculate debt fees. Therefore, these estimates may still be subject to consumer groups' concerns regarding the use of third party data series.

However, we do consider it may be useful to have some regard to service providers' historical actual borrowing practices and costs. This information can help us assess how our regulatory approach has performed systematically over time. For instance, this could help us identify aspects of our regulatory approach we could refine in future Guideline reviews.

adopted by the regulator's debt allowance benchmark tenor'. See Origin Energy, *Submission to AER TransGrid draft determination*, 6 February 2015, p. 7.

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 (2014-15) of the 2014–19 period, and

- gradually transition this rate into a trailing average approach (that is, a moving historical average) over 10 years.[2107]

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.[2108] The NER require that the resulting change to Essential Energy's annual building block revenue requirement is to be effected through a formula specified in the distribution determination.[2109] For the purposes of clause 6.5.2(L) our final decision is that the resulting change to Essential Energy's 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 K, and

- implemented using Essential Energy's final determination post-tax revenue model (PTRM) in accordance with section 3 of the AER's PTRM handbook for distribution network service providers.[2110]

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:

[2107] This final decision determines the return on debt methodology for the 2014–19 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.

[2108] NER, cl.6.5.2(i) and cl.6A.6.2(i).

[2109] NER, cl.6.5.2(l) and cl. 6A.6.2(l).

[2110] 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 Essential Energy'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 (2014–15), 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:

  o 10 year estimate.[2111]

  o 7 year estimate extrapolated to a 10 year term using the 7–10 year margin from the RBA curve.

  o 5 year estimate extrapolated to a 10 year term using the 5–10 year margin from the RBA curve.

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:

[2111] 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 the following tables.

Table 3-67 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.[2112] 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).[2113] 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

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[2112] 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.

[2113] 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,[2114] 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'.[2115] 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 3-68 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.[2116] In April 2015, Bloomberg revised its methodology for the BVAL curve (BVCSAB10) and it now publishes a 10 year estimate.[2117]

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 |

[2114] 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.

[2115] RBA, *Email in response to: AER follow up question on the basis of YTM quotations in RBA statistical table F3*, 16 October 2014.

[2116] Specifically, from 15 September 2014 to 3 November 2014.

[2117] Specifically, 14 April 2015.

Adjustment Type	Amendment made?	Comments
		spread to CGS from 7 to 10 years
		As recommended by Lally,[2118] we are satisfied this approach is comparably reliable to the more complex approaches submitted by other stakeholders,[2119] 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

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[2118] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

[2119] 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,[2120] and the two nearest CGS bonds straddling 10 years remaining term to maturity. This should be done using the following formula: [2121]

> 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:[2122]

> $yield_{10}$ = $yield_{10}$ 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:[2123]

> $yield_7$ = $yield_7$ 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.[2124]

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:

[2120] 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.

[2121] 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.

[2122] As per Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

[2123] As per Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38-44.

[2124] 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:[2125]

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.[2126]

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.[2127]

3. For all dates, convert the 10 year yields into effective annual rates, using the formula:

[2125] 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'.

[2126] Subject to the availability of the Bloomberg BVAL curve. For other contingencies, see section I.2.4.

[2127] 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 = $((1 + yield / 200)^2 - 1)*100$

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 final decision is to largely maintain the set of contingencies as set out in our draft decision. We have for two contingencies expanded the definition for more general contingency scenarios. Specifically, the contingencies now address any expansion or reduction of the longest available BVAL term, where in the draft decision they addressed changes to a 5 year term, less than 5 year term or a 10 year term.

As identified in the draft decision, we have made our final decision based on the information and third party data that is currently available.[2128] Nonetheless, in our experience it is common that the availability of third party data changes. Our final decision is to annually update the trailing average portfolio return on debt. Under the NER,[2129] the change in revenue resulting from the annual update must occur by automatic application of a formula that is specified in the determination. 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 the table 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 3-69 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	We will not apply estimates from a third party data provider that we have not

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[2128] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommended publishing a 10 year yield estimate. Therefore, in line with our specified contingencies in this decision, we will adopt this curve where it is available. As Bloomberg has not backcast the updated curve methodology, we will apply the previous methodology as per the draft decision to estimate the annual cost of debt for 2014¬–15 and 2015–16.

[2129] NER, cl. 6A.6.2(l), NER, cl. 6.5.2(l).

Event	Changes to approach
commences publication of a 10 year yield estimate.	evaluated and included during the determination process. 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.
Bloomberg reduces the maximum published BVAL term from 7 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. We have adopted this approach for the period from 15 September 2014 to 3 November 2014 where the 7 year BVAL curve was unavailable.

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,2130 from the RBA's longest published effective 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. |
| Bloomberg increases the maximum published BVAL term from 7 years. | If the longest published term is between 7–10 years, we will extrapolate it to a 10 year term using the corresponding margin from the RBA curve.

If the longest term is 10 or more years, we will apply the 10 year BVAL curve un-extrapolated, but still adjusted to be an effective annual rate. |
| 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 NER 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.

• 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.

2130 Specifically, the spread to CGS.

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.[2131] 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.

[2131] AER, *Explanatory statement−Rate of return guideline*, December 2013, pp. 23–24.

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.3   Equity raising costs

Equity raising costs are transaction costs incurred when service providers raise new equity from outside the business. Our equity raising cost benchmark allows for the costs of 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 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).[2132] We amended this method in our decisions for the ACT, NSW and Tasmanian electricity service providers.[2133] We have applied this method in subsequent decisions for other electricity and gas service providers.[2134] This approach has been further refined, as discussed and applied in the Powerlink final decision.[2135]

[2132] ACG, *Estimation of Powerlink's SEO transaction cost allowance-Memorandum*, 5 February 2007.

[2133] 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.

[2134] AER, *Final decision, Victorian electricity distribution network service providers, Distribution determination 2011–2015,* October 2010; AER, *Final Decision, Jemena Gas Networks, Access arrangement proposal for the NSW gas networks ,1 July 2010 – 30 June 2015*, June 2011.

[2135] AER, *Final decision, Powerlink Transmission determination 2012-13 to 2016-17*, April 2012, pp. 151-152.

J.3.1 Final decision

We accept Essential Energy's proposed method for determining equity raising costs, which is based on our established method.[2136] This is consistent with our draft decision.[2137] We consider this method produces estimates of equity raising costs that are commensurate with the efficient financing costs of the benchmark efficient entity.

Consistent with our draft decision, we have updated the capex allowance in this final decision.[2138] This has changed the value of Essential Energy's regulatory asset base (RAB), which is an input for calculating equity raising costs. Following these updates, we now provide $4.63m (real 2013-14) for equity raising costs in the 2014–2019 regulatory control period.

J.4 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.4.1 Final decision

Our final decision for debt raising costs is to largely maintain the approach set out in our draft decision. We do not accept Essential's proposal to use 9.9 basis points. Endeavour's proposal does not reconcile with either the draft decision or the approach its consultant has recommended.

Our only adjustment from our draft decision approach is to give effect to the newly implemented post-tax revenue model (PTRM) update. Amongst other things, this update affects the calculation of debt raising transaction costs. In the process of consulting on the update, Networks NSW submitted that (as with equity raising costs) the debt raising costs calculation should use the nominal (inflated) opening RAB value, rather than nominal closing RAB from the prior year as in version 2 of the TNSP PTRM.[2139] We have implemented this suggestion, noting that the change will result in a slight increase in the calculated costs of raising debt (reflecting one year's inflation).[2140]

[2136] Essential Energy, *Regulatory proposal*, May 2014, p. 115.

[2137] AER, *Draft decision, Essential Energy distribution determination 2015-16 to 2018-19, Attachment 3: Rate of return*, November 2014, p. 325.

[2138] AER, *Draft decision, Essential Energy distribution determination 2015-16 to 2018-19, Attachment 3: Rate of return*, November 2014, p. 325

[2139] Networks NSW, *Submission on Distribution PTRM,* November 2014, Attachment 1, p. 2.

[2140] AER, *Final decision: Amendment—Electricity transmission and distribution network service providers Post Tax Revenue Models (version 3),* January 2015, p. 14.

In total, we accept debt raising costs of $20.3 million (nominal) over the 2014–19 period, as set out in Table J-1. This is a reduction of $3.1 million or 13 per cent compared to Endeavour Energy's revised proposal. We are satisfied this estimate contributes towards a total opex forecast that reasonably reflects the opex criteria.

Table J-1   AER's final decision on debt raising costs (million, $ nominal)

	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Distribution	3.6	3.8	4.0	4.2	4.4	20.0
Metering	0.0	0.1	0.1	0.1	0.1	0.3
Total	3.6	3.9	4.1	4.3	4.5	20.3

Source: AER analysis.

J.4.2   Debt raising transaction costs

The NSW distribution network service providers (Ausgrid, Endeavour Energy and Essential Energy) proposed to apply 9.9 basis points as the rate to calculate debt raising costs.[2141] This value was based on the initial report prepared by their consultant Incenta submitted with their initial proposals.[2142] Specifically, the value was the outcome of the standard approach to debt raising costs but using an indicative return on capital and the projected RAB values from the proposals as inputs.[2143]

In our draft decision, we largely accepted Incenta's methodology to estimate debt raising transaction costs, however we updated it to reflect the draft decision projected RAB and the draft decision return on capital. In its updated report for TransGrid, Incenta adopted the approach of using an up-to-date rate of return and based its updated estimate on the revised proposal cost of capital, specific to each service provider.

However, Ausgrid, Endeavour Energy and Essential Energy did not adopt this aspect of the draft decision. In contrast, they submitted that:

> …the AER has not considered the full range of efficient debt raising costs that are faced by the benchmark efficient entity. These include more than the transactions costs outlined by Incenta. They also include liquidity commitment fees and the costs of 3 months ahead financing. However, we have maintained a conservative approach to minimize the impacts of our costs on our customers and only incorporated a minimal 9.9bbpa figure for debt raising cost.[2144]

[2141] Ausgrid, *Revised revenue proposal*, January 2015, p. 187;

[2142] Ausgrid, *Regulatory proposal*, May 2014, p. 78.

[2143] Incenta Economic Consulting, *Debt raising transaction costs–Ausgrid*, May 2014, p. 19.

[2144] Ausgrid, *Revised regulatory proposal*, January 2015, p. 187; Endeavour Energy, Revised regulatory proposal, January 2015, p. 212; Essential Energy, Revised regulatory proposal, January 2015, p. 230.

We are not satisfied that this approach will result in a debt raising cost allowance that contributes towards a total opex forecast that reasonably reflects the opex criteria. In contrast, we consider that:

- the NSW distribution network service providers' proposed allowance is inconsistent with the advice of their own consultant regarding the estimation of debt raising transaction costs

- the NSW distribution network service providers did not include the additional allowances identified by Incenta in their initial proposals, and have not identified why those allowances should affect its estimate of debt raising transaction costs

- in the draft decisions for TransGrid, ActewAGL and JGN, we did not accept the other categories of debt raising costs identified by Incenta.[2145] We have maintained this approach in our final decision for those service providers. This is because we are not satisfied that the proposed 'other debt raising costs' are necessary. In contrast, we are satisfied the PTRM's timing assumptions already provide adequate compensation for the timing of revenue compared to expenses (liquidity related costs), to the extent that these cost streams are necessary.[2146]

We have updated the final decision estimate of debt raising transaction costs to reflect the final decision projected RAB and the final decision return on capital. Our final decision on the unit costs and components of Essential Energy's benchmark rate of debt raising transaction costs is set out in Table J-2.

Table J-2   Benchmark debt raising costs (basis points per annum)

Number of bonds	Value	1 bond issued	16 bonds issued
Amount raised		$250m	$4000m
Arrangement fee		7.37	7.37
Bond Master Program (per program)	$56,250	0.32	0.02
Issuer's legal counsel	$15,265	0.09	0.09
Company credit rating	$77,500	0.44	0.03
Annual surveillance fee	$35,500	0.14	0.01
Up-front issuance fee	5.20bp	0.73	0.73
Registration up-front (per program)	$20,850	0.12	0.01
Registration- annual	$7,825	0.31	0.31
Agents out-of-pockets	$3,000	0.02	0.02

[2145]   See for example AER, *Transgrid draft determination—Attachment 3: Rate of return*, November 2014, p. 325

[2146]   AER, *Draft decision: Attachment 3—Rate of return*, November 2014, p. 327.

Number of bonds	Value	1 bond issued	16 bonds issued
Total (basis points per annum)		9.5	8.6

K Return on debt averaging periods (confidential)

L Review of confidential return on debt approach material submitted by Networks NSW (confidential)