

Jemena Electricity Networks (Vic) Ltd

2016-20 Electricity Distribution Price Review Regulatory Proposal

Attachment 9-2

Rate of return proposal

Public

30 April 2015



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GLOSSARY

AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator's
CGS	Commonwealth Government Securities
DCF	Discount Cash Flow
DDM	Dividend Discount Model
EDPR	Electricity Distribution Price Review
FFM	French Three Factor Model
Guideline	Rate of Return Guideline
JEN	Jemena Electricity Networks
JGN	Jemena Gas Networks'
MRP	Market Risk Premium
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NGR	National Gas Rules
OLS	Ordinary Least Squares
PTRM	Post Tax Revenue Model
RAB	Regulated Asset Base
RBA	Reserve Bank of Australia
RPP	The Revenue and Pricing Principles
S&P	Standard and Poor's
SFG	SFG Consulting
SIRCA	Securities Industry Research Centre of Asia-pacific
SL-CAPM	Sharpe-Lintner Capital Asset Pricing Model

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1. SUMMARY

1.1 APPLYING A NEW FRAMEWORK FOR SETTING THE ALLOWED RATE OF RETURN

1.1.1 THE NEW FRAMEWORK

1. Electricity distribution networks are capital intensive with long lived assets and therefore a key aspect of the Australian Energy Regulator's (AER's) distribution determination is the allowed rate of return on the capital invested in our business. Rule 6.12.1 provides¹ that two of the constituent decisions that form part of the overall determination are:
 - A decision on the allowed rate of return for each regulatory year of the regulatory control period in accordance with rule 6.5.2,² and
 - A decision on whether the return on debt is to be estimated using a methodology in which the allowance is potentially different for different regulatory years in the regulatory control period and, if that is the case, the formula that is to be applied in accordance with rule 6.5.2(i).³
2. Where there is uncertainty, expert evidence explains how the expected costs for electricity consumers of setting too low an allowance for the return on capital are greater than the expected costs of setting the allowance too high.⁴
3. An efficient allowed rate of return is particularly important. If the rate of return is inflated, customer network charges will be higher than necessary. Equally, if the rate of return is below a fair market return, network businesses will be unable to attract investment capital necessary to promote efficient investment in electricity services in the long-term interests of consumers.
4. As a result of reforms adopted by the AEMC in 2012, the rules governing the AER's allowed rate of return decisions set out in clause 6.5.2 have been re-written. A range of previous policy considerations have now been encapsulated in an explicit guiding principle for the AER's decision concerning the rate of return in the following rate of return objective:⁵

...that the rate of return for a Distribution Network Service Provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the Distribution Network Service Provider.... [Emphasis added]

5. The new rules require all the AER to have regard to all the relevant models and other available inputs,⁶ not just the sub-set of material that the rules previously required. With respect to equity, the new rules require⁷ the allowance to be set having regard to the prevailing conditions in the market for equity funds. With respect to debt, the AER has alternatives.⁸ One alternative is the 'on the day' method (which takes a focus on the

¹ National Electricity Rules (NER), rules 6.12.1(5) and (5A). Unless otherwise noted, all references to rules or clauses are to the NER

² NER, rule 6.5.2

³ NER, rule 6.5.2(i).

⁴ Oxera, *Aiming high in setting the WACC: framework or guesswork?*, 2015. This is also an important reason why the revenue and pricing principle in section 7(2) of the NEL is consistent with the NEO.

⁵ NER, rule 6.5.2(c).

⁶ NER, rule 6.5.2(e)(1).

⁷ NER, rule 6.5.2(g).

⁸ NER, rule 6.5.2(i).

prevailing conditions in the market for debt funding) and another permits a broader timeframe to be considered which the AER could do by adopting a trailing average method.

6. The new rules do not alter the requirements the National Electricity Law (**NEL**)⁹ that provide that in making the determination in accordance with the rules the AER must exercise its network regulatory functions:
 - In a manner that contributes to the achievement of the National Electricity Objective (**NEO**)—including the promotion of efficient investments for the long term interests of end users of electricity, and
 - Taking into account the revenue and pricing principles which specifically include the principle that network businesses should be provided with a reasonable opportunity to recover at least their efficient costs in providing the regulatory services and complying with their regulatory obligations.
7. The same Australian Energy Market Commission (**AEMC**) rule reform removed the tightly specified requirements for the AER to adopt the SL-CAPM for establishing the permitted return on equity and the ‘on the day’ method for determining the allowance for debt. Further, the previous requirement for there to be persuasive evidence before the AER departed from its previous choice of model parameters has been removed. Instead the AER is required to consider all the available models and evidence in reaching its decision.

1.1.2 THE RATE OF RETURN GUIDELINE

8. A key undercurrent driving the need for rule reform was the inability of the pre-existing tightly specified SL-CAPM to adapt to prevailing market conditions and deliver market reflective rates of return.
9. As required by the rules, the AER has issued rate of return guideline¹⁰ (the **guideline**) concerning its intended approach to applying the new rules. The AER has issued draft decisions in relation to our NSW and ACT electricity distribution counter-parts and concurrently issued draft decisions relating to certain other electricity transmission and gas distribution network businesses.
10. With respect to equity, we are concerned that the AER’s approach set out in the guideline and draft determinations does not conform to the new rules and would not provide a sufficient allowed rate of return for capital. As detailed in this attachment, despite reviewed a great deal of expert analysis concerning a broader range of models and other inputs, in substance the approach adopted delivers outcomes that are barely distinguishable from, and could have been produced by, the previous regulatory regime.
11. Further, the approach is delivering returns on equity that are well below the prevailing market conditions. the AER continues to apply the SL-CAPM as its foundation model which acts as a filter through which all the other material must pass before it is given any weight.

1.2 OUR CONCERNS WITH RECENT AER DECISIONS

12. In a manner that is very closely aligned to the pre-reform approach, the most recent regulatory determinations,¹¹ the AER calculates a 40% (equity) and 60% (debt) blended rate of return by applying the AER’s own ‘Ibbotson’ inspired specification of the Sharpe-Lintner capital asset pricing model (**SL-CAPM**) with a significantly lower ‘beta’ than ever before. Applying this recent approach of the AER to current market data would not result in an efficient rate of return.

⁹ NEL, sections 16(1)(a) and (2)(a)

¹⁰ AER, *Rate of Return Guideline*, December 2013, issued on 17 December 2013, <http://www.aer.gov.au/node/18859>. This guideline was developed as part of the Better Regulation reform program.

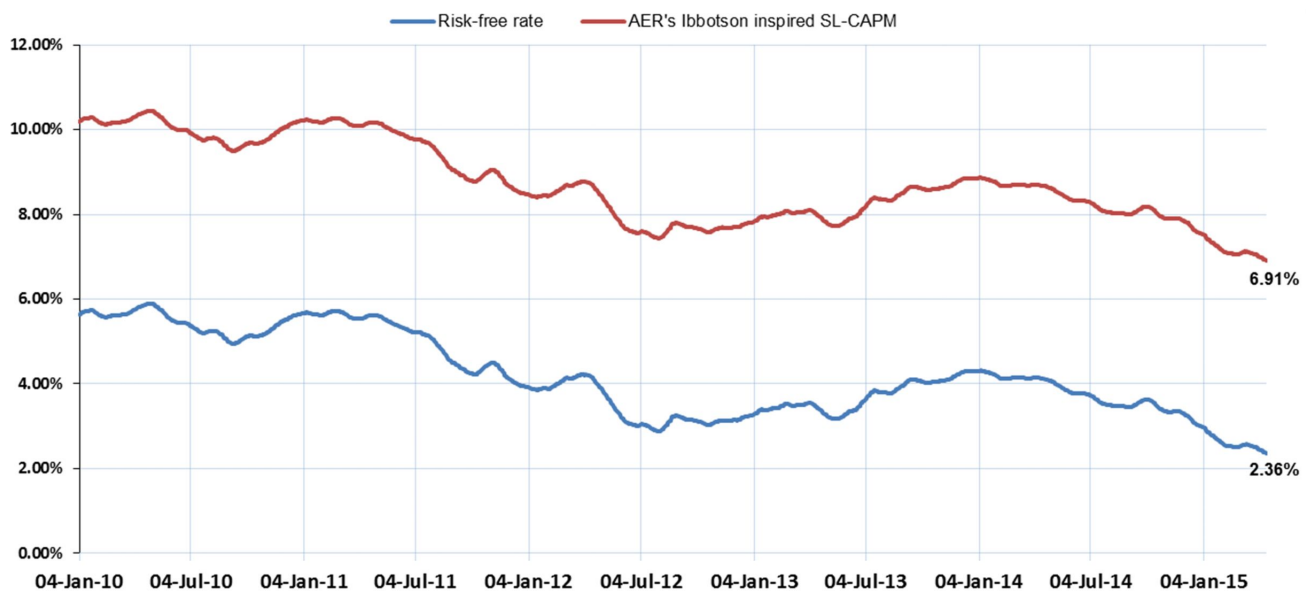
¹¹ For example, AER, *Jemena Gas Networks (NSW) Ltd Access arrangement, 2015–2020*, Attachment 3: Rate of return, November 2014, pp. 8 and 21 (of PDF version).

13. The distinguishing feature of the Ibbotson approach to measuring the historical market risk premium (**MRP**) for use in the SL-CAPM is that its estimates for the rate of return track the risk free rate in perfect parallel and, in current conditions. This means that the estimates for the return on equity have plummeted one-for-one as the Commonwealth Government Securities (**CGS**) yields have fallen.

1.2.1 RETURN ON EQUITY

14. There are a number of ways in which AER regulatory determinations concerning the equity allowance have changed over the last five years.¹² Nevertheless, when assessing whether the current approach is sensible and robust, it is informative to consider what rates of return allowances the method would have delivered if it had been employed over a number of years.
15. Figure 1–1 shows how the AER’s current approach to setting the allowed return on equity is directly related to CGS yields. The blue line shows the yields on CGS and the red line shows the estimated returns using the AER’s method.¹³

Figure 1–1: Historical CGS yields and the Ibbotson inspired SL-CAPM



Source: Reserve Bank of Australia (**RBA**), Jemena Electricity Networks (**JEN**) analysis.

16. The fundamental problem with this approach is that there is no reason to suppose that investors’ required rates of return have dropped in line with CGS yields and the AER allowed return on equity. To ensure that the allowed rate of return is commensurate with market returns, the AER must broaden the estimation methods it takes into account and give them real weight.
17. In fact, the drop in permitted returns is considerably larger because the AER has also lowered the beta to record low levels. Compared with previous determinations the AER’s current approach to the model inputs, and the resulting rate of return for equity, are as set out in Table 1–1.

¹² For instance, for the 2011–2015 period the AER’s determination employed an 0.8 beta compared with a beta of 0.7 today.

¹³ That is, allowed return on equity = risk free rate + beta x MRP = CGS yield + 0.7 x 6.5. The CGS yields are sourced from statistics available from the RBA’s website.

Table 1–1: Previously allowed returns on equity

	Last ESC determination (2005)	First Victorian DB AER determination (October 2010)	Current draft AER determination for NSW DBs (Nov 2014)
Risk free rate	2.64% (real)	5.65% (Nominal)	3.55% (Nominal)
Beta	1.00	0.80	0.70
MRP	6.00%	6.50%	6.50%
Nominal return on equity	11.42%	10.85%	8.10%
Real return on equity	8.64%	8.07%	5.46%

Source: Essential Services Commission (ESC), AER.

18. As discussed in this attachment, our principal objections to the way in which the guideline and recent AER draft determinations set allowances for equity are that:
- **Accounting for risk.** The AER does not correctly assess the degree of risk facing our business as required and as such its approach under-compensates equity holders for the risks they take on when investing in electricity network businesses. As such, the AER is not correctly applying the rate of return objective with respect to risk.
 - **Reliance on a single model.** The AER should not give any model, least of all the SL-CAPM, a central or 'foundation' role in setting an allowed rate of return for equity and, instead, all the four relevant models should be used and a weighted average of the four models should be used as the rules require.
 - **Bias in that model.** Further, the AER's favoured SL-CAPM model is known to be very significantly downwardly biased when estimating returns for stocks assigned a beta of less than 1.0 and there is no basis to conclude that the AER's approach of selecting beta and MRP from the upper ends of its ranges will compensate for that bias which also undermines the achievement of the rate of return objective and is contrary to the revenue and pricing principles.
 - **Inputs to that model.** The SL-CAPM relies on just three inputs—the risk free rate, a beta value and a value for the MRP—and the AER has made significant errors in relation to two of these and as such the rate of return objective cannot be met and is contrary to the revenue and pricing principles.
 - **MRP input.** When applying the SL-CAPM the Ibbotson and Wright approaches to establishing the key 'MRP' parameter are equally valid and each should be used when the SL-CAPM estimate is derived and as such the AER fails to correctly have regard to the Wright approach to setting the MRP.

1.2.2 RETURN ON DEBT

19. With respect to setting the allowance for debt, the AER accepts that in practice prudent businesses ensure that their debt matures on a staggered basis. Progressively over a 10 year period the AER would adopt a trailing average for debt and this should mean that the volatility in the debt allowance in absolute terms, and also the volatility in differences between the regulatory allowance and the actual costs of debt, should be substantially reduced.
20. As such, the combined effect of the AER's allowed rate of return for debt has also plummeted over the last five years even though the AER acknowledges that a benchmark firm in our position will have a significant historical cost to our debt costs.
21. Further, the AER's adoption of an overly optimistic BBB+ credit rating for a 60% leveraged benchmark firm depresses the permitted rates of return below a truly market reflective return which should be based on a BBB credit rating.

22. Table 1–2 shows how the opening debt allowance would drop under the AER’s proposed transition methodology:

Table 1–2: Previously allowed returns on debt

	Last ESC determination (2005)	First Victorian DB AER determination (October 2010)	Current draft AER determination for NSW DBs (Nov 2014)
Risk free rate	2.64% (Real)	5.65% (Nominal)	3.55% (Nominal)
Credit rating	BBB+	BBB+	BBB+
Debt risk premium	1.425%	4.34%	2.96%
Nominal return on debt	6.73%	9.35%	6.51%
Real return on debt	4.07%	6.61%	3.91%

Source: Essential Services Commission (ESC), AER.

23. The AER’s post tax revenue model (**PTRM**) applies the allowed rate of return regulation to the asset base to deliver an allowance in pecuniary terms. An important additional variable in the PTRM used for establishing the second and subsequent years allowance is the expected rate of inflation. There has not been a detailed examination of the way in which inflation is estimated since 2008 and there are some indications that the factual circumstances upon which the current approach is based may have changed. During the course of the regulatory determination process, we will monitor this issue and if necessary put forward further analysis on whether the current approach still meets the requirements of the rules.

1.3 OUR VIEWS ON THE GUIDELINE

24. The rules require that our proposal identify where we propose departures from the guideline, and Table 1–3 summarises these:

Table 1–3: Our proposal compared to the guideline

Element	Guideline position	Our proposal	Rationale for our proposal
Return on equity			
Relevant models to consider	SL-CAPM, Black CAPM, Fama-French three factor model (FFM), and the dividend discount model (DDM).	Adopts the approach in the guideline.	These are relevant models for estimating the required return on equity.
Which models should be used in setting the allowance	Of the four models that the AER accepts are relevant, it only uses the SL-CAPM, Black CAPM and DDM, and not the FFM.	Diverge because we use all four models.	The FFM provides valuable insights and corrects for well-documented biases that are not explicitly considered by other models.

Element	Guideline position	Our proposal	Rationale for our proposal
<p>How the information gleaned from the models should be synthesised.</p>	<p>The SL-CAPM, implemented in the way the AER has in the past, should (continue) to play the central role.</p> <p>Any other information should take a secondary role, at most being used to inform the estimate of one of the SL-CAPM parameters.</p> <p>In many instances, the information is simply being used to guide the choice of a parameter estimate from within a narrow range of values, rather than to contribute to a full, quantitative evaluation of that parameter estimate.</p>	<p>All the relevant information—that is, all four models including the two principal ways to approach the SL-CAPM—should contribute directly to the allowed rate of return for equity as an average weighted according to the specific contributions each model can make.</p>	<p>There is no correct basis for the AER’s Ibbotson inspired implementation of the SL-CAPM to be given the greatest weight, or for it to constrain the extent to which other inputs can affect the computation of the allowed rate of return for equity.</p>
<p>Implementing the SL-CAPM</p>	<p>The SL-CAPM should be implemented using a current risk free rate, a beta of 0.7 and a long term MRP of 6.5%, which is largely guided by historical estimates.</p>	<p>The beta should be, at a minimum, 0.8 and equal weighting should be given to the Ibbotson and Wright approaches to estimating the MRP.</p> <p>When implementing the Ibbotson approach, the MRP should be the arithmetic average for the longest available series—that is 6.56%.</p> <p>The appropriate role for the DGM is as a model to be employed directly in delivering an estimate for the return on equity rather than as an input to estimating the MRP for the SL-CAPM.</p> <p>Combining the above, we propose an MRP of 8.17%.</p>	<p>Network businesses have greater systematic risk than the AER assumes and the SL-CAPM is downwardly biased for low beta stocks and for stocks with a high book-to-market ratio.</p> <p>The Ibbotson and Wright approaches for estimating MRP are based on the same historical data but different methodologies return different estimates—and as such regard should be given to both.</p> <p>When seeking to employ the Ibbotson approach, the AER identifies a historical MRP range of 5.1%–6.5%. The low end of this range is flawed in that it relies on an incorrectly adjusted yield series and irrelevant geometric averages.</p>

Element	Guideline position	Our proposal	Rationale for our proposal
Return on debt			
Trailing average, 'on the day' method or a hybrid.	Setting aside the issue of transition—discussed below—ultimately the debt allowance should be set on the basis of a trailing average.	The proposal endorses, as a matter of principle, that a trailing average approach should be used to determine the estimate of the return on debt, although we consider that the hybrid return on debt is more appropriate for smaller firms like JEN.	This methodology better reflects the practice of a prudent network operator which is to issue debt at intervals and to maintain a staggered debt portfolio.
Nominating averaging periods	<p>The AER requires averaging periods to be nominated for each of the constituent years of the 2016 electricity distribution price review (EDPR) period. Specifically, the period must be specified prior to the commencement of the EDPR period:</p> <ul style="list-style-type: none"> at the time the period is nominated, all dates in the averaging period must take place in the future the averaging period should be as close as practical to the commencement of each regulatory year in a regulatory control period. <p>A period needs to be specified for each regulatory year within the EDPR period.</p>	<p>Averaging periods will be nominated in advance of the year in which it occurs.</p> <p>However, only the first averaging period should be nominated in advance of the EDPR period. Subsequent periods should be nominated using a separate pre-specified process that requires AER approval.</p>	This approach gives the benchmark efficient entity a better opportunity to match its actual costs with the return on debt allowance.
Tenor for benchmark debt portfolio.	10 years	Adopts the approach in the guideline.	There are strong drivers for debt to be raised on a long term and 10 years is the longest current term that is common in the Australian marketplace.

1 — SUMMARY

Element	Guideline position	Our proposal	Rationale for our proposal
Credit rating from Standard and Poor's (S&P)	BBB+	BBB	In both cases the credit rating is established on the basis of a median of a group of comparators but we would exclude Ausnet from the group on the basis that it is majority government owned.
Source of data	Use an independent third data provider. In the recent draft decisions, the AER used a simple average of RBA and Bloomberg data.	For the first averaging period, we would draw the data from the service that performs best when tested against the underlying market data observed at the time the data is needed. For subsequent averaging periods, we adopt the approach in the guideline except if there is a significant divergence between the data drawn from the services and the underlying market data in which case we would apply the method used for the first averaging period. This is consistent with the guideline.	On a number of previous occasions, the figures quoted by various services have diverged significantly from the underlying market data and with 'set and forget' annual updating there is no safeguard against such divergences. The two third party indicator series provide reasonable historical data at present, although this may change over time if methods or data used by those third parties changes.
Provision for the new issue premium	None made.	Without prejudice to whether filling in aspects of the framework not covered by the guideline constitutes a 'departure', we note that our proposal considers a 27 bases point provision for the new issue premium. By not including this provision, our proposed return on debt is conservative. We may review this in our revised proposal.	CEG recommends a new issue premium of 27 basis points.

Element	Guideline position	Our proposal	Rationale for our proposal
Form of transition to a trailing average return on debt	<p>There would be a transition towards the trailing average over two five year regulatory periods.</p> <p>In the first year of the first regulatory period the 'on the day' approach would be accorded a 100% weighting. For each of the next 10 years, a weighted average would be calculated in which the weight accorded to the 'on the day' approach would reduce by 10% compared with the year before. In the second year and subsequent years, 10% of the weighted average would be drawn from the prevailing cost of debt in that year and this figure would then contribute a 10% weighting in each of the next nine years until in year 10, there would be 10% weighting assigned to each of the 10 most recent years.</p>	<p>We adopt a hybrid approach to transition to the trailing average approach over a 10 year period.</p> <p>This makes use of an historical average approach to the measurement of the spread over swap. In addition, swap rates are measured during the averaging period. Swap rates for different tenors are combined.</p>	<p>The hybrid approach was efficient financing practice under the previous rules for a benchmark entity in JEN's circumstances. As such, a transition should start from this practice when transitioning to a trailing average. The hybrid approach corresponds with the debt-raising and hedging practices of privately-owned, regulated distribution businesses</p>

1.4 THE REST OF THE ATTACHMENT

25. This attachment is structured as follows:
- **Risk**—the changing risk profile for electricity distribution businesses (section 2)
 - **Return on equity**—establishing the allowance for the return on equity (section 3)
 - **Return on debt**—establishing the allowance for the return on debt (section 4)
 - **Debt raising costs**—establishing the allowance for debt raising costs (section 5)
 - **Inflation expectations**—establishing the inflation rate (section 6), and
 - **Conclusion**—an illustrative calculation establishing a return on debt using data from period 2 to 30 January 2015 (section 501).

2. THE CHANGING RISK PROFILE FOR ELECTRICITY DISTRIBUTION BUSINESSES

2.1 OVERVIEW

26. The allowed rate of return objective in rule 6.5.2(c) highlights that risk is an important consideration in setting the allowed rate of return for equity and debt. Electricity network operators compete with other businesses to attract investment capital and investors will only provide the investment capital needed for the business if a competitive return is provided that adequately rewards the investors for the risks of that investment.
27. For consumers, it is important that regulatory decisions do not over-reward investors for risk—because prices would be higher than they need to be—and equally that these decisions do not under-compensate businesses for risk—because under-capitalised businesses cannot make required investments or meet required service standards to consumers, and there may also be a greater risk of financial failure.
28. In considering the risk of electricity network investments made during the regulatory control period it is also important to remember that the time frames are long-term. The assets in any electricity network generally last at least 50 years. An important new development is that over the 50 year timeframe it is no longer safe to assume that the network businesses will be natural monopoly businesses across the entirety of their current core business because competition from off-grid solutions is becoming significant. In fact, for some key customer categories in the relevant time frame, grid connection may not be able to continue to compete with these new technologies.
29. The AER's draft decisions proceed on the basis that the businesses are regulated natural monopolies.¹⁴ The draft decisions also assume that an adequate risk-reflective return can be achieved by using a 60:40 gearing ratio, to blend an equity allowance determined using the SL-CAPM as a foundation model with a 'beta' of 0.7 and debt allowance using a benchmark credit rating of BBB+. The draft decisions and the guideline that they apply are largely based on consideration of an analysis of risk by the AER itself and a report from Frontier Economics¹⁵—both undertaken at the time of the AER's guideline development process.
30. It is simply not the case that an adequate compensation for risk can be provided by adopting a beta of 0.7 and credit rating of BBB+ for the benchmark firm, based principally on analysis of historical data.
31. The guideline¹⁶ concluded that electricity and gas networks were low risk base on the Frontier Economics report,¹⁷ but, as discussed in paragraph 105 of SFG's beta report,¹⁸ the Frontier Economics document does not provide support for an equity beta of below 1 and, indeed Frontier Economics does not state that the beta should be below that figure.

¹⁴ AER, *Draft decision for Ausgrid distribution determination 2015-16 to 2018-19, Overview*, November 2014 (pdf version);
AER, *Draft decision for Directlink determination 2015-16 to 2019-10, Overview*, November 2014 (pdf version);
AER, *Draft decision for Endeavour Energy distribution determination 2015-16 to 2018-19, Overview*, November 2014 (pdf version);
AER, *Draft decision for Essential Energy distribution determination 2015-16 to 2018-19, Overview*, November 2014 (pdf version);
AER, *Draft decision for Jemena Gas Networks (NSW) Ltd Access Arrangements 2015-20, Overview*, November 2014 (pdf version);
AER, *Draft decision for Transgrid transmission determination 2015-16 to 2018-19, Overview*, November 2014 (pdf version).

¹⁵ Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia, A report prepared for the AER*, July 2013.

¹⁶ AER, *Rate of Return Guideline, Explanatory Statement, Appendices*; December 2013 (**Guideline Appendices**), p. 42 (pdf version).

¹⁷ Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia, A report prepared for the AER*, July 2013, pp. 21–26.

¹⁸ SFG, *Equity beta*, Report for Jemena Gas Networks, ActewAGL and Networks NSW, 12 May 2014, p. 20.

32. The AER's use of the Frontier Economics' observation that energy network businesses are less risky than the market average fails to acknowledge:
- **New operational risks**—the significant new operational risks arising from disruptive technologies such as solar power, battery storage, smart meters and the user-friendly service innovations that these technologies now enable, many of which had not fully manifested by the time the Frontier Economics' report was published. For the first time in a century, the combined effect of these developments is throwing into doubt the scale, design, direction for growth and longevity of electricity network investments. These are discussed later in this section
 - **High leverage of energy networks**—the implications for the required rate of return for equity when the benchmark efficient entity is taken to have taken on 60% debt funding, a degree of leverage that is considerably higher than the average level of leverage adopted by most businesses. This issue was not directly analysed by Frontier Economics' which focused on operational risks.
33. Further, the draft decisions suggest that in addition to recompensing the business for risk through the product of beta (0.7) with the MRP (6.5%), the business is further insulated from risk because:
- There is a constrained ability for the regulator to remove assets from the regulatory asset base through 'optimisation' assessments, and that asset utilisation and cost recovery risks are recompensed through this form of protection for 'cash flows'—which was considered by Frontier Economics, but which is not an issue that is wholly within the relevant expertise of an economic expert
 - The regulatory determination will adopt a revenue cap as opposed to a price cap—which was not considered by Frontier Economics.
34. The AER does not have a proper basis for concluding that these mechanisms are effective in controlling the operational risks discussed in this section and the amplifying effect of a high leverage assumption. This is particularly so if the number of disconnections calls into question the willingness or ability of the remaining customers to pay for not only 'common use' assets but potentially even stranded assets that were put in place solely to service customers who have disconnected.

2.2 EVOLVING OPERATING RISK PROFILE

2.2.1 TRADITIONAL THINKING

35. In considering the risk of electricity network investments made during the regulatory control period it is important to remember that the time frames are long-term timeframes. The assets in any electricity network generally last at least 50 years.
36. Since the beginning of the National Electricity Market (**NEM**), the AER and its predecessors have considered that electricity network businesses have lower risk and, indeed, the returns permitted have been declining over time.¹⁹
37. For at least a century, the principal characteristics of the electricity system have not changed: the most cost effective way to manage load reliably has been to connect almost everyone to the interconnected network that provides access to centralised generation. Alternatives, including wind farms and hydro-electric power are more discrete and recent. Throughout the 20 years that the economic regulation has applied through the NEM,

¹⁹ For instance, see: AER, *Rate of return guideline, Explanatory statement*, December 2013.

2 — THE CHANGING RISK PROFILE FOR ELECTRICITY DISTRIBUTION BUSINESSES

demand has been consistently growing in a way that is less volatile than many other industries and technological change has been slow. In some ways the regulatory framework has assisted in reducing risk.²⁰

2.2.2 NEW CHALLENGES

38. However, the risk of electricity network businesses has changed dramatically in the very recent past in ways that were not considered as recently as the 2013 report commissioned by the AER from Frontier Economics as part of the guideline consultation process. Essentially electricity distribution businesses are now confronted with two possible future scenarios, one in which we evolve and survive and the other in which our network progressively becomes redundant. In this section of the submission we explain how the risks we face have substantially changed.
39. Section 3 of our regulatory proposal explains these changes in detail and their impact on JEN specifically. Section 2.3 below explores new technologies and their effect on electricity distribution, while section 2.4 looks at how this affects risk facing the benchmark efficient entity.

2.3 CHANGES TO ELECTRICITY DISTRIBUTION

2.3.1 NEW TECHNOLOGIES

2.3.1.1 Solar panels

40. First, we consider solar panels as the main example of dramatic developments in distributed generation.²¹ Solar panels have been available since the 1970s but they played almost no part at all in supplying electricity to the grid-connected mass market in the ensuing 30 years because the technologies used to manufacture them were price prohibitive.
41. In recent times, prices of solar cells have been falling rapidly. Since 1998, reported solar system prices have fallen by 6–8% per year on average and by 12%–15% from 2012–2013, depending on system size.²² This change largely occurred because of governmental policies in Germany and Italy to encourage the installation of solar panels.²³ With vastly increased sales volumes, manufacturers in Europe and China invested heavily in technology to reduce solar panel costs and invested in much larger scale, low cost manufacturing facilities. Since 2008, prices of the panels themselves have dropped 80%.
42. The Lawrence Berkeley National Laboratory, has reported that:²⁴

module prices began a steep descent in 2008, falling by \$2.7/W in real 2013 dollars from 2008 to 2013 and constituting 67% of the total \$4.0/W decline in the installed price of 10 kW systems over that period.

²⁰ For example, NER. Chapter 6 generally and the provisions at clause S6.2.2A (of schedule 6.2) in particular, tightly constrain any write-offs or write-downs (also known as 'optimisation').

²¹ As noted on page 7 of Accenture, *Forging a Path towards a Digital Grid, Global perspectives on smart grid opportunities*, 2013, smaller-scale wind is another distributed technology to which this discussion applies.

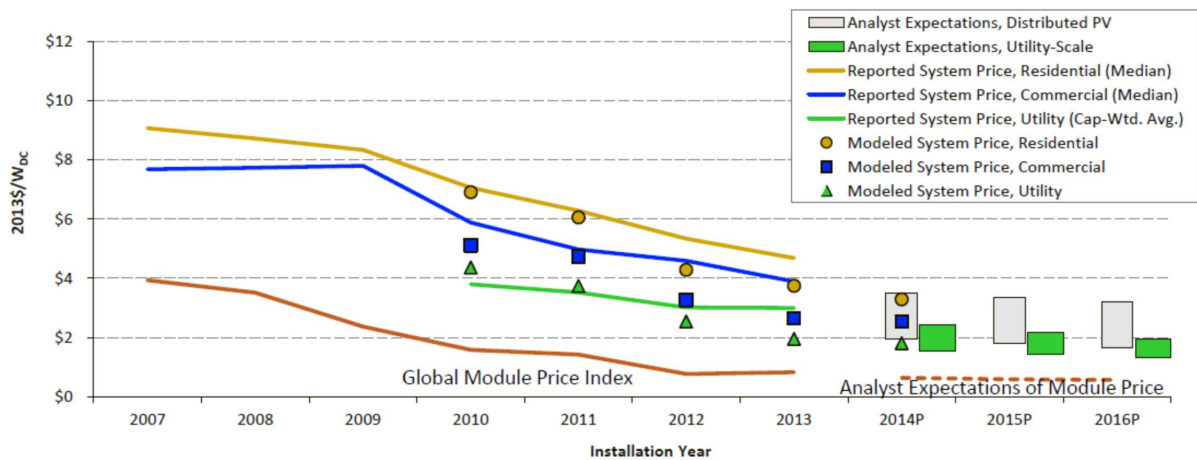
²² D Feldman, G Barbose, R Margolis, T James, S Weaver, N Darghouth, R Fu, C Davidson, S Booth, and R Wiser, *Photovoltaic System Pricing Trends, Historical, Recent, and Near-Term Projections*, 2014 Edition, September 22, 2014 U.S. Department of Energy SunShot

²³ Today those two countries account for approximately 50% of the world's 100GW installed capacity.

²⁴ Galen Barbose, Samantha Weaver, Naim Darghouth, *Tracking the Sun VII An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2013*, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, September 2014, p. 15.

43. Figure 2–1 depicts these declining prices.

Figure 2–1: Reduction in solar panel prices



Source: Feldman et al.²⁵

44. The effect of dramatically lower global solar installation prices is that global businesses are aggressively marketing solar systems in Australia.²⁶

2.3.1.2 Smart technology

45. The second significant development concerns ‘smart’ technology—smart grids and smart meters, for example—that enables better management and control by the consumer of when and how they consume electricity. To date, this has been conceived of as being a technology to improve the performance of the traditional grid connected power industry but many of the same technologies will be able to be used with or without grid connection.

46. Some smart grid projects have been launched in Australia already,²⁷ and we can only anticipate that more projects will be undertaken in the future. Smart meters have been rolled out comprehensively in Victoria, and consumers can elect to be billed on a ‘flexible pricing’ basis,²⁸ which allows consumers to better manage their energy usage and thereby reduce their energy bill.

47. Indicative of the effect of these technologies, for the first time, since before the advent of economic regulation, AEMO²⁹ has reported lower demand:³⁰

The NEM in 2013–14 generated 194 terawatt hours (TWh) of electricity—a 2.5 per cent reduction from the previous year, and 3 per cent below forecast.

²⁵ D Feldman, G Barbose, R Margolis, T James, S Weaver, N Darghouth, R Fu, C Davidson, S Booth, and R Wisner Photovoltaic System Pricing Trends, *Historical, Recent, and Near-Term Projections* 2014 Edition September 22, 2014 U.S. Department of Energy SunShot.

²⁶ Mr T. Werner, CEO of global solar power conglomerate, SunPower recently stated that ‘The economics of solar work better in Australia than in America’, per *SunPower says Australia could be global leader in local generation*, *RenewEconomy*, 29 April 2014.

²⁷ See Smart Grid Smart City project, <http://www.smartgridsmartcity.com.au>.

²⁸ See State Government of Victoria, *Flexible Pricing*, <http://www.smartmeters.vic.gov.au/flexible-pricing>.

²⁹ AEMO, *South Australian Electricity Report*, 28 August 2013.

³⁰ AER, *State of the Energy Market*, 2014 p. 5.

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2.3.1.3 Power storage

48. The third significant factor to consider concerns power storage, most notably batteries and super capacitors. As Paul Graham, chief economist of the CSIRO Energy Flagship has commented,³¹ it is unclear how long it will be before power storage systems can be said to be affordable—and thus game-changing. The forum's report states:³²

Although currently regarded as too expensive for large-scale applications, sustained investment in materials manufacture and technological development could mean electricity storage plays a future game-changing role in many aspects of the electricity system.

49. And:³³

The current high levels of investment in battery technology for various applications, such as electric vehicles, makes it reasonable to assume that electricity storage will cost less in the future, but how much less is uncertain. The International Energy Agency (2012) projects the costs of batteries for electricity vehicles will halve by 2020.

50. Indeed, the state of technology in the power storage industry is likened to that of the solar panel industry in 2008, before the substantial price falls:³⁴

Developments like the Tesla "Gigafactory" will be a game changer and will help bring costs down. [SunPower CEO Tom Werner] says battery storage is at a similar stage to solar five years ago, just before its massive cost fall.

51. Similar to the solar panel market, price reductions of power storage systems are resulting from a race between global manufacturers to improve production technology and scale economies in manufacturing to win large-scale new business opportunities in industrialised countries.
52. For example, European Union air quality directives have contributed to each of the City of Paris and the City of London letting contracts for shared car schemes each of which will have 3,000 electric cars³⁵ to replace 22,000 privately owned petrol vehicles in their cities. The French based global power storage conglomerate (Bollere) bid aggressively to win each of these contracts primarily in order to 'prove up' the economics of deploying its lithium metal polymer (LMP) battery on a large scale.
53. Bollere's LMP is just one of several competing storage technologies that are attracting substantial investments. Other significant energy storage projects include NaS batteries (Presidio, U.S., and Rokkasho Futamata Project, Japan), Vanadium redox flow (Sumitomo's Densetsu Office, Japan), Lead acid (Notrees Wind Demonstration Project, U.S.) and Li-ion (AES Laurel Mountain, U.S.).³⁶

³¹ CSIRO, *Change and Choice: The Future Grid Forum's Analysis of Australia's potential electricity pathways to 2050*, December 2013, p. 30.

³² CSIRO, *Change and Choice: The Future Grid Forum's Analysis of Australia's potential electricity pathways to 2050*, December 2013, p. 30.

³³ CSIRO, *Change and Choice: The Future Grid Forum's Analysis of Australia's potential electricity pathways to 2050*, December 2013, p. 30.

³⁴ Mr T. Werner, CEO of SunPower, per 'SunPower says Australia could be global leader in local generation', *RenewEconomy*, 29 April 2014.

³⁵ There are already 2,000 such cars deployed under this contract in Paris (<https://www.autolib.eu/en/our-commitment/urban-revolution/>).

³⁶ See International Energy Agency, *Technology Roadmap: Energy Storage* 2014, p. 18.

54. Australia is a member of the OECD's sister organisation, the International Energy Agency, which published an authoritative report this year recognising that energy storage is beginning to play a part in mainstream electricity supply. A key conclusion of the report is that:³⁷

*Energy storage technologies are valuable in most energy systems, with or without high levels of variable renewable generation. Today, some smaller-scale systems are cost competitive or nearly competitive in remote community and off-grid applications... Public investment in energy storage research and development has led to **significant cost reductions**. However, additional efforts (e.g., targeted research and development investments and demonstration projects) are needed to **further decrease energy storage costs and accelerate development**. [Emphasis added]*

55. Clearly businesses are already investing vast sums in research, development and the manufacture of power storage technology, and many more companies will likely follow. For example, a future power storage project is being undertaken by Tesla Motors. Tesla Motors is investing over \$5bn into the Tesla 'Gigafactory'³⁸—a battery manufacturing facility in the United States due to begin producing Lithium-ion batteries in 2020. Interestingly, Tesla has a history of releasing their patents to the public,³⁹ and perhaps Tesla will release their Lithium-ion patents in the future. Doing so would pave the way for local Australian producers to begin manufacturing powerful batteries with ostensibly no R&D costs, having the effect of flooding the local market with a cheap and reliable battery capable of partially replacing the consumer's need for grid electricity.
56. These innovations are a direct challenge to our business model and tangibly increase the risk of operating in the industry.

2.3.2 THE EFFECT ON NETWORKS

57. Taken separately, each of the above developments—reduced costs for distributed generation, reduced costs for energy storage and the improved ability for consumers to manage their consumption—pose their own types of new risk for power network operators. Taking each in isolation it is possible to envisage that investors in energy networks might be immunised from risk as the guideline suggests, because inherent in the way these regulations work is that the significant majority of customers have a clear incentive to stay connected to the grid.
58. However, when these three factors combine it calls into question whether customer disconnections from the grid might be significant enough to put at risk the viability of the whole regulated price recovery system. Customers connect to the grid and stay connected for two main reasons—to gain access to cost competitive generation and to have access to a reliable supply of electricity as and when they need electricity.
59. The risk that now looms within the relevant 50 year investment horizon is that a significant number of customers may disconnect from the grid and instead install solar panels or other distributed generation combined with battery storage—either on an individual basis or in clusters linked to new micro-grids. The important point is that the future is uncertain. While energy network businesses do generally consider that they will provide a valuable service to a large number of customers for an enduring period, there are other possible scenarios that also weigh on investors' minds. To the extent that these scenarios are ascribed any material probability of occurring, they will negatively affect the extent to which network business revenues are considered certain.
60. The NEM's Consumer Advocacy Panel funded the preparation of a report *What Happens When We Un-Plug* that studied whether it might be cost effective for consumers in Bendigo, Werribee and Melbourne to disconnect

³⁷ International Energy Agency, *Technology Roadmap: Energy Storage*, 2014.

³⁸ See Tesla Motors, http://www.teslamotors.com/sites/default/files/blog_attachments/gigafactory.pdf.

³⁹ See: Tesla Motors, <http://www.teslamotors.com/blog/all-our-patent-are-belong-you>; and The Guardian, 'Tesla Motors to open source its technology', 13 June 2014, <http://www.theguardian.com/technology/2014/jun/13/tesla-open-source-technology>.

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individually or in clusters.⁴⁰ It was found that it was already economic for some customers to disconnect and for most others it will become economic to do so before 2020. We do not agree that these are the report's scenarios will occur but we cannot prove to equity markets that they have a nil probability occurring.

61. We consider that other more moderate scenarios are more likely but these too predict significant new off-grid competition—or even some customers for which grid connection will no longer be competitive—and therefore a potentially significant change to our business over the life of the investments we are being asked to make today.
62. Certainly other businesses are already investing on the basis that they will provide off-grid solutions by-passing network operators altogether for certain customer categories.⁴¹

SunPower itself is looking at deploying systems that combine solar PV and storage and will soon announce its first pilot schemes in Australia, likely to be rolled out through its partly owned local retailer Diamond Energy. It is also looking at microgrid solutions in Australia, although it sees the biggest potential in the commercial roof top market...

*'We do not know how it will evolve. It will be messy, that's what we do know,' Werner says. 'But it is great to be in our position because we are a **disruptor**.'* [Emphasis added]

63. Investment analysts are already downgrading electricity utility bonds in other countries in response to this risk:⁴²

Electric utilities ... are seen by many investors as a sturdy and defensive subset of the investment grade universe. Over the next few years, however, we believe that a confluence of declining cost trends in distributed solar photovoltaic (PV) power generation and residential-scale power storage is likely to disrupt the status quo. Based on our analysis, the cost of solar + storage for residential consumers of electricity is already competitive with the price of utility grid power in Hawaii. Of the other major markets, California could follow in 2017, New York and Arizona in 2018, and many other states soon after...

*In the 100+ year history of the electric utility industry, there has never before been a truly cost-competitive substitute available for grid power. We believe that solar + storage **could** reconfigure the organization and regulation of the electric power business over the coming decade. We see **near-term risks** to credit from regulators and utilities falling behind the solar+ storage adoption curve and **long-term risks** from a comprehensive re-imagining of the role utilities play in providing electric power. [Emphasis added]*

2.4 CHANGING RISK

2.4.1 CURRENT ASSUMPTION

64. It is apparent from the discussion above how difficult it can be to forecast the numbers and speed of disconnections because they are influenced by unpredictable technological changes prompted in large part by government environmental policies in other countries as well as local geography and local governmental policies.

⁴⁰ Szatow T and D Moyse; *What Happens When We Un-Plug? Exploring the consumer and market implications of viable, off-grid energy supply*, 10 February 2014, Energy for the People with the Alternative Technology Association.

⁴¹ Mr T. Werner, CEO of SunPower, per: *SunPower says Australia could be global leader in local generation*, RenewEconomy, 2014.

⁴² Barclays credit strategy team per Barron's Income Investing, 2014.

65. Indeed our business would be less risky if we knew that certain customers will choose to self-supply from a particular date and others would continue to gain value from staying connected. If such certainty existed, we could design our network augmentations and replacement program on that basis.
66. The guideline also suggests that our business is low risk because our assets are not subject to being 'optimised'—that is, written off if they are not fully used.⁴³ Additionally, through the mechanism of tariff classes, to some extent we are able to differentiate in pricing to provide incentives for marginal customers to stay connected but that mechanism only operates effectively if an even narrower range of customers can carry all the redistributed costs of the unused infrastructure, which certainly cannot be assured.

2.4.2 A NEW RISK PROFILE

67. Each of the above mechanisms assumes that we continue to have a large connected customer base that can absorb these costs. Electricity industry commentators often refer to a 'tipping point' or a 'point of inflection' or even a 'death spiral', where the regulated pricing system becomes unsustainable and an endless spiral of disconnections commences.⁴⁴
68. The 'death spiral' theory posits that if a significant number of customers find that distributed generation and power storage is more cost effective than staying connected, then the network prices for those who remain connected would rise to recover the costs of the infrastructure no longer used for the customers who had disconnected. As the prices are raised, it creates the incentive for another group of customers to disconnect and so on until there is not a sufficient customer base to be able to cover the costs of the whole system.
69. Again, the point here is not that we subscribe to the notion that our business will die but rather:
- The future is uncertain and no scenarios can be ruled out, and
 - It cannot be assumed that the current regulatory system as it currently exists will continue to be effective in redistributing the costs of stranded assets amongst our customers.
70. In other words, there is a chance that the current regulatory system may not survive during the life of the assets we are being asked to invest in.
71. A particular risk that we face in Victoria arises from the high levels of gas penetration which, at more than 90%, eclipse the rates in any other State or Territory.⁴⁵ When a household has gas heating, hot water and cooking, a smaller number of PV panels will satisfy the smaller electricity demand compared with a household in which all its major appliances are electrical, and a smaller battery storage capacity would enable disconnection from the grid altogether. Similarly, if there are disconnections from the grid, the regulatory arrangements would seek to recover the stranded cost from the remaining customers and, because most of them have gas connected too, they would be asked to carry a high per kW cost, in turn creating inequity and further incentives to disconnect.

2.4.3 EFFECT ON THE RATE OF RETURN

72. Because the rate of return objective requires that the allowed rate of return must be commensurate with the efficient financing costs of a benchmark entity with a similar degree of risk as that which applies to us, it is incumbent upon the AER to engage with the above material and identify how these risks are accommodated in the overall allowed return on capital.

⁴³ AER, *Rate of Return Guideline*, Explanatory Statement, pp. 55–56: 'For electricity network service providers once the assets are included in the RAB, assets cannot be optimised out under the NER.'

⁴⁴ For example, see article by Faye Griffiths, 23 April 2014 writing in *Business Spectator*.

Also see: Accenture 2013, *Forging a Path toward a Digital Grid Global perspectives on smart grid opportunities*, p. 21.

⁴⁵ AER 2014, *State of the Energy Market*, p. 110.

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73. In particular:

- It is not safe to base forward looking risk assessments on historical information
- It is not correct to infer from the Frontier Report that a benchmark business with a 60% leverage has a beta below 1
- The regulatory arrangements providing for optimisation and a move to a revenue cap may tend to control some risks but there is no basis to conclude that they result in a beta below 1
- There is an upward directional trend concerning our business's risk at the same time that the directional trend of the AER's regulatory decision making is in the opposite direction, and
- There is a high likelihood that permitted returns will fall materially below market rates if the regulatory determination fails to acknowledge increased risks and instead employs historical assessments of beta and combining this with a model such as the SL-CAPM is acknowledged to be downwardly biased for stocks with beta below 1.

74. By contrast, our equity proposal employs all the relevant models and principal methods of implementing them. Some of these approaches are forward looking and some historically based and unlike the AER they do not drive the regulatory determination in a direction that is contrary to the underlying evolution of the risks facing the business.

75. The change in risk for energy networks also supports our proposals to retain an equity beta for the SL-CAPM of 0.8 and adopt a credit rating of BBB (see sections 3.1.5.3. and 4.4.1).

3. RETURN ON EQUITY

76. Since it is assumed that a benchmark entity in our position would be efficiently financed using 40% equity and 60% debt, the AER needs to set an allowed rate of return to reflect the costs of equity capital employed in the business. Stock markets—and equity markets more generally—are notoriously volatile and unpredictable and finance market experts have developed models to assist in the task of establishing benchmark rates of return.
77. The two main ways that this is done are either through capital asset pricing models or dividend growth models. In the past, Australian regulators have used capital asset pricing models and US regulators have tended to use dividend growth models.
78. As noted in the introduction to this chapter, the rules require the AER to have regard to the relevant models and other inputs that are available when setting the allowed rate of return for equity. As explained in detail in this section 1.3, we are concerned that the AER's approach as set out in its guideline and recent draft decisions to evaluating and using the available material is deeply flawed and that a very different approach is needed.
79. In the past, the AER has always used the SL-CAPM for setting rates of return for electricity distribution businesses in the past but there is now a vast array of evidence that shows the significant shortcomings of the SL-CAPM and the superior usefulness of other models. The shortcomings of the SL-CAPM are significantly exacerbated when it is implemented using current low government bond yields and a MRP based on a long term average. Indeed the SL-CAPM is very poor at explaining the movement in returns over time and produces estimates that are systematically biased downwards for assets with betas of less than one and for assets with high book-to-market ratios—such as the benchmark entity.
80. The SL-CAPM's downward bias is considerably exacerbated in the current times of low official interest rates if the model is implemented using current CGS yields with an MRP that does not reflect prevailing market conditions.
81. Under old rule 6.5.2, the AER implement the SL-CAPM in a narrowly defined way which would have essentially required the AER to combine current very low CGS bond yields with an MRP that does not reflect prevailing market conditions and, therefore, it would have been difficult to achieve a rate of return that is commensurate with the prevailing return on equity funds without making compensating adjustments. However, according to the new rule 6.5.2, the AER has a broader degree of discretion as to which models and other inputs to use and it can exercise this discretion to give significant weight to methods that do not suffer from the flaws of the SL-CAPM implemented using current CGS yields and a long run risk premium.
82. However, the guideline and recent draft decisions indicate that the AER's approach that continues to give primary weight to the SL-CAPM deviates from the requirements of the new rules that regard be had to a broader range of inputs in reaching a decision that is in line with the prevailing efficient return on equity. While the AER's documents records that a detailed process of examining the submissions put to by interested parties, very little of this material is actually used to calculate the allowed rate of return save the SL-CAPM. All the other information is either given no weight or is used in a highly constrained way so that it contributes very little to the final result.
83. We are concerned that the AER's approach does not comply with its statutory obligations by:
- Continuing to put the worst performing of the available models—the SL-CAPM—centre stage by employing it as the 'foundation model'
 - Having insufficient regard to much of the material presented by, in some cases expressly assigning zero weight to the material—FFM—or in other cases, adopting an approach that highly constrains the ability of relevant information to contribute to the 'bottom line' rate of return for equity—the limited and indirect role assigned to the DGM and Black CAPM

- Using the SL-CAPM as a filter through which all other information must first pass before it can have any bearing on the permitted rate of return and this approach significantly curtails the manner and degree to which the other information can contribute to the allowed rate of return, and
- Making errors in applying the SL-CAPM.

84. This section explores these issues in detail as follows:

- Section 3.1.1 introduces the models that are relevant in estimating the return on equity
- Section 3.1.2 summarises the approach in the guideline
- Section 0 identifies the key reasons why the approach in the guideline is delivering an unacceptably low return on equity and does not comply with the requirements of the rules
- Section 3.1.4 sets out JEN's proposed approach to the return on equity, and
- Section 3.1.5 provides an illustrative calculation using current market data.

3.1.1 IDENTIFY AND COMPARE THE RELEVANT MODELS AND ANY OTHER RELEVANT EVIDENCE

85. As noted by the AEMC, there is no single model that is preferable as being free of weaknesses or that captures all of the strengths of others.⁴⁶

There are a number of other financial models that have varying degrees of weaknesses. Some of the financial models that have gained some prominence include the Fama-French three-factor model, the Black CAPM, and the dividend growth model. Weaknesses in a model do not necessarily invalidate the usefulness of the model. Ultimately, it is important to keep in mind that all these financial models are based on certain theoretical assumptions and no one model can be said to provide the right answer.

Given that there are other financial models and methods for estimating the cost of equity capital that vary in their acceptance academically and consequent usage by market practitioners, restricting consideration to the CAPM alone would preclude consideration of other relevant estimation methods.

*The Commission is of the view that **estimates are more robust and reliable if they are based on a range of estimation methods, financial models, market data and other evidence.** A framework that eliminates any relevant evidence from consideration is unlikely to produce robust and reliable estimates, and consequently is unlikely to best meet the NEO, the NGO and the RPP.*
[Emphasis added]

86. Consequently, the AEMC decided that the new rule 6.5.2(e) should require the AER to have regard to all the relevant models, financial methods, market data and other evidence available.

87. Because the requirement to have regard to all the relevant models and other inputs is new, as well as considering the issue from first principles, it is also informative to consider how the same exercise occurs in the United States.

⁴⁶ AEMC, *Draft Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, August 2012, p. 47.

88. In 1944, the US Supreme Court established the equivalent of the AEMC's rate of return objective and, indeed, indirectly this is the source of the language used in the AEMC's objective:⁴⁷

The return to the equity owner should be commensurate with the return on investments in other enterprises having corresponding risks.

89. The US Supreme Court also explained how this should be applied in order to meet broader policy concepts that in the Australian system appear in the NEO and the revenue and pricing principles (RPP):⁴⁸

That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, as to maintain its credit and to attract capital.

90. Since that time the predominant model used in the United States applying the above requirements has been the dividend discount model but each of the following models have also been used and we agree with the conclusions of the guideline that these are the relevant financial models today:

- SL-CAPM
- Black-CAPM
- FFM,⁴⁹ and
- DDM.

91. SFG Consulting (SFG) provides a good summary as to why these four models constitute the relevant field of techniques for estimating a market based return on equity:⁵⁰

In our view, these four models all provide evidence that is relevant to the estimation of the required return on equity for the benchmark efficient entity. We reach this conclusion for the following reasons:

- a) **All four models have a sound theoretical basis.** *The Sharpe-Lintner CAPM, Black CAPM and Fama-French model are all based on the notion that the expected return on any asset is equal to a linear combination of the returns on an efficient portfolio and its zero covariance portfolio. This basic theoretical framework is the same for all three models, which differ only according to the way the efficient portfolio and the zero-covariance portfolio are determined. For example, under the Fama-French model the efficient portfolio is formed by combining three factor portfolios, whereas under the Sharpe-Lintner CAPM and Black CAPM the market portfolio (proxied by a stock market index) is assumed to be efficient. The Sharpe-Lintner CAPM further assumes that investors can borrow and lend as much as they like at the risk-free rate. The dividend discount model is based on the notion that the current stock price is equal to the present value of expected future cash flows (dividends).*
- b) **All four models have the purpose of estimating the required return on equity as part of the estimation of the cost of capital.** *This point is not weakened by the fact that the models can be used to inform other decisions as well. For example, the Sharpe-Lintner*

⁴⁷ *FRC v Hope Natural Gas Co.*, 320 U.S.591 (1944) at [603].

⁴⁸ *FRC v Hope Natural Gas Co.*, 320 U.S.591 (1944) at [603].

⁴⁹ Although the AER found the FFM to be relevant, its guideline proposes to give it no role. See page 13 of the guideline. AER, *Rate of Return Guideline*, December 2013.

⁵⁰ SFG, *The required return on equity for regulated gas and electricity network business*, A report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks, 6 June 2014.

CAPM and the Fama-French model can also be used to compute “alpha” for the purpose of mutual fund performance evaluation.

- c) **All four models can be implemented in practice.** *For all four models, there is a long history and rich literature concerning the estimation of model parameters. This literature has developed empirical techniques, constructed relevant data sets, and considered issues such as the trade-off between comparability and statistical reliability.*
- d) **All four models are commonly used in practice.** *Some form of CAPM is commonly used in corporate practice and by independent expert valuation practitioners. The Black CAPM is commonly used in rate of return regulation cases in other jurisdictions (where it is known as the “empirical CAPM”). The dividend discount model is also commonly used in rate of return regulation cases in other jurisdictions (where it is known as the “discounted cash flow” approach). The Fama-French model has become the standard method for estimating the required return on equity in peer-reviewed academic papers and its use to estimate the required return on equity is required knowledge in professional accreditation programs. [Emphasis is theirs]*

- 92. Other information—such as expert reports prepared in the context of assessing whether corporate takeover offers are ‘fair’ and surveys of practitioners—could be used if the quality is dependable and the context for why that material was prepared is considered. To the extent that these other sources are of any use, their value is to illustrate how the above models are implemented and combined in practice to deliver timely estimates of value or return.
- 93. Along with a number of other energy network businesses, JEN has commissioned a series of detailed reports from a number of leading experts to explore the strong and weak characteristics of each model. The first set of relevant reports was provided by the Energy Networks Association as part of the consultation process on the guideline.⁵¹

⁵¹ See: NERA, *Review of cost of equity models*, A report for the Energy Networks Association, June 2013;
 NERA, *Estimates of the [Black CAPM] zero beta premium*, A report for the Energy Networks Association, June 2013;
 NERA, *The market, size and value premiums*, A report for the Energy Networks Association, June 2013;
 NERA, *The Fama-French Three-Factor Model*, A report for the Energy Networks Association, October 2013;
 NERA, *The Market Risk Premium: Analysis in Response to the AER’s Draft Rate of Return Guidelines*, A report for the Energy Networks Association, October 2013;
 CEG, *Estimating the return on the market*, June 2013;
 CEG, *Estimating E[Rm] [expected return on the market] in the context of regulatory debate*, June 2013;
 CEG, *Information on equity beta from US companies*, June 2013;
 CEG, *AER equity beta issues paper: International comparators*, October 2013;
 SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013;
 SFG, *Evidence on the required return on equity from independent expert reports*, A report for the Energy Networks Association, 24 June 2013;
 SFG, *Regression-based estimates of risk parameters for the benchmark firm*, 24 June 2013;
 SFG, *The Vasicek adjustment to beta estimates in the Capital Asset Pricing Model*, 17 June 2013;
 SFG and Monash University, *Comparison of OLS and LAD regression techniques for estimating beta*, 26 June 2013;
 SFG and Monash University, *Assessing the reliability of regression-based estimates of risk*, 17 June 2013;
 SFG, *Reconciliation of dividend discount model estimates with those compiled by the AER*, 10 October 2013;
 SFG, *Letter: Water utility beta estimation*, October 2013; and
 Incenta Economic Consulting, *Term of the risk free rate for the cost of equity*, A report for the Energy Networks Association, June 2013.

94. Since the publication of the guideline, SFG has prepared a suite of reports, which explore in detail a series of issues raised in the explanatory statement that accompanied the guideline. A report prepared by SFG dated 12 May 2014⁵² addresses the issues raised in connection with the equity beta in the context of the SL-CAPM. Another three reports⁵³ focus on the issues raised in relation to each of the other financial models and a fifth report⁵⁴ addresses how to set a single allowed rate of return figure for equity using the above inputs. In February 2015 SFG has written further reports on each of the above topics in response to the suite of draft determinations that the AER issued in late 2014.⁵⁵
95. NERA has also prepared reports that provide important insights into the empirical performance of the SL-CAPM, the AER's variation on the SL-CAPM and the Black CAPM⁵⁶ and into historical estimates of the MRP.⁵⁷
96. Incenta has provided two reports, one prepared for submission to the AER as part of the first group of decisions to be made under the new rules released in late 2014 and another in response to those draft decisions.
97. Grant Samuel has extensive experience undertaking valuations in the context of stock market acquisitions and it has provided its views on the AER's approach, and specifically the AER's mischaracterisation of its independent expert report for Envestra.⁵⁸
98. The key characteristics of the models follow.

3.1.1.1 SL-CAPM

99. The SL-CAPM is the model with which Australian economic regulators are most familiar and it has been required since the beginning of the NEM. This model estimates a return on equity by adding a margin for risk to the risk free rate. For the investment in question—in this case the benchmark efficient firm—the risk margin is the product of:
- A generalised estimate of the average reward for risk that investors expect on a fully diversified portfolio—that is, the MRP, and
 - The 'beta'—which is a measure of the extent to which the investment in question carries non-diversifiable risk.

⁵² See: SFG, *Equity beta*, A report for Jemena Gas Networks, ActewAGL and Networks NSW, 12 May 2014.

⁵³ See: SFG, *Cost of equity in the Black Capital Asset Pricing Model*, Report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 22 May 2014;

SFG, *The Fama-French Model*, A report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA Power Networks, 13 May 2014; and

SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, A report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, Transend and TransGrid, 15 May 2014.

⁵⁴ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015.

⁵⁵ See: SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy, 18 February 2015;

SFG, *Using the Fama-French model to estimate the required return on equity*, 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, 13 February 2015; and

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.

⁵⁶ NERA, *Empirical Performance of the Sharpe-Lintner and Black CAPM*, A Report Jemena Gasworks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SAPower Networks and United Energy, February 2015.

⁵⁷ NERA, *Historical Estimates of the Market Risk Premium*, February 2015.

⁵⁸ Grant Samuel, *Letter to the Directors of TransGrid*, 2 January 2015.

100. It is also commonly used in most other infrastructure revenue regulatory frameworks. SIRCA states:⁵⁹

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 CAPM's 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.

101. However, the model has theoretical weaknesses—most notably the unrealistic assumption that investors can borrow and lend at the risk free rate in the quantities they wish. Further, empirical studies have consistently found the performance of this model to be poor. As SFG explains:⁶⁰

In particular, stocks with low beta estimates earn higher returns than predicted by the Sharpe-Lintner CAPM, and stocks with high beta estimates earn lower returns than predicted by the Sharpe-Lintner CAPM. This empirical result has been documented in literature over 50 years The poor empirical performance of the Sharpe-Lintner CAPM likely occurs for two reasons. First, risks other than systematic risk are incorporated into share prices (in particular, stocks with a high book-to-market ratio persistently earn higher returns than stocks with a low book-to-market ratio). Second, the common measurement of systematic risk – the regression coefficient of excess stock returns on market returns – is an imprecise measure of risk.

102. And:⁶¹

The model tends to underestimate the mean returns to low-beta assets, value stocks and, in the US and some other countries, low-cap stocks. A value stock is a stock that has a high book value relative to its market value or, identically, a low market value relative to its book value. A growth stock is a stock that has a low book value relative to its market value or, identically, a high market value relative to its book value.

103. NERA, which investigated this issue in detail comparing the empirical performance of the SL-CAPM and the Black CAPM, which product results corresponding with those of SFG. NERA uses two types of tests and in relation to in-sample tests, the findings were:⁶²

The data indicate that there is a negative rather than a positive relation between returns and estimates of beta. As a result, the evidence indicates that the SL CAPM significantly underestimates the returns generated by low-beta portfolios and overestimates the returns generated by high-beta portfolios. In other words, the model has a low-beta bias. The extent to which the SL CAPM underestimates returns to low-beta portfolios is both statistically and economically significant.

⁵⁹ McKenzie M and G Partington, *Report to the AER; Part A: Return on Equity*, The Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited, October 2014, p. 9.

⁶⁰ SFG, *Cost of equity in the Black Capital Asset Pricing Model*, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 22 May 2014, p. 2;
See also SFG, *Equity Beta*, 12 May 2014, pp. 6–7.

⁶¹ NERA, *Review of the Literature in Support of the Sharpe-Lintner CAPM, the Black CAPM and the Fama-French Three-Factor Model*, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA PowerNetworks, and United Energy, March 2015, p. 9.

⁶² NERA, *Empirical Performance of the Sharpe-Lintner and Black CAPM*, A Report Jemena Gasworks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SAPower Networks and United Energy, February 2015, p. 54.

*As an example, we estimate that the lowest-beta portfolio of the 10 portfolios that we construct to have a beta of 0.54 – marginally below the midpoint of the AER’s range for the equity beta of a regulated energy utility of 0.4 to 0.7. Our in-sample results suggest that the SL CAPM underestimates the return to the portfolio by **4.90 per cent per annum**. [Emphasis added]*

104. Similar findings arise from NERA’s out-of-sample tests.
105. A further estimation problem arises during periods of particularly high official interest rates or low official interest rates when this model is implemented in the way that the AER has used it for many years by using a current Commonwealth Government Bond yield to estimate the risk free rate in combination with a very long run average of historical excess returns to estimate the MRP. The AER’s approach (whose MRP is inspired by Ibbotson) behaves as if investors’ expectations moved in perfect parallel with yields on the Commonwealth Government Bonds and there is no solid basis for this assumption.
106. There are alternatives to establishing the MRP for use in the SL-CAPM to the Ibbotson inspired approach adopted by the AER. One is known as the Wright approach in which the historical average is used in conjunction with a current expectation of inflation (discussed further below) but this approach is not a panacea for the flaws in the Ibbotson approach and it does nothing to address the downwardly biased returns for low beta stocks that arise due to the unrealistic assumption concerning the ability of investors to borrow and lend at the risk free rate.

3.1.1.2 The Black CAPM

107. The Black CAPM is a ‘next generation’ model in that it builds on the SL-CAPM by incorporating additional flexibility. It is related to the SL-CAPM in the following way:⁶³

[T]he Sharpe-Lintner CAPM remains a specific application of the more general model, the Black CAPM.

108. And:⁶⁴

The Black CAPM does not rely upon the assumption that all investors can borrow at the risk-free rate of interest.

109. The Black CAPM has been demonstrated to provide a significantly better empirical fit to the data than the SL-CAPM:⁶⁵

Using the 10 portfolios formed on the basis of past estimates of beta and monthly data from January 1979 to December 2013, we find ... little evidence of bias in the Black CAPM.

110. Although the AER has accepted that the Black CAPM’s theoretical insights are relevant to its determinations, it does not directly use the Black CAPM to estimate the required rate of return on equity. Rather, this model’s theoretical insights are used by the AER via the ‘back door’ as one of the rationales for adopting a beta estimate at the high end of the AER’s constraining beta range.

⁶³ SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, 22 May 2014, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, p. 15.

⁶⁴ SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 22 May 2014, p. 2.

⁶⁵ NERA, *Empirical Performance of the Sharpe-Lintner and Black CAPM*, A report Jemena Gasworks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SAPower Networks and United Energy, February 2015, p. 56.

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111. The AER’s approach is not the way in which the Black CAPM is usually used for regulatory purposes. Despite the AER’s protestations that the model is unusable because a zero beta portfolio is allegedly hard to estimate, as identified in Table 3–1, the Black CAPM (also referred to as ‘empirical’ or the ‘Zero Beta’ CAPM) has been used extensively in US regulation cases particularly when adopting a beta materially less than one.

Table 3–1: Use made by regulators of the Black, Zero-Beta and Empirical CAPM⁶⁶

Regulator	Industry	Application	Citation	Date
New York Public Service Commission	Electricity distribution	50/50 weighting. ‘Traditional’ CAPM/zero-beta CAPM, paragraph 56.	<i>Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service; Petition for Approval, Pursuant to Public Service Law, Section 113(2), of a Proposed Allocation of Certain Tax Refunds between Consolidated Edison Company of New York, Inc. and Ratepayers</i> 2009 N.Y. PUC LEXIS 507. ⁶⁷	2009
New York Public Service Commission	Gas distribution	50/50 weighting. Average of traditional CAPM result and zero beta CAPM result, paragraph 20.	<i>Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of National Fuel Gas Distribution Corporation for Gas Service</i> 2007 N.Y. PUC LEXIS 449; 262 P.U.R.4th 233. ⁶⁸	2007
New York Public Service Commission	Gas and electricity distribution	50/50 weighting. Average of traditional CAPM result and zero beta CAPM result, paragraph 19. This decision changed the weighting from 75/25 to 50/50, the previously accepted weighting following the approach in the <i>Generic Finance</i> case.	<i>Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Central Hudson Gas & Electric Corporation for Electric Service; Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Central Hudson Gas & Electric Corporation for Gas Service</i> 2006 N.Y. PUC LEXIS 227; 251 P.U.R.4th 20. ⁶⁹	2006

⁶⁶ The data in this table is drawn from consultation of reports of the various applicable regulators.

⁶⁷ *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service; Petition for Approval, Pursuant to Public Service Law, Section 113(2), of a Proposed Allocation of Certain Tax Refunds between Consolidated Edison Company of New York, Inc. and Ratepayers* 2009 N.Y. PUC LEXIS 507.

⁶⁸ *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of National Fuel Gas Distribution Corporation for Gas Service* 2007 N.Y. PUC LEXIS 449; 262 P.U.R.4th 233.

⁶⁹ *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Central Hudson Gas & Electric Corporation for Electric Service; Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Central Hudson Gas & Electric Corporation for Gas Service* 2006 N.Y. PUC LEXIS 227; 251 P.U.R.4th 20.

Regulator	Industry	Application	Citation	Date
Oregon Public Utility Commission	Electricity distribution	<p>Zero-beta is used to identify contrast with S-L:</p> <p><i>'as beta decreases, the cost of equity decreases by less than the Sharpe-Lintner CAPM model suggests.....as beta decreases, the cost of equity decreases by less than the Sharpe-Lintner CAPM model suggests. This is important, ..., because it means the costs of equity for utilities with betas of less than 1 are closer to the cost of equity for an average risk stock than is shown by the Sharpe-Lintner CAPM model. Under this model, the required return for the risk-free asset is expected to be higher than the return on Treasury bills.'</i> Paragraph 20.</p> <p><i>'While the results in this case cast further doubt on the validity of Staff's CAPM methodology, we do not believe that CAPM should be rejected in its entirety. We continue to believe that, in certain cases, CAPM analyses may provide a useful and reliable addition to the DCF results for determining cost of equity.'</i> Paragraph 23.</p> <p>The SL-CAPM was given no weight. Discount cash flows (or DDM) was preferred.</p>	<i>In the Matter of PacifiCorp's Proposal to Restructure and Reprice its Services in Accordance with the Provisions of SB 1149.</i> 2001 Ore. PUC LEXIS 418; 212 P.U.R.4th 379. ⁷⁰	2001

112. Further, even if the Black CAPM does not perfectly model the relationships in question SFG notes that:⁷¹

Because the Black CAPM is more general in that it allows flexibility in a parameter input (rz versus rf) it gives some chance of aligning with historical stock returns.

113. While empirical studies have consistently found that this model performs better than the SL-CAPM, the Black CAPM is known to have a downward bias for value stocks:⁷²

[S]tocks with above-average book-to-market ratios would be expected to have returns above that predicted by the Black CAPM and a zero beta premium of 3.34%. If the risks associated with high

⁷⁰ In the Matter of PacifiCorp's Proposal to Restructure and Reprice its Services in Accordance with the Provisions of SB 1149. 2001 Ore. PUC LEXIS 418; 212 P.U.R.4th 379.

⁷¹ SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 22 May 2014, p. 15.

⁷² SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 22 May 2014, p. 38.

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book-to-market stocks are not incorporated elsewhere, and the Black CAPM alone is used to estimate the cost of equity with a zero beta premium of 3.34%, the cost of equity will be understated.

114. The same implementation problem arises as with the SL-CAPM when the current returns on central bank debt are used as the estimate of the risk-free rate and this value is added to an essentially constant long run average estimate of MRP.

3.1.1.3 The Fama French three factor model

115. This model provides separately for an additional return on value stocks and empirical studies in the US and Australia have confirmed that:⁷³

The Fama-French model has the advantage of providing an unambiguously better fit to the data than the Sharpe-Lintner CAPM.

116. This model—in relation to which a Nobel prize has been awarded—⁷⁴ is newer than the other two CAPM models. Despite being the newer model, since the turn of the century the FFM has been part of the evidence in a number of state regulatory proceedings in the United States, including:

Table 3–2: FFM and SL-CAPM estimates used in US regulatory proceedings

Regulatory proceeding	Description	FFM estimate	SL-CAPM estimate	Difference
Before the California Public Utilities Commission ⁷⁵	Mr Hunt (an expert witness), used the FFM and the SL CAPM	14.0%	12.55%	1.45%
Before the Delaware Public Service Commission ⁷⁶	Artesian Water Company led evidence that included Fama French data. ⁷⁷ The Commission accepted that evidence without reservation.	N/A	N/A	N/A

⁷³ SFG, *The Required Rate of Return on Equity for Regulated Gas and Electricity Network Businesses*, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 6 June 2014, p. 9.

⁷⁴ Eugene Fama is the 2013 recipient of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel the Nobel Prize in Economics), Eugene F. Fama—Facts. Nobelprize.org. Nobel Media AB 2014. Web. 15 Mar 2015. http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2013/fama-facts.html.

⁷⁵ *Application of Pacific Gas and Electric Company for Authority to Establish Its Authorized Rate of Return on Common Equity for Electric Utility Generation and Distribution Operations and Gas Distribution for Test Year 2006. (U 39 M); Application of Southern California Edison Company (U 338-E) for Authorized Capital Structure, Rate of Return on Common Equity, Embedded Cost of Debt and Preferred Stock, and Overall Rate of Return for Utility Operations for 2006; Application of San Diego Gas & Electric Company (U 902-M) for Authority to: (i) Increase its Authorized Return on Common Equity, (ii) Adjust its Authorized Capital Structure, (iii) Adjust its Authorized Embedded Costs of Debt and Preferred Stock, (iv) Increase its Overall Rate of Return, and (v) Revise its Electric Distribution and Gas Rates Accordingly, and for Related Substantive and Procedural Relief 2005 Cal. PUC LEXIS 537; 245 P.U.R.4th 442.*

⁷⁶ *In the matter of the application of Artesian Water Company, Inc., for an increase in water rates 2003 Del. PSC LEXIS 51.*

⁷⁷ *In the matter of the application of Artesian Water Company, Inc., for an increase in water rates 2003 Del. PSC LEXIS 51 at [8]-[11]*

Regulatory proceeding	Description	FFM estimate	SL-CAPM estimate	Difference
On behalf of the Nevada Public Utilities Commission ⁷⁸	<p>Mr Ronald Knecht (an expert witness) proposed a return on equity of 10.28% which was calculated as an arithmetic mean of four components. He applied two discounted cash flow (DCF) estimates, a 2CAPM/ FFM model average, and one risk premium estimate.</p> <p>A hearing was held before the Public Utilities Commission of Nevada in April 2006. Mr Knecht stated that this approach was superior to relying only on the average of DCF models, because the CAPM, FFM, and “capital appreciation and income” (CA + I risk premium) methods used basic cost of capital input data differently from the DCF models. The overall result for the 2CAPM / FFM was reported to be 10.13%. The outcome of 10.13% was comprised of a result from the CAPM with a ‘Value Line’ beta of 10.45%, a result from the CAPM using an Ibbotson beta (with size adjustment) of 8.25%, and a result from the Fama French Three Factor model of 11.63%. The evidence was considered by the Public Utilities Commission of Nevada in April 2006.</p>	10.13%	8.25% (with Ibbotson beta with size adjustment) and 10.45% (with value line beta)	1.88% and (0.32%)
On behalf of the Nevada Public Utilities Commission ⁷⁹	<p>On a separate occasion, Mr Knecht used the FFM and SL-CAPM. He obtained a result for an average energy utility of 11.39 per cent. The average of two CAPM methods and the FF3F model was 11.13 per cent. On both of these occasions the Nevada Public Utilities Commission accepted Mr Knecht’s Fama French evidence without reservation.⁸⁰</p>	11.39%	11.38%	0.01%

⁷⁸ Application of Sierra Pacific Power Company for authority to increase its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto; Application of Sierra Pacific Power Company for approval of new and revised depreciation rates for electric operations based on its 2005 depreciation study, 2006 Nev. PUC LEXIS 91 at [63].

⁷⁹ Application of NEVADA POWER COMPANY for authority to increase its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto. 2007 WL 2171450 (Nev.P.U.C.).

⁸⁰ Application of NEVADA POWER COMPANY for authority to increase its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto. 2007 WL 2171450 (Nev.P.U.C.) at [102];

And see Application of Sierra Pacific Power Company for authority to increase its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto; Application of Sierra Pacific Power Company for approval of new and revised depreciation rates for electric operations based on its 2005 depreciation study, 2006 Nev. PUC LEXIS 91 at [63].

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Regulatory proceeding	Description	FFM estimate	SL-CAPM estimate	Difference
Before the California Public Utilities Commission ⁸¹	On another occasion in December 2014, Mr Knecht gave expert evidence (evidence that contained Fama French data) before the California Public Utilities Commission. Whilst the Commission observed that the FFM had previously been rejected by the California Public Utilities Commission, the Commission recognised that the FFM has 'gained great currency in investment practice'. ⁸²			
Before the Massachusetts Department of Telecommunications ⁸³	Mr Moul (an expert witness) cites the Fama French study as demonstrating the relationship between company size and stock returns.	N/A	N/A	N/A
Before the California Public Utilities Commission ⁸⁴	Mr Hunt used the FFM and SL-CAPM.	15.04%	11.59%	3.45%
Before the California Public Utilities Commission ⁸⁵	Mr Hayes from San Diego Gas & Electric also used the FFM and SL-CAPM.	13.89%	11.73%	2.16%

117. In his testimony before the Californian Public Utilities Commission, Gary Hayes notes:⁸⁶

[T]he California Public Utilities Commissioner Bohn stated after the January 2007 cost-of-capital workshop: The commission should remain open to receiving evidence from new additional models should parties wish to provide such. We should always welcome new and better tools and ways of tackling problems.

118. However, the Commissioner went on to exhort the participants:⁸⁷

First, the FF model is not a new, untested formula dropping in from academia. It has behind it a solid track record of research and has been the topic of extensive debate...Nowadays, the FF model is used routinely by financial economists as they research investments, returns, and relative performance, as it is a useful tool with which to interpret return data on a wide number of asset

⁸¹ Application of Southern California Edison Company (U338E) for Authority to Establish Its Authorized Cost of Capital for Utility Operations for 2013 and to Reset the Annual Cost of Capital Adjustment Mechanism 2014 Cal. PUC LEXIS 622 at [7], citing Application of Southern California Edison Company (U338E) for Authorized Cost of Capital for Utility Operations for 2008; and Related Matters 2007 Cal. PUC LEXIS 593 at [5.2.5].

⁸² Application of Southern California Edison Company (U338E) for Authority to Establish Its Authorized Cost of Capital for Utility Operations for 2013 and to Reset the Annual Cost of Capital Adjustment Mechanism 2014 Cal. PUC LEXIS 622 at [15].

⁸³ Moul, Paul R., Direct Testimony of Paul R. Moul, Managing Consultant, P. Moul & Associates, Concerning Cost of Equity, Commonwealth of Massachusetts Department of Telecommunications and Energy, 17 October 2005, p. 50.

⁸⁴ Application of Southern California Edison Company (U338E) for Authorized Cost of Capital for Utility Operations for 2008; And Related Matters. 2007 Cal. PUC LEXIS 593; 262 P.U.R.4th 53.

⁸⁵ Testimony of Gary G Hayes on behalf of San Diego Gas and Electric before the California Public Utilities Commission, 2007, p. 19.

⁸⁶ Testimony of Gary G Hayes on behalf of San Diego Gas and Electric before the California Public Utilities Commission, 2007, pp. 12–15.

⁸⁷ Testimony of Gary G Hayes on behalf of San Diego Gas and Electric before the California Public Utilities Commission, 2007, pp. 12–15.

types... Use of the FF model is not limited to just the halls of the academy; it has expanded into the investing world as well. Other professional practitioners have begun to utilize the FF model. Valuation experts now add FF results to fairness opinions issued in mergers-and-acquisitions transactions. Noteworthy is the Delaware courts' acceptance – and in one case, utilization – of FF evidence in asset-valuation disputes.... From the perspective of the everyday ROE analyst, the FF model is very accessible....Aside from its three California appearances, the FF method has also made its debut in Massachusetts and Nevada....The Commissioner asked [the witness] whether FF is more accurate or useful than old standards. Accuracy, when measured as an equation's ability to predict returns (called R2 by statisticians) is improved by the FF factors...Therein lies the model's usefulness as a cross check on its sibling, the CAPM.

119. The guideline, however, takes the approach that although the FFM is 'relevant' it should play no part whatsoever in the establishment of the allowed rate of return. In our view this is wholly unacceptable.
120. If the FFM is wholly excluded from the analysis, there is no other model that specifically addresses the downward bias for value stocks. As SFG notes:⁸⁸

Our view is that if the Fama-French model is not given any consideration by the AER, the estimated cost of equity will be understated. If we were to rely solely upon the Sharpe-Lintner CAPM, populated with a regression-based estimate of beta, we would adopt a second-best solution, because we would ignore the empirical evidence that the HML factor proxies for risk.

121. Below we discuss in more detail the concerns we have about the manner in which this evidence has been treated in the guideline and the recent draft determinations.

3.1.1.4 The Dividend Discount Model

122. The DDM is also referred to as the discount cash flow (DCF) model. The Federal Energy Regulatory Commission of the United States of America noted that:⁸⁹

The DCF model is a well established method of determining the equity cost of capital, (See Illinois Bell Telephone Co. v FCC, 988 F.2d 1254, 1259 n. 6 (D.C.Cir 1993).

123. And:⁹⁰

*'The DCF method 'has become the most popular technique of estimating the cost of equity, and it is generally accepted by most commission. **Virtually all cost of capital witnesses use this method, and most of them consider it their primary technique.**' Quoting J. Bonbright et al., Principles of Public Utility Regulation and other methods such as the risk premium model have not been used by the Commission for almost two decades. [Emphasis added]*

124. The DCF model or DDM approaches the task of estimating the required rate of return in a different way:⁹¹

The dividend discount model approach has the advantage of not requiring any assumptions about what factors drive required returns – it simply equates the present value of future dividends to the

⁸⁸ SFG, *The Fama French Model*, A report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA PowerNetworks, 13 May 2014, p. 3.

⁸⁹ *United States of America Federal Energy Regulatory Commission Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity* 123 FERC ¶ 61,048 at [53].

⁹⁰ *United States of America Federal Energy Regulatory Commission Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity* 123 FERC ¶ 61,048 at [53].

⁹¹ SFG, *The required return on equity for regulated gas and electricity network business*, A report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks, 6 June 2014, p. 9.

current stock price. It is also commonly used in industry and regulatory practice. Whereas the Guideline materials identify some concerns with the dividend discount approach, the specification adopted in this report addresses most of those concerns. Consequently, our view is that the dividend discount estimate of the required return is relevant evidence and some regard should be given to it.

125. This model performs well provided a robust method is used for forecasting future dividends. SFG has reviewed a range of ways that this model can be implemented, considering the techniques produced by or for the AER during the guideline consultation process and methods described in other publications. The principal issues include the length of the period over which growth reverts to an assumed long run assumed long run growth rate, whether that progression is linear or otherwise and how long term dividend growth is assumed to be related to assumptions about over-all economic growth.
126. The AER has rejected the DDM/DCF approach to estimating the required return on equity for the benchmark entity and instead uses it only to inform the estimate of the market-wide MRP. This is wholly inconsistent with the US approach, which relies primarily on DCF estimates directly in establishing the permitted returns of the firm being regulated.

3.1.2 THE APPROACH IN THE GUIDELINE

127. The most straight forward approach (that was rejected in for the guideline) would be to estimate all the relevant models and determining what weight they should have in contributing to an over-all rate of return.⁹² This was essentially option three considered by the AER as part of the guideline development process. It was rejected on the following basis:⁹³

(3) Use several primary models with quantitative but non-complicated fixed weighting. For example, this might entail the choice of two models with broad, simple weightings (such as 70:30)....

*This may reduce the significance of weaknesses in any one model or source of information. The limitations of this approach, however, is that it may be **complex to implement** (given multiple models must be estimated), and **may not provide an appropriate level of predictability**. A multiple model approach may also lead to **inappropriate consideration being given to relevant material**. These limitations are discussed in detail in section 5.3.10. [Emphasis added]*

128. Importantly, the criterion of ‘predictability’ is regarded as being desirable for investors.⁹⁴

As noted in our consultation paper, and in stakeholder submissions, the guideline should provide certainty and predictability to assist investors in making their investment decisions.

129. These three reasons for rejecting the straight forward approach of giving all the models an explicit weight in determining the rate of return for equity have been misapplied:

- **Complex to implement.** The criterion of ‘complexity’ is irrelevant to the rate of return objective, NEO and revenue and pricing principles but, in any event, it is quite incredible to regard the approach of specifying each of the models and taking a weighted average can be more complex than the six step foundation model, an abridged version of which is quoted below

⁹² Which would be consistent with the regulatory precedent from the US in, for example, the two Nevada PUC cases cited above.

⁹³ AER, *Rate of Return Guideline*, Explanatory Statement, pp. 54–55.

⁹⁴ AER, *Rate of Return Guideline*, Explanatory Statement, p. 102.

- **Lack of predictability.** In fact taking a weighted average delivers more predictable outcomes in that any anomalies that occur only in one model have little impact upon the weighted average while any version of a 'primary model' is highly sensitive to any changes in the parameters used in that primary model. In any event, the businesses must be in a better position than the AER to assess whether investors perceive a multi-model approach to lack predictability when compared with the SL-CAPM because it is our own shareholders and potential shareholders who are the investors in question. We are not aware of any businesses—nor any potential investors—who provided a submission or any evidence to the AER to support its conclusion in this respect. Indeed, all network business and investor submissions of which we are aware supported the multi-model approach
- **Incorrect consideration of relevant material.** Section 5.3.10 of the explanatory statement explains that the third consideration concerning the inappropriate consideration being given to relevant material is simply a summary of all the criticisms that the AER makes in relation to the FFM, Black CAPM and DDM and this consideration would fall away on the basis that the AER's criticisms of these models are incorrect for the reasons discussed in this attachment.

130. Instead, the guideline adopts a 'foundation model approach' consisting of the following steps:⁹⁵

Step one: identify relevant material

... We will, in accordance with the rules, have regard to all relevant material. However, this does not require us to use all of that material to inform our estimate of the return on equity. ...

Step two: determine role

... Specifically, we may use relevant material in one of four different ways:

As the foundation model:

... To inform where within the return on equity range (set by the foundation model) our 'final' return on equity point estimate should fall:

... Not used to estimate the return on equity:

...

Step three: implement foundation model

[W]e propose to implement the Sharpe–Lintner CAPM as follows:

[Except in the manner identified as follows, the Explanatory Statement then summarises the way in which the AER has approached the SL-CAPM confirming that this will continue. In particular the Ibbotson inspired implementation of the SL-CAPM will be used to establish the MRP.]

The MRP range will be estimated with regard to theoretical and empirical evidence—based on evidence such as historical excess returns, survey evidence, financial market indicators, estimates from other regulators, and DGM estimates.

The MRP point estimate will be determined based on regulatory judgement, taking into account estimates from each of those sources of evidence...

⁹⁵ AER, *Rate of return guideline*, December 2013, pp. 56–62.

The range and point estimate for the return on equity will be calculated based on the range and point estimates from the corresponding input parameters. For example, the lower bound of the return on equity range would be calculated by applying the point estimate for the risk free rate and the lower bound estimates for the equity beta and MRP.

Step four: other information

Under step four, other information that may inform our final return on equity point estimate is considered. ...

The manner in which we may use other information, however, may differ for each alternative source. Specifically, some of the other information may provide a range (at a point in time) for the return on equity, while others may provide only directional information. ... Alternatively, the Wright approach, and other regulators and brokers provide more direct estimates of the expected return on equity for service providers.

Table 5.3 Form of other information

Additional information	Form of information
Wright approach	Point in time
Other regulators' return on equity estimates	Point in time
Brokers' return on equity estimates	Point in time and directional
Takeover and valuation reports	Directional
Comparison with return on debt	Relative

Source: AER analysis.

Step five: evaluate information set

This step requires the evaluation of the full set of material that we propose to use to inform, in some way, the estimation of the expected return on equity. This includes assessing the foundation model range and point estimate alongside the other information from step four.

In evaluating the full information set, the consistency (or otherwise) of the information is expected to be important. That is, circumstances where most of the other information suggests the return on equity should be above the foundation model estimate is likely to be more persuasive than if only a single estimate suggests an alternative value. The strengths and limitations of each source of additional information, however, will also be an important factor guiding the informative value of the available material.

Step six: distil a point estimate of the expected return on equity

Our approach requires the determination of a single point estimate for the return on equity. As outlined in section 5.2 our starting point for estimating the return on equity will be the foundation model point estimate. Moreover, the final point estimate is expected to be selected from within the foundation model range....

The use of regulatory judgement may also result in a final estimate of the return on equity that is outside the foundation model range. This recognises that, ultimately, our rate of return must meet

the allowed rate of return objective. In these circumstances, we may reconsider the foundation model input parameter estimates, or more fundamentally, we may also reconsider the foundation model itself. That said, we consider it reasonable to expect our final return on equity estimate, in most market circumstances, to fall within the foundation model range. ...

Further, under our approach, if the foundation model point estimate is not adopted the final estimate of the return on equity will be determined as a multiple of 25 basis points. This recognises the limited precision that the return on equity can be estimated. ...”

131. The reasons why the AER favours the above ‘foundation model approach’ are as follows. The foundation model is one of the variants of implementing a ‘primary model’ approach. In relation to primary model approaches the AER states:⁹⁶

The key benefit of using a primary model is that it provides greater predictability of outcomes.

132. Again, this claim of predictability is unsupported, particularly as regards the effect it has on investor appetites and must be rejected as a proper ‘key benefit’ of adopting the ‘foundation model’.
133. In addition to the ‘key benefit’, the AER also identified the considerations (shown in Table 3–3) concerning the foundation approach.

Table 3–3: Our concerns with the foundation model approach

AER comment (pages 79 and 80 of Explanatory Statement)	Our comment
Using the foundation model and other information informatively (as opposed to determinately) to estimate the expected return on equity is consistent with the approaches adopted by market practitioners.	The AER has not cited any examples of market practitioners using a six step foundation model or anything that resembles it. We are unaware of any practitioners who do so and would be most surprised if there were.
Using the foundation model and other information informatively acknowledges the inherent uncertainty in estimating the expected return on equity. That is, it recognises that all models are incomplete and that some approaches provide greater insight than others.	As discussed below, all the models are complete in the sense that they provide independent estimates for the return on equity and compared with all three of the other models, the model that provides the least insights is the SL-CAPM chosen by the AER to be the foundation model.
Using the foundation model and other information informatively acknowledges the need for regulatory judgement in estimating the expected return on equity. Given the breadth of material and range of values that may represent reasonable estimates of the expected return on equity, the use of judgement is unavoidable.	While regulatory judgement is required, the approach of the AER involves qualitative and quantitative judgements of a wide variety of forms at every step of the process. This undermines predictability and transparency.
Using a foundation model approach is relatively simple to implement (particularly in comparison to combining different estimates of multiple models). For example, the foundation model—the Sharpe–Lintner CAPM—is a model that stakeholders are familiar with already (given its widespread use amongst market practitioners and other regulators).	We simply do not understand how the foundation model can be described as simple to implement when compared with the weighted (or simple) average approach. For example, that approach can be distilled to a simple mathematic or logical formula whereas most aspects of the foundation model is incapable of expression in that form. The way in which the information is categorised and combined is extremely complex and often not transparent.

⁹⁶ AER, *Rate of return guideline*, December 2013, p. 54.

AER comment (pages 79 and 80 of Explanatory Statement)	Our comment
<p>Using a foundation model approach may allow stakeholders to make reasonable estimates of the returns expected to be determined in advance of a determination. We consider that our proposed approach provides more guidance than the alternative of separately estimating and combining different models. As noted in stakeholder submissions, the guideline should provide certainty and predictability to assist investors in making their investment decisions.</p>	<p>We do not agree. The AER has made judgements at each of the six steps of the foundation model process that are all open to extensive debate and difficult to rationalise. Consequently these points undermine certainty considerably. Adopting the foundation approach makes the resulting rate of return highly sensitive to changes in the results emerging from the AER's specification of the SL-CAPM whereas a weighted average varies less as any one of its contributing parts moves.</p>
<p>Using a foundation model, and drawing on other information to determine a final estimate of the expected return on equity, provides an appropriate balance between a relatively replicable and transparent process and providing flexibility in changing market circumstances. Such a process provides scope for engaging with the openness and flexibility of the rules within a broad structure.</p>	<p>The foundation model has delivered lower and lower allowed rates of return on equity as the yield on CGS has fallen even though the prevailing return on equity has not fallen nearly to the same extent. Consequently, a better characterisation of the model is that it adjusts in a manner that is inconsistent with the change in equity markets. The process is also not easy to replicate due to the significant number instances in which 'regulatory judgement' is exercised without an explanation of how the "judgement" has led to the adoption of a particular value.</p>
<p>Using a foundation model and other information informatively, and selecting a final estimate of the return on equity that is a multiple of 25 basis points (if departing from the foundation model estimate), disavows the pursuit of false precision.</p>	<p>In fact the other information (such as the Wright approach) strongly suggests that the foundation model is delivering an incorrect range and that a departure should have occurred. In fact there are no departures of a precise or approximate nature where there should be.</p>
<p>Using the Sharpe–Lintner CAPM as the foundation model reflects our assessment of the model against our criteria. Specifically, we consider it is superior to alternative models (for the purposes of estimating the return on equity for the benchmark efficient entity).</p>	<p>We do not agree that the criteria are relevant nor (even if they were relevant) that they have been correctly applied. The SL-CAPM cannot be regarded as superior on any relevant metric.</p>
<p>Our approach has also been developed in consultation with a range of stakeholders, including service providers and their industry associations, investors, and consumer groups.</p>	<p>Certainly there was an extensive opportunity for stakeholders to provide submissions but very little account was taken in the foundation model to any of the concerns raised by the businesses.</p>

134. Further, the concept of selecting a primary model implicitly assumes that one of the available models must be superior to all the other models and introduced a hierarchy but this assumption is without any support and is contrary to the views of AEMC when the new rules were adopted.

3.1.3 FLAWS WITH THE AER'S APPROACH TO ESTIMATING THE ALLOWED RETURN ON EQUITY

135. The AER's approach to estimating the allowed return on equity is flawed and contrary to law in several critical respects:
- The AER brings a skewed perspective to the evaluation of the strengths and weaknesses of the models—see section 3.1.3.1
 - The AER's extra-legislative criteria distort the evaluation of the merits of the available inputs—see section 3.1.3.2

- The guideline does not give real weight to all of the relevant inputs as required—see section 3.1.3.3
 - The AER has improperly laboured over maintaining one model as preeminent with the consequent improper constraints inherent in using a ‘foundation’ model instead of devoting its efforts to specifying all the available models and giving to each one a weight which is proportionate or deserved—see section 3.1.3.4
 - Even when implementing the foundation model approach, the AER has made a flawed selection of the Ibbotson inspired approach to implementing the SL-CAPM as the foundation model—see section 3.1.3.5
 - The AER’s incorrect selection of a beta of 0.7—see section 3.1.3.6
 - The AER’s incorrect selection of a MRP of 6.5%—see section 3.1.3.7
 - The AER’s flawed use of independent expert reports—see section 3.1.3.8, and
 - The AER’s inconsistent treatment of imputation credits—see section 3.1.3.9.
136. In Jemena Gas Networks’ (JGN’s) response to the AER’s draft determination for its NSW gas distribution network dated February 2015, we set out in detail our concerns with the proposed approach to establishing the allowed rate of return for equity. We maintain all of the concerns that we expressed at that time and we have since identified further material presented in this proposal that expands upon and substantiates the veracity of those concerns.
137. The following points will assist the AER in digesting the material presented in this proposal and reconciling it with our NSW gas distribution network response:
- The concerns we previously expressed with the AER’s search for one superior model are covered in section 3.1.3.4
 - The concerns we previously expressed with the AER’s selection of the SL-CAPM as the superior model are covered in section 3.1.3.5
 - The concerns we previously expressed that the AER’s approach does not adequately correct for biases in the SL-CAPM by implementing an adjustment for SL-CAPM deficiencies are addressed in section 3.1.3.7
 - The concerns we previously expressed with the AER’s failure to have adequate regard to relevant evidence are addressed in section 3.1.3.1, 3.1.3.3 and 3.1.3.5
 - The concerns we previously expressed with the AER’s beta estimate are addressed in section 3.1.3.6
 - The concerns we previously expressed with the AER’s treatment of the MRP evidence are addressed in section 3.1.3.7
 - The concerns we previously expressed with the role of the Wright approach in the AER’s approach are addressed in section 3.1.3.5
 - The concerns we previously expressed with the imputation credit adjustment in the AER’s approach are addressed in section 3.1.3.9, and
 - The concerns we previously expressed with the consistency of other evidence in the AER’s approach principally concerns issues discussed in sections 3.1.3.1, 3.1.3.6 and 3.1.3.7.
138. The additional evidence presented in this submission principally concerns regulatory precedents drawn from the US and Europe—which show that regulators can and do commonly use models that the AER or its consultants wrongly assume are rarely used in practice. These regulators have readily overcome implementation challenges that the AER has identified as a key basis declining to follow the recommendations of our consultants. This material also demonstrates that there is strong regulatory support for the need to avoid using an unadjusted Ibbotson inspired SL-CAPM at the current point in the economic and interest rate cycle.

139. This attachment also provides a further analysis of legal errors that have arisen in the AER's interpretation and application of the rules as a result of the misapplication of extra-legislative criteria.

3.1.3.1 A skewed perspective on the strengths and weaknesses of the available models

140. We are concerned that the assessment by the AER is not being undertaken on an even handed basis. We have observed that the reasoning in the guideline and recent draft decisions:

- Does not make 'like for like' criticisms—criticisms that apply equally to the SL-CAPM are only levelled against the Black-CAPM or FFM
- Inadequate recognition is accorded to significant weaknesses of the SL-CAPM and other models do not suffer these weaknesses, and
- Relatively minor implementation challenges with implementing the other models—or challenges that are equivalent in nature to that which apply when implementing the SL-CAPM are—exaggerated and portrayed as major weaknesses rather than approaching these challenges with a problem solving mindset.

141. For example, despite the superior empirical performance of the Black CAPM discussed above,⁹⁷ the AER relegates this model to a secondary status on the following basis:⁹⁸

The model is not empirically reliable

142. And:⁹⁹

The model is not widely used to estimate the return on equity by equity investors, academics or regulators.

143. The AER elaborates on the first criticism, stating that the return on the zero beta asset is unobservable and that the methods for estimating it are unreliable. Both the AER and McKenzie & Partington appear to reach that conclusion by observing differences between the reports lodged by the businesses on this question. The AER makes a further apparent criticism that:¹⁰⁰

While we consider SFG's latest estimate of the zero beta premium appears more plausible, we believe that the large range of zero beta estimates by consultants for the NSPs indicates the model is unsuitable to use to estimate the RoE of our benchmark efficient entity.

144. However, the AER is in effect undermining its own approach. This is because the estimation of beta and the MRP for use in the AER's primary model, the SL-CAPM, can be undertaken in a broad range of plausible and implausible ways and are not observable. For example, the AER's own consultants produce beta results that range from 0.3 to 0.8 and results for the MRP that are a full percentage point apart. With the NSP's studies included, the ranges are somewhat wider again however the yard-stick used to exclude the Black-CAPM could also be put forward as a basis upon which to exclude the results from the SL-CAPM.

⁹⁷ See section 3.1.3.2.

⁹⁸ SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 18 February 2015, 11–12 [52]–[53].

⁹⁹ SFG, *The required return on equity for the benchmark efficient entity*, 2015, 11–12 [52]–[53].

¹⁰⁰ For example, AER, *Draft decision, Jemena Gas Networks (NSW) Ltd Access arrangement, 2015-16 to 2019-20*, Attachment 3: Rate of Return, November 2014, p. [3-182] (PDF version).

145. Similarly, with respect to the—arguably irrelevant—consideration of whether the model is widely used, SFG notes that:¹⁰¹

[I]t is common for U.S. regulatory cases to use what is known as “the empirical CAPM.” This is an implementation of the CAPM formula with an intercept above the contemporaneous risk free rate – to be consistent with the Black CAPM and the empirical evidence that supports it. The AER’s contention that the Black CAPM is not widely used in practice relies only on the label of the model, and not on its substance.

146. In its letter, Grant Samuel shares its views more broadly concerning the AER’s model selection choices:¹⁰²

In this case, it seems that the AER’s approach has been to avoid changing its existing (single) formula “foundation model” and proceed on the basis that as long as it can show that the model is widely used and the individual inputs can be justified, there is no need to concern itself with whether or not the final output is commercially realistic.

147. Despite conceding that the model is useful indirectly to estimate the MRP for use in the foundation model, the AER decided not to use the DDM directly in estimating the allowed return on equity. One reason put forward is that:^{103, 104}

[W]e do not consider that the ... level of data exists to form robust dividend yield estimates for Australian energy service providers. For example, there are only five sample Australian service providers for which dividend yield data is available. Further, the time series for when these estimates are available are both variable and short.

148. However, exactly the same five companies’ data is used by the AER as the primary basis for establishing the beta range of 0.4 to 0.7 for use in the SL-CAPM.

149. Another reason put forward by the AER is that it considers that its results of the DDM are too sensitive to the input assumptions that are used:¹⁰⁵

The sensitivity of DGMs to input assumptions limits the ability to use DGMs as the foundation model.

150. However, the AER does not give even handed acknowledgement to the same criticisms applying to the CAPM. In Grant Samuel’s words:¹⁰⁶

The DGM [(dividend growth model)], in its simplest form, has only two components to estimate – current dividend yield and the long term growth rate for dividends. The current yield is a parameter that can be estimated with a reasonably high level of accuracy, particularly in industries such as infrastructure and utilities. We accept that 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.

¹⁰¹ SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 18 February 2015, p. 21 [71].

¹⁰² Grant Samuel, *Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid*, 12 January 2015.

¹⁰³ The relevant businesses are the APA Group, DUET, Envestra, Spark Infrastructure and SP AusNet (now AusNet Services).

¹⁰⁴ For example, dividend yield estimates for Envestra are available from 2001, and from 2006 for Spark Infrastructure.

¹⁰⁵ AER, *Rate of Return Guideline*, Explanatory Statement, Appendices, December 2013, p. 21.

¹⁰⁶ Grant Samuel, *Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid*, 12 January 2015, p. 3.

However, there is no way in which the issues, uncertainties and sensitivity of outcome are any greater for the DGM than they are with the CAPM which involves two variables subject to significant measurement issues (beta and MRP). The uncertainties attached to MRP estimates in particular are widely known yet are glossed over in the AER's analysis of the relative merits. Section D of Attachment 3 of the Draft Decision contains almost 40 pages discussing the most esoteric aspects of methodologies for calculating beta but in the end the AER's choice of 0.7 is, in reality, an arbitrary selection rather than a direct outcome of the evidence. Moreover:

- The plausible beta range nominated by the AER (0.4-0.7) creates a 2 percentage point swing factor for the CAPM-based cost of equity. Its own expert nominated an even wider range (0.3-0.8);
- The 40 pages contain little meaningful discussion of issues such as standard errors or stability over time (as opposed to different time periods). Data on these aspects would be important to properly evaluate the overall reliability of the statistics; and
- The publication of only averages for individual companies and not the range hides the underlying level of variability in these measures.

In short, the claim of superiority for the CAPM is unfounded.

151. The Grant Samuel letter adds:¹⁰⁷

It is also difficult to fathom why the AER states that the DGM is highly sensitive to interest rates but makes no mention of the sensitivity of CAPM to interest rates.

152. The AER also suggests that the perpetual time-frame¹⁰⁸ over which the DDM (also referred to as the DGM) is specified is inappropriate for regulatory purposes, but SFG notes:¹⁰⁹

We do not really have useful information about whether there is a term structure for equity. We are attempting to estimate the cost of equity from share prices to obtain a timely estimate of required returns. It might be the case that the cost of equity from year 10 onwards is different to the cost of equity for years 1 to 10, and it might be the case that the cost of equity is the same for all years.

153. And Grant Samuel points out:¹¹⁰

The AER also seeks to distinguish discount rates for valuations from discount rates for regulatory purposes by the fact that valuations have a perpetuity timeframe (and must reflect expectations of investors over that timeframe) while the regulator sets the return on equity only for the length of that regulatory period (typically five years). We do not believe this distinction is valid. For a start, the AER adopts a 10 year term for its overall rate of return (page 3-25) including a 10 year risk free year rate so if the five year timeframe of the Draft Decision was paramount then its own methodology is inconsistent with the return objective. In any event, 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).

¹⁰⁷ Grant Samuel, *Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid*, 12 January 2015, p. 3.

¹⁰⁸ For example, AER, *Draft Determination, Jemena Gas Networks, 2015-20, Attachment 3: Rate of Return*, November 2014, p. [3-277] (PDF version).

¹⁰⁹ SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, A report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, Transend and TransGrid, 15 May 2014, para. 74.

¹¹⁰ Grant Samuel, *Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid*, 12 January 2015, p. 5.

154. Grant Samuel also disputes the notion that the DGM is not used in practice.¹¹¹

In our opinion, in examining the CAPM and comparing it to the DGM, the AER has unfairly accentuated the failings of the DGM while, at the same time, it has ignored many real shortcomings in the CAPM.

155. The AER's treatment of the FFM provides the most concrete illustration of the double-standards that have been applied because the AER has excluded the results from the model from consideration altogether. SFG's repudiation of the AER's criticisms also illustrate that criticisms (a) and (b) shown below apply equally to the SL-CAPM while criticisms (c) and (d) are incorrect—yet the FFM and not the SL-CAPM model is excluded on this basis:¹¹²

In our view, the reasons that the AER provides for dismissing the Fama-French model are without basis:

- (a) *Sensitivity to different estimation periods and methodologies.*

The AER states that the estimates from the Fama-French model can vary across different estimation periods and techniques. In response, we note that this applies to all models that require the estimation of parameters. For instance the AER's own estimates for beta vary materially over time and across estimation methods. Moreover, the fact that some estimates of the Fama-French model might produce inconsistent results is not a basis for dismissing all estimates. A better approach would be to consider the relative quality and reliability of estimates.

- (b) *Estimation of ex ante required returns.*

The purpose of the Fama-French model is the same as the purpose of the Sharpe-Lintner CAPM – to explain the cross-section of stock returns. That is, the purpose of these models is to identify the features of stocks that can be used to predict what average returns they are likely to generate in the future. The key difference is that the predictions from the Fama-French model have been shown to be more closely associated with stock returns. It is theoretically possible that the superior empirical performance of recent decades might not continue into the future, but that should not be the basis for dismissing the Fama-French model.

- (c) *Lack of a theoretical foundation.*

We note that the Fama-French model was originally motivated by the poor empirical performance of the Sharpe-Lintner CAPM. Fama and French identified that the Sharpe-Lintner CAPM did not work and set about developing a model that did. Since that time, theoretical justifications for the Fama-French factors have been developed, in a way that is quite standard for scientific progression. In our view it would be illogical to reject the Fama-French model in favour of the Sharpe-Lintner CAPM on the basis that its original motivation was the poor performance of the very model that is to be adopted in its stead.

- (d) *Complex to implement.*

The Fama-French model is not complex to implement. It requires the estimation of factor returns and factor sensitivities (betas). There are simply three factors instead of one. In any event, a superior model should not be rejected in favour of an inferior one on the grounds of simplicity.

¹¹¹ Grant Samuel, *Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid*, 12 January 2015, p. 2.

¹¹² SFG, *Using the Fama-French model to estimate the required return on equity*, 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, 13 February 2015, p. 2.

156. In summary, we are concerned that the AER has approach all aspects of the evaluation of the various models in a way that is pre-disposed to favour the SL-CAPM and reject the other models or assign the other models to a highly constrained role.
157. Specifically, we support the view of SFG that:¹¹³

In our view, what the Rules require is an identification of all estimation methods, financial models and other evidence that may be relevant to estimating the return on equity. Following that identification, and assuming that there is more than one information source that is relevant, some weight will need to be ascribed to the information sources or they will somehow need to be combined to produce a point estimate. The Rules do not specify that the Sharpe-Lintner CAPM is to be used unless a model about which there is no debate or potential weaknesses is identified. Each of the information sources, including the Sharpe-Lintner CAPM must be fairly assessed if the estimate of the return on equity is to be arrived at on a reasonable basis and be the best forecast or estimate possible in the circumstances. The evidence supports a finding that the best forecast or estimate is one that is properly informed by estimates from a range of evidence, including the Sharpe-Lintner CAPM, the Black CAPM and the Fama-French model.

3.1.3.2 Extra-legislative criteria distort the evaluation of the merits of the available inputs

158. Instead of directly applying the rate of return objective, the NEO and the RPP, the guideline applies a set of extra-legislative criteria¹¹⁴ that do not appear in the NER or the NEL.
159. Although the criteria appear on their face to constitute a reasonably common sense or at least innocuous set of considerations, they have been instrumental in contributing to several of the significant errors in the formation and implementation of the foundation model approach. Because each of these criteria is initially introduced in abstract terms, it is not immediately obvious how or why the application of the criteria when applied when evaluating the relevant evidence leads to error.
160. Indeed as explained below, the AER's application of these criteria has incorporated irrelevant considerations, contrary to the requirements of the Rules. For example estimation methods and financial models are required to be consistent with 'well accepted economic and finance principles' and promote 'simple over complex approaches'.¹¹⁵
161. When the AEMC adopted the current common rate of return rules to apply to our business and equally to gas network businesses, it explicitly repealed the words 'well accepted' financial model from the former gas rules because the AEMC considered that it lead to excessive conservatism. To explain this point further, recall that the current rules are common to both electricity and gas and they are the product of a repeal of three sets of rules—none of which the AEMC considered to be performing adequately. Unlike the former electricity rules, former gas rules 87(1) and (2) permitted the AER to adopt a financial model other than the SL-CAPM but the model selected had to be a 'well accepted' model 'such as the CAPM'.

¹¹³ SFG, *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity*, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy, 27 March 2015, pp. 22–23.

¹¹⁴ AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, p. 24.

¹¹⁵ AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, p. 38.

162. The AEMC's adoption of a common set of rules for electricity and gas consciously repealed the 'well accepted' criterion because it inappropriately narrowed regulatory decisions.¹¹⁶

In [two previous gas] cases, the Tribunal reached identical conclusions on the application of rule 87(1) and rule 87(2). The Tribunal considered that since the CAPM is a "well accepted financial model" under the provisions of rule 87(2), provided that the inputs to this model are appropriate, the output from this model will necessarily lead to an outcome in accordance with the objective specified in rule 87(1). Therefore, under the Tribunal's interpretation of the NGR, using only the CAPM to estimate the return on equity was sufficient to satisfy the objective in rule 87(1).

163. And:¹¹⁷

[R]ules 87(1) and (2) as interpreted by the Tribunal, could be applied in such a way as to reduce the range of information that can be used in estimating the rate of return. Such application could lead to the adoption of relatively formulaic approaches to determining the rate of return rather than focussing on whether the overall estimate of the rate of return meets the overall objective.

164. And further:¹¹⁸

The rate of return estimation should not be formulaic and be driven by a single financial model or estimation method.

165. And finally:¹¹⁹

An example of an estimation process that has become formulaic is the mandatory use of the CAPM under the NER and the view that appears to be adopted in practice that CAPM is the only "well accepted" model under the NGR, despite the flexibility to consider other models.

166. The way in which the AER uses the 'well accepted' criterion in its Guidelines is exactly the sort of excessively conservative outcome that the AEMC sought to avoid by repealing that phrase from the gas rules and choosing not to adopt the phrase in the electricity rules.

167. There are a number of other ways that this excessive conservatism manifests itself and causes decision making error. For example, a key report upon which the AER relies on in support of the foundation model framework was prepared by Associate Professor Handley of the University of Melbourne¹²⁰. He was not asked what the best way of achieving the rate of return objective was. Rather he was asked whether the AER's approach was capable of meeting the objective and, importantly:¹²¹

*[Do] you consider any material in the regulatory proposals from the service providers and the three consulting reports, provide **compelling reason to depart from the core framework** underpinning the foundation model approach as outlined in Figure 5.1 on page 12 of the Guideline? [Emphasis added]*

168. This question illustrates two forms of conservatism: inertia around the SL-CAPM when making the guideline and inertia around the guideline when making regulatory determinations. The latter is directly contrary to the

¹¹⁶ AEMC, *Draft Rule Determination*, p. 42.

¹¹⁷ AEMC, *Draft Rule Determination*, p. 42.

¹¹⁸ AEMC, *Draft Rule Determination*, p. 47.

¹¹⁹ AEMC, *Draft Rule Determination*, p. 47.

¹²⁰ Handley J, *Advice on the Return on Equity*, A report prepared for the Australian Energy Regulator, 16 October 2014, pp. 3 and 6.

¹²¹ Handley J, *Advice on the Return on Equity*, A report prepared for the Australian Energy Regulator; 16 October 2014, p. 6.

3 — RETURN ON EQUITY

AEMC's rule determination which repealed the rules that required there to be 'persuasive evidence' before the AER was permitted to depart from its Statement of Regulatory Intent.

169. The AEMC's reasoning was as follows:¹²²

[T]he persuasive evidence test is problematic. Although regulatory certainty is desirable, it should not be attained at the expense of limiting the regulator's ability to make the highest-quality rate of return estimate at any particular time.

170. And:¹²³

In its draft rule determination, the Commission took the view that inclusion of an inertia principle would undermine the strength of its proposed rate of return framework. The Commission further noted that its proposed non-binding rate of return guidelines would safeguard the framework against the problems of an overly-rigid prescriptive approach that cannot accommodate changes in market conditions. Instead, sufficient flexibility would be preserved by having the allowed rate of return always reflecting the current benchmark efficient financing costs.

171. Returning to the inertia the AER gives to the SL-CAPM, the primary basis for the Securities Industry Research Centre of Asia-Pacific (**SIRCA**) Limited's McKenzie and Partington to endorse the use of the CAPM is simply that it is the model with the earliest birthday and a misplaced assumption that it is the 'standard workhorse'.¹²⁴

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.

172. This conservatism has been a significant contributor to the decision to adopt the SL-CAPM as the foundation model, with secondary weight being given to the DDM, the Black-CAPM only in the limited role of informing certain parameter estimates used within the SL-CAPM, and no weight at all being given to the FFM which is of a substantially younger vintage than the SL-CAPM. This conservatism runs directly counter to the intention of the AEMC that the new rules do away with the incumbency of the SL-CAPM and open the decision making to the inclusion of all the relevant models and other inputs:¹²⁵

In the Commission's view, achieving the NEO, the NGO, and the RPP requires the best possible estimate of the benchmark efficient financing costs. This can only be achieved by ensuring that the estimation process is of the highest possible quality. It means that a range of estimation methods, financial models, market data and other evidence should be considered, with the regulator having discretion to give appropriate weight to all the evidence and analytical techniques considered.

173. In referring to the decision of the Tribunal in which it concluded that the use of well-accepted financial models effectively guaranteed that the resulting estimate of the required return on equity was reasonable and commensurate with the prevailing conditions in the market, the AEMC stated:¹²⁶

The Commission considered that this conclusion presupposes the ability of a single model, by itself, to achieve all that is required by the objective. The Commission is of the view that any relevant evidence on estimation methods, including that from a range of financial models, should be considered to determine whether the overall rate of return objective is satisfied.

¹²² AEMC, *Economic Regulation of Network Service Providers Rule Change Final*, November 2012, .p. 41.

¹²³ AEMC, *Economic Regulation of Network Service Providers Rule Change Final*, November 2012, p. 46.

¹²⁴ McKenzie M and G Partington, *Report to the AER, Part A: Return on Equity*, SIRCA, October 2014, p. 9.

¹²⁵ AEMC, *Economic Regulation of Network Service Providers Rule Change Draft*, p. 42.

¹²⁶ AEMC, *Economic Regulation of Network Service Providers Rule Change Final*, November 2012, p. 48.

174. And:¹²⁷

The Commission considered that no one method can be relied upon in isolation to estimate an allowed return on capital that best reflects benchmark efficient financing costs.

175. Models chosen on the basis of being simple can easily fall into error by excluding a proper consideration of the full range of factors affecting the prevailing return on equity.
176. Wines kept beyond their best become vinegar and it is similar with the SL-CAPM. There is overwhelming evidence that the SL-CAPM's dominant role should cease. The model has a poor empirical performance and it is demonstrably producing downwardly biased results—particularly for firms such as the benchmark efficient entity and in market conditions that are currently being experienced. The Black CAPM avoids the low-beta bias but further empirical improvements are possible by using the FFM to address the value bias. The DDM has been used for many years in the US and it provides an independent, alternative basis for setting a rate of return that is also free of the flaws in the SL-CAPM but the AER dismisses the possibility that all these other models should play a material role in the AER's estimation process.
177. If an existing model is shown to be flawed in ways that newer models are not, then collective inertia and simplicity are not proper decision making constraints upon giving the newer model(s) real weight according to the substantive contributions they can make. It cannot be the case that by removing any reference within the rules to the incumbency of the SL-CAPM, the AEMC intended a 'chicken and egg' situation that prevents the regulator from moving to adopt a new model until another regulator has.
178. The criterion that the choice of inputs should 'promote the simple over the complex where appropriate'¹²⁸ also leads the decision making process astray. The explicit requirement in rule 6.5.2(e) is to consider all the relevant inputs and no mention is made of the exclusion or devaluation of inputs on the basis that they are complex. Although simplicity is intuitively appealing, it is eminently possible (as illustrated below) that a certain degree of complexity is required to properly estimate the prevailing return on equity for an efficient benchmark business.
179. The preference for the simple over the complex has been instrumental in the selection of the SL-CAPM as the 'foundation model'—but the expert theoretical and empirical evidence demonstrates that the exclusion of additional detail (which the AER refers to as complexity) is required to avoid downward biases for stocks with betas of less than one (i.e. Black CAPM) or otherwise incorrect results for 'value stocks' (i.e. FFM).
180. This criterion is also inconsistently applied. For instance, the AER's own foundation model concept is a good deal more complex than any of the SL-CAPM, Black CAPM and DDM taken individually and the aggregate result is clearly more complex than simply estimating the FFM. It is also a good deal more complicated than simply estimating all the models and taking a (weighted) average of the results.
181. The 'fit for purpose' criterion, when implemented by the AER, is also problematic. That criterion imports the notion that each relevant model should be employed in a manner that is 'consistent with the original purpose for which it was compiled'.¹²⁹ There is no logical basis to apply this constraint upon the use of the models. By analogy, medicines are commonly initially identified and marketed for one purpose (e.g. Aspirin as a pain killer) but are found to be very useful for other purposes (e.g. the use of Aspirin to ameliorate high blood pressure).
182. The AER has also adopted the criterion for consideration: 'where applicable, reflective of economic and finance principles and market information'. The AER reveals its intent through its written deliberations, and it appears

¹²⁷ AEMC, *Economic Regulation of Network Service Providers Rule Change Final*, November 2012, p. 49.

¹²⁸ AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, p. 31.

¹²⁹ AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, p. 39.

that the theoretical pedigree of the model is one of the key considerations as to whether the criterion is met or not:¹³⁰

We consider economic and finance theory provides important insights into the conditions for achieving economic efficiency, including for the setting of revenue and prices for natural monopoly service providers. Economic theory also suggests economically efficient outcomes are in the long-term interests of consumers. This criterion is intended to draw on these theoretical insights to maximise the likelihood that regulatory outcomes would promote economic efficiency, and thus would achieve the allowed rate of return objective and the (national electricity and gas) objectives.

183. Expressed in that way, the criterion appears unobjectionable but the AER has in fact used it as a criterion of inclusion *and* exclusion—as well as ‘ruling in’ a model, the AER considers has a strong theoretical foundation despite its dubious empirical credentials (i.e. the SL-CAPM), the AER’s draft explanatory statement for the rate of return guideline used this as one significant basis for ‘ruling out’ the FFM. The explanatory statement to accompany the guideline as promulgated gave greater emphasis to other considerations but it still noted that:

[W]e consider the statement by McKenzie and Partington—that there is no clear theoretical foundation to identify the risk factors, if any, that the model captures—to be informative.

184. In fact, the model’s theoretical underpinning is strong¹³¹ and more importantly its empirical credentials are strong and on this basis alone—regardless of whether it has a strong theoretical foundation—require that significant weight be accorded to the model.
185. Excluding models on this basis is likely to frustrate the achievement of the rate of return objective. To illustrate the point, consider by analogy what would have happened if the AER’s criteria were to have been applied to the discovery of the magnetic compass which was used for extensively for approximately 500 years from about 1100 before a theory was developed in 1600 to explain why it worked—that is, the idea that the earth itself was magnetic and that a magnetic needle will align with the earth’s magnetic field.

3.1.3.3 The guideline does not give real weight to all the relevant inputs as required

186. The approach to establishing the return on equity set out in the guideline is not consistent with the NER and is not the best possible estimate of the required rate of return for equity that progresses the NEO. In particular, the guideline does not meet the requirements of the new rule 6.5.2(e) that regard must be had to ‘relevant estimation methods, financial models, market data and other evidence’. It is recognised that ‘an expression such as ‘have regard to’ is capable of conveying different meanings depending on its statutory context.’¹³² And in the absence of a definition of relevant, it is to be given its ordinary meaning in the context.¹³³

¹³⁰ AER, *Rate of Return, Guideline Explanatory Statement*, December 2013, p. 21.

¹³¹ NERA, *The Fama-French Three-Factor Model, A report for the Energy Networks Association*, October 2013, pp. 8 to 10;

NERA, *Review of the Literature in Support of the Sharpe-Lintner CAPM, the Black CAPM and the Fama-French Three-Factor Model*, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA PowerNetworks, and United Energy, March 2015, pp. 17–21.

¹³² *Re Dr Ken Michael Am; Ex Parte Epic Energy (WA) Nominees Pty Ltd & Anor* [2002] WASCA 231, para. 55; and *Project Blue Sky v Australian Broadcasting Authority* (1998) 194 CLR 355.

¹³³ *Project Blue Sky v Australian Broadcasting Authority* (1998) 194 CLR 355.

187. In this regard, it was noted by the AEMC in its draft rule determination¹³⁴ and final rule determination:¹³⁵

*The final rule provides the regulator with sufficient discretion on the methodology for estimating the required return on equity and debt components but also **requires the consideration of a range of estimation methods, financial models, market data and other information so that the best estimate of the rate of return can be obtained overall that achieves the allowed rate of return objective.** [Emphasis added]*

188. Nor can it be adequate to elevate a single model as the foundation model and limit the role of all other models to the secondary status of estimating parameters within that foundation model unless there is a proper basis for concluding that they are unsuitable for contributing directly to the return on equity or that the return on equity cannot lie outside those constraints and that the 'right answer' must fall within the range of outputs that the foundation model could deliver.
189. Further, it is relevant to consider the context of the overall regulatory structure into which this new rule has been inserted. The same language requiring 'regard' to be had to the full range of relevant inputs now appears in both the new NER and National Gas Rules (**NGR**) and should be similarly applied.

190. NER:¹³⁶

In determining the allowed rate of return, regard must be had to:

(1) Relevant estimation methods, financial models, market data and other evidence; ...

191. NGR:¹³⁷

In determining the allowed rate of return, regard must be had to:

(a) Relevant estimation methods, financial models, market data and other evidence;...

192. The meaning of these words needs to be understood as both a reform to previous regulatory practice in electricity and to the previous regulatory practice in gas. In this regard, two points from the gas industry are important:

- **The term 'well accepted'**—the AER was permitted under the previous gas rules to depart from solely using the SL-CAPM and it could have chosen to use alternatives for setting the return on equity. Network providers had previously proposed other methodologies that the AER had considered but had either rejected outright or else had consigned to a secondary role as a 'cross check'. The AEMC recognised that this approach needed reform to remove consequent constraints that concepts such as 'well accepted' had placed on the AER, in the sense of accommodating broader range of inputs and the AEMC considered that the new rules would achieve their stated aim.

¹³⁴ AEMC, Economic Regulation of Network Service Providers Rule Change Draft Determination, August 2012 (**AEMC Draft Rule Determination**).

¹³⁵ AEMC, *Economic Regulation of Network Service Providers Rule Change Final Determination*, November 2012, p. 8.

¹³⁶ National Electricity Rule 6.5.2(e).

¹³⁷ National Gas Rule 87(5).

- **The term ‘have regard’**— the NGR is the successor to the Gas Code and much of the language is inherited from that document. The use of the term ‘have regard’ in the Gas Code has been the subject of extensive litigation and the courts construed the term within the context of that document as imposing a requirement on the regulator to give ‘real weight’¹³⁸ to the material and that it was inadequate to consider and give no weight to relevant information. Given the prominence of that litigation in the history of the development of the current NGR it is difficult to accept that the AEMC envisaged that it would be sufficient for the AER to consider all the relevant inputs and then give certain of those inputs no probative weight or only a constrained or secondary form of weighting.

193. The guideline does not adhere to the requirement to give real weight:

- **To the FFM**—because it is not used at all (specifically given no role)¹³⁹ in the establishment of the return on equity, and
- **To the Black CAPM and DDM**—although some limited role¹⁴⁰ may be given to the other two relevant models (the Black CAPM and DDM), these other models are each only used to inform one single parameter of the SL-CAPM. Even when used to inform a parameter of the SL-CAPM, they are used as secondary evidence that is disregarded to the extent that it is inconsistent with the primary range that is established using a different subset of the available evidence. Limiting their use this way severely constrains their ability to improve the quality of the return on equity estimate. In this way these models are not used in the standard way at all to estimate which is to calculate the required return on equity for the benchmark efficient firm as is the approach adopted by other regulators including in the United States (see 3.1.1.2 above).

194. The guideline explanatory statement describes the foundation model as follows:¹⁴¹

*Use one primary model with reasonableness checks. Generally, it would be expected that the output from the primary model would be adopted as our estimate of the expected return on equity (as per option one). However, where the reasonableness checks suggested the output from the primary model was not reasonable, the expected return on equity would be **determined based on regulatory judgement** (informative use of primary model). [Emphasis added]*

195. In any event, even if it were correct to hold significant reservations about the models other than SL CAPM, the deficiencies with the SL CAPM discussed in section 3.1.1.1 are demonstrably so significant that there is no choice but to reconsider the other models and give them significant weight to offset the significant flaws that could arise from giving the SL-CAPM primary weight.

196. The more detailed specification in the NSW draft decisions¹⁴² provide additional insight into the AER’s approach of how the foundation model is to be applied, providing examples of the ‘cross check’ and ‘regulatory judgement’—each of which have been problematic concepts in energy regulation. With respect to ‘cross-checking’ it is easy to decide what to do when all the evidence is mutually corroborative. However, there is a problem when the secondary ‘cross check’ material contradicts the primary material (and usually there is no

¹³⁸ RE Dr Ken Michael AM; ExParte Epic Energy (WA) Nominees Pty Ltd & Anor [2002] WASCA 231 at [55 – 6].

¹³⁹ AER, *Better Regulation. Rate of Return Guideline*, December 2013, p. 13.

¹⁴⁰ AER, *Better Regulation. Rate of Return Guideline*, December 2013, p. 13.

¹⁴¹ AER, *Better Regulation, Explanatory Statement, Rate of Return Guideline*, December 2013, p. 78.

¹⁴² See: AER, *Draft decision for Ausgrid distribution determination 2015-16 to 2018-19*, Overview, November 2014;

AER, *Draft decision for Directlink determination 2015-16 to 2019-10*, Overview, November 2014, pp. 33–34;

AER, *Draft decision for Endeavour Energy distribution determination 2015-16 to 2018-19*, Overview, November 2014, pp. 41–42;

AER, *Draft decision for Essential Energy distribution determination 2015-16 to 2018-19*, Overview, November 2014, pp. 41–42;

AER, *Draft decision for Jemena Gas Networks (NSW) Ltd Access Arrangements 2015-20*, Overview, November 2014 pp. 37–38; and

AER, *Draft decision for Transgrid transmission determination 2015-16 to 2018-19*, Overview, November 2014, pp. 39–40.

concrete explanation by the regulator of what would happen). Where there is a conflict, either the initial estimate is to be preferred regardless of what the ‘cross check’ suggests or the secondary material is used to displace the initial estimate. In either case, one piece of information is in effect being given determinative weight and the other information is being given no weight.

197. The only ‘circuit breaker’ is to suggest that in the event of a conflict ‘regulatory judgement’ will prevail. The problem with this concept is that it is generally the term used when a regulator selects a value from within a list of conflicting factors without providing the reasoning as to how the particular value was chosen. In other words, this term is usually used when there is no reasoning provided, and in that sense the decision is unreasonable. In this circumstance, it is impossible to know whether real weight was given to all the relevant material. This is not consistent with the Rules which require reasons to be given at both the draft determination stage and the final determination stage.¹⁴³
198. For example, the AER uses ‘regulatory judgement’ in selecting a beta at the high end of its depressed range of 0.4 to 0.7 but there is no positive rationale expressed about why the 0.7 figure was selected. This means that if (as we contend) the range is incorrect, it is not possible to discern whether the 0.7 number is then also incorrect. The AER may consider that unencumbered by the depressed range the number would be higher. An alternative approach is to find an empirical method or unique rationale which directly supports the particular number.
199. The draft determinations identify a number of matters that have not been the basis of selecting the 0.7 number but the closest that the regulator comes to an articulation of why the 0.7 number has been chosen is when the AER has read all of the materials submitted to it and has reached a ‘balanced outcome’ by using ‘regulatory judgement’ that results in it being ‘satisfied’ as to the furtherance of the rate of return objective.¹⁴⁴

After taking these considerations into account, we adopt an equity beta point estimate of 0.7 for this draft 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 very 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. It also recognises the uncertainty inherent in estimating unobservable parameters, such as the equity beta for a benchmark efficient entity.

200. And:¹⁴⁵

*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. 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, FFM or SFG’s construction of the DGM (see appendix A and C). **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 appendix A.2.1).*

*Our equity beta point estimate provides a balanced outcome, given the submissions by stakeholders and services providers. Figure 3-6 shows our equity beta 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*

¹⁴³ NER, Rules 6.10.2(3) and 6.11.2(3).

¹⁴⁴ AER, *Draft decision for Jemena Gas Networks (NSW) Ltd Access Arrangements 2015-20*, Overview, November 2014, p. [3-82].

¹⁴⁵ AER, *Draft decision for Jemena Gas Networks (NSW) Ltd Access Arrangements 2015-20*, Overview, November 2014, p. [3-83].

consistent with the NEO and RPP. We provide a detailed analysis of technical issues and responses to Ausgrid's proposal in appendix D. [Emphasis added]

201. And further:¹⁴⁶

*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. 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 do not consider the 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.2.1). Our equity beta point estimate provides a balanced outcome,** given the submissions by stakeholders and services providers. Figure 3-20 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 and RPP. [Emphasis added]*

202. And finally:¹⁴⁷

*We note McKenzie and Partington have now indicated the Black CAPM (of itself) does not justify any uplift to the estimated equity beta to be used in the SLCAPM. Nevertheless, we consider the model does theoretically demonstrate that market imperfections **could lead to the SLCAPM generating RoE estimates that are too high or too low. We have taken this into account in exercising our regulatory judgment** in choosing to use an equity beta of 0.7 in the SLCAPM. This is the equity beta we indicated we would use at the time we published the Guideline.*

We also acknowledge an equity beta of 0.7 is well above the fixed weight portfolio and average of individual firm equity beta estimates in Henry's 2014 report. However, in using an equity beta of 0.7 in applying the SLCAPM, we have exercised our regulatory judgment taking into account a range of information beyond the empirical beta estimates. We have selected an equity beta point estimate of 0.7 because we consider will this lead [sic] to a RoR that meets the RoR objective and best advances the RoR objective. We consider this is appropriate in all the circumstances. [Emphasis added]

203. While the decision discloses a series of matters that were **not** the reason for the 0.7 figure, from what has been written, it is simply not possible to understand in any positive way how the figure of 0.7 was reached and in the absence of a rational explanation it is not possible to hold the decision to account. Related to the inadequacy of the explanation for the adoption of a value of 0.7 is the failure the AER to explain why this figure has been significantly reduced since the AER's 2009 determination when essentially the same information was considered (other than information which now points to a higher beta). SFG explains this in more detail in paragraphs 89 to 92 of its 25 February 2015 report on 'The required return on equity for the benchmark efficient entity'.¹⁴⁸

204. Both of these problems are illustrated in the AER's draft NSW determinations. For example, when selecting a beta range of 0.4 to 0.7 the AER relies on a small (and potentially unrepresentative) set of partly dated data for domestic firms—which are dwindling in number rapidly. The AER purports to apply a 'cross-check' comparison with international data from the UK and US but the US material, and the average of the combined material,

¹⁴⁶ AER, *Draft decision for Jemena Gas Networks (NSW) Ltd Access Arrangements 2015-20*, Overview, November 2014, p., [3-83].

¹⁴⁷ AER, *Draft decision for Jemena Gas Networks (NSW) Ltd Access Arrangements 2015-20*, Overview, November 2014, p. [3-172].

¹⁴⁸ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, pp. 19–20.

when properly considered, delivers results above the 0.7 level.¹⁴⁹ To resolve the inconsistency, the AER adheres to the initial range, effectively rendering the international ‘cross check’ material of nugatory value.

205. The same problem arises in relation to the ‘cross checking’ that is said to occur in respect of the Ibbotson inspired AER approach to specifying the SL-CAPM using the Wright approach. SFG states:¹⁵⁰

This highlights the problem of using one subset of relevant evidence when estimating the original MRP parameter while relegating another subset of the relevant evidence to the role of “cross checks.” Having determined that the Wright approach for estimating the MRP is relevant evidence, and having obtained a Wright estimate of the return on equity that is materially inconsistent with the AER’s proposed estimate, there are two possible courses of action. Either:

- (a) *The AER would retain its original estimate – in which case the cross check has no effect and there seems to be no point in performing it; or*
- (b) *The AER would revise its original estimate to make it consistent with the cross-check estimate – in which case the original evidence has effectively been discarded in favour of the cross check evidence.*

3.1.3.4 The improper search for a preeminent model and improper constraints inherent in using a ‘foundation’ model

206. An assumption underpinning the guideline is that it is possible to identify a single superior model and to accord that model ‘single foundation’ status which in practice means setting outer limits on the range of possible values for the return on equity from the high and low point estimates that model delivers.
207. The first flaw with this aspect of the guideline is that there is no evidence to support the assumption that there is a superior model and it is simply wrong. The concept of a foundation model does not appear in the NER or the NEL. Indeed, when adopting the rules, the AEMC notes with disapproval that:¹⁵¹

The AER has strongly rejected any approach other than the CAPM in its submission. The AER’s view is that it is unlikely that there would be a justifiable departure from the CAPM over the medium to long term.

208. A key purpose of the rule change was clearly to prevent the AER from retaining the SL-CAPM as a preeminent model. The AEMC’s rejoinder to the AER’s emphatic preference for the SL-CAPM was as follows:¹⁵²

“Most of the financial models that exist in the finance field are based on academic work. All of the models appear to have some weaknesses. All the models that have been advanced have been criticised for either the underlying assumptions required or lack of correlation of modelling results with empirical tests. Even the CAPM has been criticised in academic literature. For example, some of the identified limitations of the CAPM are:

- *It is based on unrealistic assumptions;*

¹⁴⁹ SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 13 February 2015. See Paragraphs 40-56. In particular, the AER states that some pieces of international evidence support an estimate below 0.7. SFG shows that these pieces of evidence, when properly considered on a like-for-like basis, support estimates above 0.7.

¹⁵⁰ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, para. 151, p. 32.

¹⁵¹ AEMC, *Draft Rule Determination*, 2012, p. 47.

¹⁵² AEMC, *Draft Rule Determination*, 2012, pp. 47–48.

- *It is difficult to test the validity of the CAPM; and*
- *The Beta estimate does not remain stable over time.*

Two of the most prominent academics in this field, Eugene Fama and Kenneth French, make the following statement on the CAPM:

'The attraction of the CAPM is that it offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk. Unfortunately, the empirical record of the model is poor – poor enough to invalidate the way it is used in applications. The CAPM's empirical problems may reflect theoretical failings, the result of many simplifying assumptions. But they may also be caused by difficulties in implementing valid tests of the model.'

An illustration of the issues associated with just relying on the CAPM to estimating return on equity has also been highlighted by the LMR Panel. In its stage one report, the LMR Panel noted that 'binding regulatory decisions hand and foot to a financial model with known defects does not immediately commend itself as an approach that will advance the NEO and NGO'.

*There are a number of other financial models that have varying degrees of weaknesses. Some of the financial models that have gained some prominence include the Fama-French three-factor model, the Black CAPM, and the dividend growth model. Weaknesses in a model do not necessarily invalidate the usefulness of the model. Ultimately it is important to keep in mind that all these financial models are based on certain theoretical assumptions and **no one model can be said to provide the right answer.** [Emphasis added]*

209. SFG states:¹⁵³

Because all the models have different strengths and weaknesses along different dimensions, it is impossible to identify one superior model that alone would out-perform the combined evidence of all of the relevant models.

210. Neither of the AER's experts was explicitly asked whether the SL-CAPM model is superior to the others or whether the SL CAPM is more likely to produce the best estimate of the required return on equity, relative to an approach that considers all of the relevant models. Rather they were asked whether the foundation model was capable of delivering an allowance that met the rate of return objective or whether there was a 'compelling reason' to depart from the SL-CAPM.
211. Even their reports demonstrate that there are strengths of the other models and weaknesses of the SL-CAPM, the inevitable conclusion of which is that the SL-CAPM is not necessarily preferable.¹⁵⁴

An apparent weakness of the Sharpe-CAPM is the empirical finding, for example by Black, Jensen and Scholes (1972) and Fama and French (2004), that the relation between beta and average stock returns is too flat compared to what would otherwise be predicted by the Sharpe-CAPM – a result often referred to as the low beta bias. In 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.

¹⁵³ SFG, *The required return on equity for regulated gas and electricity network businesses*, A report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks June 2014, para. [370], p. 89.

¹⁵⁴ Handley J, *Advice on the Return on Equity*, Report prepared for the Australian Energy Regulator, 16 October 2014, p. 5.

212. And:¹⁵⁵

The AER's proposal for estimating the expected return on equity using the S–L CAPM as a 'foundation model' provides a starting point, which is firmly based in a mature and well accepted theoretical and empirical literature. As 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. The final estimate of the expected return on equity may have regard to a broad range of relevant material including a range of multifactor models such as the Fama and French (1993) and the APT of Ross (1976), inter alia. Many of these competing models nest this foundation model and so potentially make more use of available information. In that sense, they may prove to be useful in validating this foundation model estimate.

213. As discussed in the next section, there are strong reasons why the SL-CAPM is not the best of the available models. However, even if it were the best of the available models, using it in the way that the AER has done constrains, and in some cases prevents, insights from the other models from being employed. Further, adopting a single foundation model is inconsistent with practices of other regulators who draw on a number of models to inform their decisions.¹⁵⁶

214. Elevating any one model to the 'foundation' status necessarily gives that model primary weight and all the other models less weight. Given the significant downward bias of this model for low beta stocks and the over-all empirical shortcomings of the SL-CAPM, the AER's approach gives undue primary weight to the foundation model and, contrary to the requirement to take into account all the available information, the AER's framework improperly constrains the regard the AER can effectively give to those other models.

215. There is substantial evidence that the SL-CAPM produces a downwardly biased estimate of the return on equity for low beta firms and value stocks—both characteristics apply to the benchmark efficient entity.¹⁵⁷ Recent NERA work, for example, concludes as follows with respect to its in-sample tests of the SL-CAPM:¹⁵⁸

The data indicate that there is a negative rather than a positive relation between returns and estimates of beta. As a result, the evidence indicates that the SL CAPM significantly underestimates the returns generated by low-beta portfolios and overestimates the returns generated by high-beta portfolios. In other words, the model has a low-beta bias. The extent to which the SL CAPM underestimates the returns to low-beta portfolios is both statistically and economically significant.

216. Further, using current data, SFG calculates returns using the various models, which illustrates that the SL-CAPM delivers a lower result than any other model, particularly when the SL-CAPM is estimated in the way the AER proposes via placing primary reliance on a sub-set of the relevant evidence.

¹⁵⁵ McKenzie M and G Partington, *Report to the AER, Part A: Return on Equity*, The Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited, October 2014, p. 9.

¹⁵⁶ See for example Application of Southwest Gas Corporation for authority to increased its rates and charges for natural gas service for all classes of customers in Southern and Northern Nevada. 2009 Nev. PUC LEXIS 265 at p. 7;

Application of Southwest Gas Corporation for authority to increase its rate and charges for natural gas service for all classes of customers in Southern and Northern Nevada. 2009 Nev. PUC LEXIS 237; 277 P.U.R. 4th 182 at p. 4; and

Application of Sierra Pacific Power Company for authority to begin to recover the costs of constructing the new Tracy Combined Cycle Unit and other plant additions and costs of service through an increase of its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto. 2008 Nev. PUC LEXIS 288 at p. 7.

¹⁵⁷ SFG, referring to the extensive empirical research in this respect, such as the work of Black, Jensen and Scholes (1972), Friend and Blume (1970) and Fama and Macbeth (1973) in: SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 22 May 2014, pp. 6–10.

¹⁵⁸ NERA, *Empirical Performance of the Sharpe-Lintner and Black CAPM*, A Report Jemena Gasworks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SAPower Networks and United Energy, February 2015, p. 54. Similar results arise from out-of-sample tests.

217. An important basis for the AER's exclusion of the FFM was that the AER considered there to be no clear theoretical foundation to identify risk factors. This is an improper basis upon which to exclude a model that in fact performs well empirically in explaining stock market returns. Indeed, there is a lot to be said for giving primacy to empirical performance over theories as, until they are tested robustly, theories are simply one idea as to reality.
218. There is no reason to suppose that selecting from the upper range of possible outcomes for SL-CAPM parameters will correct for these biases. Indeed by selecting from ranges set using a downwardly biased model there is logically a significant risk that the true or unbiased return on equity will lay outside that range.
219. The AER has acknowledged that the DDM, Black-CAPM and survey evidence can also be informative in addressing some of the limitations of the AER's application of the SL-CAPM. However, under the AER's framework, the inputs from this evidence are only taken into account within an upper limit selected from an application of the SL-CAPM that has not corrected for those biases. There is, therefore, every reason to suppose that the results do not accord with prevailing (unbiased) equity returns.
220. Moreover, the AER's method does not confirm to the regulator's own 'fit for purpose' criterion¹⁵⁹ which is that regard should be had to the limitations of the model's original purpose. The SL-CAPM was not originally implemented by drawing parameter estimates from competing models, and nor were the competing models developed for the purpose of estimating parameters to be used in the SL-CAPM. In implementing its convoluted foundation model approach, the AER is not being true to any model and is not implementing any model in the way that was intended.

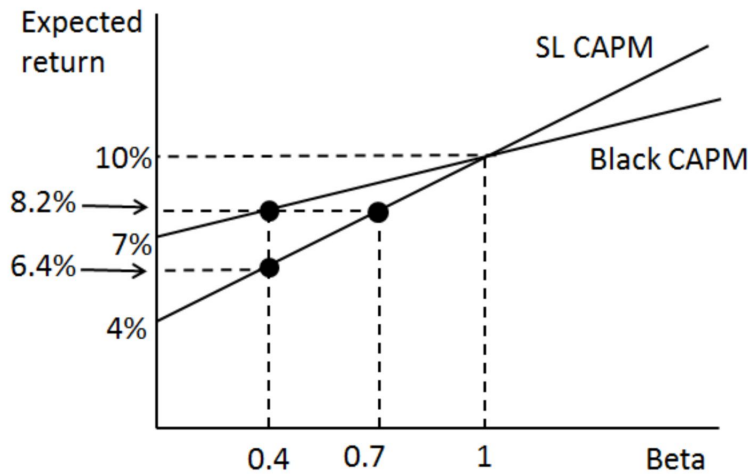
3.1.3.5 Flawed selection of the Ibbotson inspired AER approach to implementing the SL-CAPM as the foundation model

221. Even if the rules did allow a foundation model to constrain the ways in which other relevant data can contribute to the allowed rate of return, there is no basis to conclude that: 'We consider it superior to other models we have considered. We therefore employ the [Ibbotson inspired] SLCAPM as our foundation model'.¹⁶⁰
222. There are two aspects to the AER's flawed specification of the Ibbotson inspired AER approach to implementing the SL-CAPM as the foundation model (a) the selection of the SL-CAPM and (b) specifying it in the manner the AER does.
223. The SL-CAPM is flawed both because it has very weak explanatory power—that is, there is at best a very weak association between observed returns and betas—and there is a downward bias for stocks with a beta of less than one due to the assumption of the Sharpe-CAPM that there is a risk free asset and investors are assumed to be able to borrow or lend freely at the risk free rate. The Black CAPM does not suffer this flaw—as shown in Figure 3–1.

¹⁵⁹ As noted above, we consider this criterion to be a distraction that is likely to lead the AER away from the attainment of the rate of return objective. However, even it were a relevant criterion, there is a failure to apply the criterion properly.

¹⁶⁰ For example, AER, *Draft Determination, Jemena Gas Networks*, 2015–20, Attachment 3: Rate of Return, November 2014, p. [3-27].

Figure 3–1: Relationship between expected return and beta

Source: SFG.¹⁶¹

224. The size of the bias is very substantial when compared with previous Australian Competition Tribunal cases. For example, in ActewAGL the Tribunal corrected a decision arising from the selection of the source of debt by 53 basis points. Adjusting this using the 60:40 leveraging assumption, this is equivalent to approximately 80 basis points. By contrast, NERA has estimated that at about the mid-point of the AER's 0.4 to 0.7 range for beta, the downward bias is approximately 490 basis points.
225. As detailed in the discussion below, the AER does not explain clearly what it has done to address this bias but it appears that a substantial contributing factor in selecting a beta at the higher end of the AER's 0.4 to 0.7 range for beta is in recognition of this bias. The problem with this approach is that there is no reason to suppose that this adjustment is sufficient to address the low-beta bias. A much safer way to proceed would be to avoid selecting the SL-CAPM as the foundation model or, indeed, not to elevate any model to the foundation model status.
226. The low beta bias is not the only flaw of the SL-CAPM and there are others that independently, and together, are sufficient to disqualify the SL-CAPM from contention as the foundation model. Indeed, SFG is of the view that not only is it necessary to relax the assumption that investors are assumed to be able to borrow or lend freely at the risk free rate (as the Black CAPM does) to overcome the bias but to improve the over-all fit of the data to the model it is also necessary to take into account the insights from Fama and French's work:¹⁶²

The AER adopts a model that does not fully account for factors that are associated with stock returns. The AER's use of the Sharpe-Lintner CAPM, without giving consideration to the Fama-French model, means that it places sole reliance on a model that has been shown to have less ability to explain stock returns.

¹⁶¹ SFG, *The required return on equity for regulated gas and electricity network businesses*, A report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks, 6 June 2014, p. 93.

¹⁶² SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, p. 10, para. [42].

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227. All the above models are forms of capital asset pricing models which, in the US, are generally regarded as flawed when compared with the DGM. For example, the Maine Public Utilities Commission states that:¹⁶³

The theoretical weaknesses of the CAPM spelled out in the Bench Analysis causes us to rely more heavily on the DCF analysis in our decision making. In this particular case, the lack of a true forward looking beta is a large obstacle given that a pure T&D-utility industry does not exist at this point in time.

228. With models that do not suffer from the flaws of the SL-CAPM, any of them would be preferable to select as a foundation model (if the rules required or permitted such a foundation model).
229. It is not surprising, therefore, that, at present, all the other models provide a mutually corroborating cluster of benchmark returns on equity for benchmark energy network businesses. These returns are in the vicinity of 9.93 to 10.32% while the SL-CAPM falls well below that cluster at 9.3% when estimated by SFG, and orders of magnitude lower when estimated using the AER's Ibbotson inspired implementation at 7.19% using the same sample averaging period.¹⁶⁴ The 7.19% compares to the 8.1% determined by the AER during the November 2014 draft decisions,¹⁶⁵ with the drop due to the material fall in observed CGS yields over the last few months.¹⁶⁶
230. These figures also highlight the significance of choosing between different approaches to implementing the SL-CAPM when using it as a foundation model.
231. Having chosen to adopt the SL-CAPM as the foundation model, the AER is confronted with two approaches for using historical stock return data to estimate MRP: the Ibbotson and Wright approaches. The AER elects to adopt the 'status quo' which is to primarily rely on the 'Ibbotson Approach' to measuring the historical MRP. The AER combines its estimate of the historical MRP with an 'on the day' risk free rate. The AER, has quite elaborately chosen to constrict itself to the Ibbotson approach, paying no more than lip service to the notion of the Wright approach by adopting 'cross checking' of the sort described above that gives the secondary material nugatory weight.
232. In the current economic conditions, the AER's approach of combining a contemporaneous measure of the risk free rate with an essentially constant MRP delivers values that are necessarily materially lower than prevailing market returns.
233. Experts explain that there is no one-to-one relationship between movements in the risk free rate and the risk adjusted returns that investors require. In fact the MRP tends to fluctuate in the reverse direction from risk free rates.¹⁶⁷
234. Although the expert work is informative at an aggregate level, there are also occasions when this concept is readily apparent. For example, shortly after the collapse of Lehman Brothers two key propositions were inescapably prominent to finance market practitioners and the general business community alike—at the same time that investors became nervous and were demanding significantly increased returns, central banks were

¹⁶³ Public Utilities Commission, Investigation of Central Maine Power Company's Stranded Costs, Transmission and Distribution Utility Revenue Requirements, and Rate Design, 1998 Me. PUC LEXIS 603 at [42]. See also Public Utilities Commission, Investigation of Central Maine Power Company's Stranded Costs, Transmission and Distribution Utility Revenue Requirements, and Rate Design, 1999 Me. PUC LEXIS 259 at para. [41].

Note: these cases predate decisions in which an equal weighting between the Black CAPM and the SL-CAPM have been adopted.

¹⁶⁴ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, p. 35.

¹⁶⁵ AER, *Draft Determination, Jemena Gas Networks*, 2015–20, Attachment 3: Rate of Return, November 2014, p. [3-34].

¹⁶⁶ For a discussion of this drop, see: Guy Debelle, *Global and domestic influences on the Australian bond market*, 16 March 2015.

¹⁶⁷ For instance, see: SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, pp. 28–30, para. [132]–[142].

significantly reducing wholesale interest rates to try and stimulate the economy. This is a stark example of what the expert evidence shows is generally the case: the MRP and risk free rates tend to move in opposite directions.

235. This means that adding a long run average (essentially constant) MRP to a contemporaneous risk free rate will deliver downwardly biased results when risk free rates are low and upwardly biased results when risk free rates are high. In the current environment of record low risk free rates, a simple addition of a very long term MRP with a current risk free rate is almost bound to significantly under compensate equity investors.
236. Indeed, the approach in the draft determinations delivers a nominal post tax return on equity of just 8.1% which is very substantially lower than five years previously which provided for a return on equity of, in Ausgrid's case 11.82%, and similar figures for other businesses. More than two percentage points of that drop can be attributed to the fall in the underlying risk free rate. While the risk free rate has dropped in this way, there is simply no evidence available from which to conclude that equity investors' required rates have fallen in exact proportion to the fall in the risk free rate.
237. Exactly the same question confronted the AER's US counterpart in its 28 January 2014 decision concerning the New York Independent System Operator. In that case FERC decided as follows:¹⁶⁸

*We find that NYISO's proposed ROE value of 12.5 percent is adequately supported by substantial evidence. NYISO argues that unique **current conditions in financial markets created a downward bias in the CAPM results, necessitating a calibration adjustment of 1.21 percent to the calculated return on equity of 11.29 percent.** Specifically, NYISO argues that the result yielded by the CAPM analysis "appeared potentially too low relative to regulated rates of return and as the CAPM is subject to bias at times during the interest rate cycle" because of the potential impact on the historic relationship between the market returns for government debt and common equities. Given the recent trends of near-historic low yields for long-term U.S. Treasury bond rates, the CAPM's input for the "risk-free" rate, we find that it is a reasonable assumption that the current equity risk premium (which is added to the risk-free rate to calculate the cost of equity data point that determines the slope of the CAPM curve) exceeds the 86-year historical average used as the consultants' CAPM input. **The current low treasury bond rate environment creates a need to adjust the CAPM results, consistent with the financial theory that the equity risk premium exceeds the long-term average when long-term U.S. Treasury bond rates are lower than average, and vice-versa.** [Emphasis added]*

238. Even in Continental Europe, where NERA notes there is a significant problem mismatching long term market risk premia with short term risk free rates that is already leading to under-investment, it is remarkable to note what those countries regard as a "short term" averaging period for the risk free rate:¹⁶⁹
- In Austria a five year averaging period is combined with a 110 year MRP
 - In the Netherlands a three year averaging period is combined with a 110 year MRP
 - In France a one to two year averaging period is combined with a 110 year MRP, and
 - In Norway a long term risk free rate is combined with long term MRP.
239. On this issue, the AER is clearly out of step with all its major peers.

¹⁶⁸ Federal Energy Regulatory Commission, *Order accepting tariff filing subject to condition and denying waiver*, Docket No. ER14-500-000, 28 January 2014, p. 36.

¹⁶⁹ NERA, *European Regulators' WACC Decisions Risk Undermining Investment Decisions*, 2015, p. 4. The table also reports on Denmark which has a 6 month averaging period and Germany with an unspecified "short term" averaging period. Across the Channel in the UK there is a 'long and short term' averaging period for the risk free rate.

240. It might be tempting to jump to the conclusion that under-compensating investors at this time is of little concern if, once the economic cycle turns, the current under-compensation could be off-set by future over-compensation but this is not the case. If there is a mismatch in either direction between prevailing rates and regulatory allowances, inefficiencies will arise. Firstly, there are costs for the businesses of absorbing inter-temporal fluctuations in returns through explicitly or implicitly carrying a balance sheet provision for such a mismatch. Secondly, at times of under-compensation timely investments are discouraged or delayed and at times of over-compensation the opposite effect applies and there is an incentive to invest earlier than required. Neither is efficient, nor in the interests of consumers. Note also that these effects are pro-cyclical which means that the direction of the mismatch encourages businesses to reduce capital expenditures at times when input costs are likely to be low and to increase capital expenditures at times when input costs are likely to be high.
241. It is appropriate, therefore, that the rules require (as they do) that each determination provides for a regulatory allowance that is commensurate with the prevailing efficient costs for a benchmark firm at the time. In the AEMC's words:¹⁷⁰

If the allowed rate of return is not determined with regard to the prevailing market conditions, it will either be above or below the return that is required by capital market investors at the time of the determination. The Commission was of the view that neither of these outcomes is efficient nor in the long term interest of energy consumers.

242. In other words, unless the AER has a proper basis to conclude that the investors' expectations move in parallel with the risk free rate, placing effectively sole reliance on the Ibbotson inspired implementation of the SL-CAPM as it does, prevents its MRP estimate from adjusting to produce an allowed rate of return that can accommodate the prevailing expectations of equity investors.

3.1.3.6 Errors in the AER's selection of beta

243. Equity beta is the key input into the SL-CAPM representing the AER's view as to the risks associated with the operation of an energy network business relative to benchmark efficient businesses. The AER has indicated that it intends to adopt an 'equity beta' to its lowest level ever in Australian regulatory decision making. The equity beta has progressively been down-graded from 1.0 for most of the period since the NEM began¹⁷¹ to 0.8 and now proposed to be 0.7 (including in NSW).
244. The AER's decision to significantly downgrade the beta value is based on a general review of risk by Frontier Economics and on domestic empirical estimates. Frontier's report sets the scene in a broad qualitative sense, suggesting that electricity businesses are comparatively safe—even with high levels of leverage. In our view, that report fails to properly assess the risks facing the business as noted by SFG.¹⁷² Specifically, the Frontier report only deals with operational risks that are relevant to the asset beta. The Frontier report does not consider whether the higher-than-average leverage offsets the lower-than-average asset beta, and therefore never makes any recommendation about whether the equity beta is likely to be above or below 1. We submit that the AER has clearly misinterpreted and misrepresented the findings of that report.
245. Further, it proceeds in the face of firm evidence that electricity network businesses are becoming more risky over time compared with a balanced market portfolio. By contrast, as detailed in this attachment, there is significant evidence to conclude that electricity network businesses are experiencing significant increases in risk. Debates can be had as to whether these risks are best included in the beta or elsewhere but presently these increases are accommodated neither in the equity beta nor in any other part of the regulatory framework.

¹⁷⁰ AEMC, Rule Determination, November 2014, p. 44.

¹⁷¹ Note that in South Australia the figure was 0.9.

¹⁷² SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 13 February 2015, 12 [38].

246. When it comes to making a quantitative estimate, it would be surprising if all parties did not agree with the following proposition:¹⁷³

In an ideal world there would be a very large number of domestic comparators and there may be no need to consider international comparators at all.

247. Unfortunately the current situation could not be further from the ideal world because the number of domestic firms has dwindled to an unworkably small number with current data available for only four domestic comparators. When the US Federal Energy Regulatory Commission was confronted with the same problem (i.e. a comparator set that shrank below 10 or so) in relation to interstate gas pipeline businesses, it broadened the sample:¹⁷⁴

[S]tructural changes have strained the Commission's prior approach towards proxy group composition to breaking point. As a result of mergers, acquisitions, and other changes in the natural gas industry, fewer and fewer interstate natural gas companies have satisfied our prior requirements for proxy group composition.

Our policy change was born out of a practical recognition that the size of the proxy group used under our prior approach had shrunk dramatically.

248. However, the AER continues to rely on an ever narrowing set of current data supplemented by ever more dated observations that cannot any longer be assumed to represent the prevailing return on equity funds as required by rule 6.5.2(g). As SFG explains:¹⁷⁵

The AER adopts a set of nine domestic comparator firms, only four of which remain listed. Two of the firms have not been listed since 2006 and one has not been listed since 2007. The AER's approach is to maintain the beta estimates for these firms in its sample, even though those estimates become progressively more dated with the passage of time. That is, the beta estimate at the time a firm delists becomes a permanently determinative observation in the AER's sample. By the time the current Guideline expires, three of the nine beta estimates will be more than 10 years out of date. These estimates will, by definition, not reflect anything that has transpired in financial markets for over a decade.

249. In the guideline process,¹⁷⁶ the AER drew this scarce dataset several results that appear to be mutually corroborative but which are in fact averages drawn from substantially over-lapping datasets or the same datasets reworked using two different statistical techniques. This delivered a range of 0.4 to 0.7. The principal analysis that was intended to inform the estimate was a report by Henry which was not delivered until five months after the Guideline was issued.

250. In this report from Professor Henry of the University of Liverpool Management School¹⁷⁷ the AER's brief tightly specified the data he was to use ('nine specified Australian gas/electricity firms', 'short term Australian Government debt' and the 'ASX 300 Accum') and precisely what work was to be done. He was instructed to use 100% Australian data, weekly returns, value weights, no Blume adjustment, no Vasicek adjustment, the

¹⁷³ SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 13 February 2015, 12 [38].

¹⁷⁴ Federal Energy Regulatory Commission, *Statement of Chairman Joseph T. Kelliher*, 17 April 2008.

¹⁷⁵ SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 13 February 2015, p. 10 [28]-[29].

¹⁷⁶ AER, *Rate of Return Guideline*, Explanatory Statement, Appendix C, 2013, pp. 53–55.

¹⁷⁷ Henry, O, *Estimating : An update*, University of Liverpool Management School, April 2014.

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Dimson thin trading adjustment, the ordinary least squares regression model and to report his answers at the 95% confidence interval.

251. Indeed there are only two aspects of the project in which Henry was explicitly permitted to exercise his judgement: in relation to the regression equation he was permitted to use '[E]ither raw returns or excess returns (but not both)¹⁷⁸ and with respect to the stability and robustness tests he was permitted to adopt 'consultant's choice'. In other words, Professor Henry's work does not set out his expert opinion as to the level of beta at large and instead he has undertaken a highly constrained process of employing inputs provided by the AER in a manner specified by the AER and the results are a product of the AER's views concerning each of the relevant inputs.

252. Within that constrained framework, Henry's report states:¹⁷⁹

The consultant is of the opinion that the most reliable evidence about the magnitude of is provided in Tables 2, 14 and 16 using individual assets and fixed weight portfolios...

*In the opinion of the consultant, the majority of the evidence presented in this report, across all estimators, firms and portfolios, and all sample periods considered, suggests that the point estimate for lies in the range **0.3 to 0.8**. [Emphasis added]*

253. Indeed of the nine firms that Henry was instructed to consider, (in Henry's Table 2) two of the beta estimates significantly exceed 0.8 (Alinta at 0.8795 and Hastings at 1.0305). The report states that:¹⁸⁰

[T]aken together, the evidence from Table 2 suggests that the point estimates of equity beta lie in the range 0.21 to 1.04.

254. The range reported by Henry is narrower than the 0.21 and 1.04 due to the instructions that the AER placed upon him as to how he was to establish a range.

255. In other words, even using the AER's tightly constrained set of instructions, its own consultant states that the range is 0.3 to 0.8, not 0.4 to 0.7 as published in the guideline and when unconstrained by the strictures imposed in the AER's instructions, the analysis delivers beta estimates that vary even further in an upward and downward direction.

256. Despite this December 2014 evidence demonstrating the 0.4 to 0.7 range published in the guideline to be in error, the AER has failed to retract and correct the document. Instead, in the draft determinations the approach is to delve into the report and assert that the majority of the beta figures fall within the AER's narrower range even though the narrower range is not consistent with the instructions the AER itself provided to Henry.

257. The AER sought to bolster the domestic data with one set of international comparators for the guideline and another in the NSW draft determinations. SFG has examined all that material and concluded that, in relation to the first set of data relied upon, all the contemporaneous estimates are above 0.7.

¹⁷⁸ Henry, O, *Estimating* : An update, University of Liverpool Management School, April 2014, p. 4.

¹⁷⁹ Henry, O, *Estimating* : An update, University of Liverpool Management School, April 2014, p. 63.

¹⁸⁰ Henry, O, *Estimating* : An update, University of Liverpool Management School, April 2014, p. 17.

258. In relation to the latter data, the analysis has been undertaken with insufficient rigor. For example, the AER has relied upon the following:¹⁸¹

Alberta Utilities Commission (2013). This report documents submissions to the regulator in relation to equity beta – it does not present any estimates of beta. Unsurprisingly, user groups such as the Canadian Association of Petroleum Producers (CAPP) submitted that a low equity beta should be used. The report provides no information at all about the basis for the equity beta submissions. There is no information about how many, or which comparator firms were used. There is no information about what statistical techniques were employed or how the range of resulting estimates was distilled into a point estimate or range.

259. It is also important to note that the beta used in Alberta is the starting point for the analysis and after which an assessment is made of whether ‘adders’ are required to increase the returns to meet the required returns.

260. SFG has identified significant flaws in the use of the following report:¹⁸²

PWC (2013) In its recent draft decisions the AER summarises the evidence from the PWC report for the NZCC as follows:

‘PwC’s June 2014 report presents the following raw equity beta estimates for New Zealand energy network firms as at 31 December 2013: 0.6 for the average of the individual firm estimates.’

The AER implies that this estimate of 0.6 can be compared with its allowed equity beta of 0.7. However, such a comparison would be an error for the reasons set out below. First, the 0.6 estimate does not appear anywhere in the PWC report. The beta estimates set out in the “Utilities” section of the report are set out in the table below.

Table 1. PwC beta estimates for the NZCC

<i>Company</i>	<i>Raw beta</i>	<i>Leverage</i>	<i>Regeared beta (to 60% debt)</i>
<i>Contact</i>	<i>0.9</i>	<i>0.27</i>	<i>1.64</i>
Horizon	0.5	0.31	0.86
<i>NZ Windfarms</i>	<i>0.5</i>	<i>0.33</i>	<i>0.84</i>
<i>NZ Refining</i>	<i>0.8</i>	<i>0.17</i>	<i>1.66</i>
<i>TrustPower</i>	<i>0.5</i>	<i>0.36</i>	<i>0.80</i>
<u>Vector</u>	<u>0.7</u>	<u>0.50</u>	<u>0.88</u>

The AER’s estimate of 0.6 is the average of the raw beta estimates for Horizon and Vector, which are considered to be the firms most comparable to the benchmark efficient entity. The average of the regeared estimates for these two firms is 0.87.

261. In summary, the AER’s range for beta of 0.4 to 0.7 is erroneous and inconsistent with the evidence before it. This is a key reason why the 0.7 figure chosen by the AER is also in error and the discussion now progresses to discuss that issue.

¹⁸¹ SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 13 February 2015, p. 15, para. [56(c)].

¹⁸² SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 13 February 2015, p. 16, para. [50(d)].

262. Although Appendix C of the guideline explanatory statement is replete with criticisms and rejections of the point estimates proposed by user groups and businesses alike—exactly how the AER chooses to adopt the upper 0.7 value from its (excessively) constrained range of 0.4 to 0.7 is unclear. The closest that Appendix C comes to an explicit statement is as follows:¹⁸³

[O]ur proposed point estimate of 0.7 is not inconsistent with our consultants' advice.

263. And:¹⁸⁴

Adopting a point estimate around the mid-point would be more reasonable if our intention was to base the allowed return on equity on the Sharpe–Lintner CAPM and empirical estimates alone. However, the rules require us to have regard to relevant estimation method, financial models, market data and other evidence when determining the allowed rate of return. When this information is taken into account, we consider it reasonable to select a point estimate from the upper end of the range of empirical equity beta estimates.

264. The best inference from the totality of the AER's document appears to be that the selection is primarily chosen as an apology for the downward biases of the SL-CAPM (discussed above).
265. The problem is, even if the range of 0.4 to 0.7 is appropriate—which is clearly incorrect according to the AER's own consultant's domestic stock analysis and an even handed international comparison—the AER has not demonstrated that taking the upper end of that range is an adequate correction for the downward biases. Appendix C of the guideline provides a discussion¹⁸⁵ of this issue but in such heavily qualified terms that it is clear the AER cannot be satisfied of the adequacy of this correction factor. That is, there is no basis to support the conclusion that selecting the upper bound of the AER's assessment of the range supported by the sample of four current and five former domestic comparators will be exactly sufficient to redress all the known biases in the SL-CAPM. A better approach would be to simply estimate the models that have been developed to redress the well-documented problems with the SL-CAPM.

3.1.3.7 Errors estimating the historical average MRP

266. The AER considers that the reasonable range for MRP is from 5.1—which is 20 basis points above the geometric means of various cuts of the data going back to 1883—to 7.8—which is drawn from the high-point of the AER's DDM. As well as the historical means and DDM analysis, the AER considers certain other information as set out below.
267. The AER has not explicitly explained how its 6.5 point estimate is drawn from the range:¹⁸⁶

We propose to estimate the MRP point estimate based on our regulatory judgement, taking into account estimates from each of those sources of evidence and considering their strengths and limitations.

268. Information considered by the AER include:¹⁸⁷

- Historical long run average MRPs

¹⁸³ AER, Rate of Return Guideline, Explanatory Statement, Appendix C, 2013, p. 76.

¹⁸⁴ AER, Rate of Return Guideline, Explanatory Statement, Appendix C, 2013, pp. 76–77.

¹⁸⁵ AER, Rate of Return Guideline, Explanatory Statement, Appendix C, 2013, pp. 69–73.

¹⁸⁶ AER, *Rate of Return Guideline*, Explanatory Statement, December 2013, p. 90.

¹⁸⁷ AER; Draft decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of Return, November 2014, pp. 194–205.

- Dividend growth models
- Survey evidence
- Other regulators' determinations.

269. Below, we discuss each of these in turn.

(A) Historical long run average MRPs

270. The AER has stated that it places the greatest weight upon the historical long run average MRP. Specifically, the guideline explanatory statement says:¹⁸⁸

*Both the arithmetic and geometric averages are relevant to consider when estimating a 10 year forward looking MRP using historical annual excess returns. The Tribunal has found no error with this approach. The best estimate of historical excess returns over a 10 year period is therefore likely to be **somewhere between the geometric average and the arithmetic average of annual excess returns.** [Emphasis added]*

271. The low point of the range is established as follows. In the guideline process the AER states:¹⁸⁹

The geometric mean historical excess return currently provides the lowest estimate of the MRP with a range of 3.6 to 4.8 per cent. However, as we discuss in more detail in appendix D, there are concerns with using the geometric mean as a forward looking estimate. Therefore, we consider a reasonable estimate of the lower bound will be above the geometric average. However, we give some weight to geometric mean estimates. Therefore, we consider a lower bound estimate of 5.0 per cent appropriate.

272. In other words, the low end of the range is established from the high end of the geometric mean estimates (i.e. 4.8) to which 20 basis points is added.

273. The guideline process used data up to 2012 for the above analysis. In the NSW draft determinations the above figure of 4.8 is updated and is now 4.9 using the additional data available for 2013.¹⁹⁰ The data that was current as at the time of the NSW draft determinations is set out in Table 3–4.

¹⁸⁸ AER, *Rate of Return Guideline*, Explanatory Statement, Appendices, December 2013, p. 83.

¹⁸⁹ AER, *Rate of Return Guideline*, Explanatory Statement, December 2013, p. 93.

¹⁹⁰ For example, AER, Draft decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of Return; November 2014, p. [3-194] footnote 774.

Table 3–4: Historical MRP estimates identified by the AER

Sampling period	Arithmetic mean (%)	Geometric mean (%)
1883 – 2013	6.3	4.9
1937 – 2013	6.0	4.1
1958 – 2013	6.5	4.0
1980 – 2013	6.4	4.0
1988 – 2013	5.9	4.1

Source: AER.¹⁹¹

274. The above material is erroneous in the following respects:
- Geometric means are irrelevant because they are only appropriate in the context of compounding but the AER’s revenue model is a non-compounding model
 - The first three time periods reported are derived from wrongly adjusted by using a 0.75 adjustment figure to the Lambertson yield series instead of NERA’s adjustment factor that varies over time
 - It gives no weight to the Wright approach in which historical estimates compare returns with the expected inflation rate.
275. Further, historical MRP estimates are notoriously volatile and unless there is a concrete reason to curtail the period over which it is estimated, the longest possible period should be adopted. This is the approach of international experts (such as, Dimson, Marsh and Staunton) and as such only the 1883 to 2013 arithmetic figure should be used. When that is adjusted to overcome the erroneous adjustment of the Lambertson yield series, the correct historical average MRP is 6.56 or 6.6 when expressed to two decimal places.
276. Each of these issues is discussed below. NERA has undertaken further analysis of the historical MRP estimates relied upon by the AER and reported above and found them to be wanting in two further respects:¹⁹²
1. **Geometric means are downwardly biased**—the AER insists on using geometric means on the basis of advice from McKenzie and Partington in 2011 and 2012 to the effect that an arithmetic mean would be upwardly biased where WACC estimates are compounded.¹⁹³ However, both the AER’s own consultant, Lally,¹⁹⁴ and NERA have more than once pointed out that the regulatory arrangements do not provide for compounding. Since the regulatory arrangements do not involve compounding, the reverse is true and the use of a geometric mean is downwardly biased as has been noted by the Maine Public Utilities Commission: ‘we agree with the Company that it is improper to use a geometric mean in the CAPM model.’¹⁹⁵

¹⁹¹ AER, Draft decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of Return, November 2014 p. [3-195].

¹⁹² 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.

¹⁹³ 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. 12.

¹⁹⁴ 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, pp. 12–13.

¹⁹⁵ Public Utilities Commission, Investigation of Central Maine Power Company’s Stranded Costs, Transmission and Distribution Utility Revenue Requirements, and Rate Design, 1998 Me. PUC LEXIS 603 at [41]; and Public Utilities Commission, Investigation of Central Maine Power Company’s Stranded Costs, Transmission and Distribution Utility Revenue Requirements, and Rate Design, 1999 Me. PUC LEXIS 259 at [42].

2. **Brailsford, Handley and Maheswaran results are not reliable**—the AER continues to adopt a paper authored by Brailsford, Handley and Maheswaran, first published in 2008 and updated in 2011 and again in 2012 reaching a value for the MRP (for identifying a value for the MRP used in the SL-CAPM).¹⁹⁶ The AER continues to take this approach despite that the reliability of the data underlying the article has been brought into question repeatedly.

Available data series

277. Clearly, in 1882, stock market operators and analysts could not have foreseen that data on their trading activity would ultimately be of interest in an important regulatory process.
278. In 1958, Donald Lamberton working at the Sydney Stock Exchange put together data that could later be used for an analysis of the stock market returns to inform regulatory proceedings.¹⁹⁷ Professor Robert Officer of the University of Melbourne was in possession of this data series when he first undertook CAPM analysis that is the foundation of the current regulatory work.¹⁹⁸ Professor Officer provided the Lamberton series to Dimson, Marsh and Staunton who are the publishers of a number of widely used studies and updates of the MRP covering approximately 30 countries.¹⁹⁹
279. For the period from 1882 to 1957, the data put together by Lamberton²⁰⁰ and used by Officer (1989),²⁰¹ and Dimson, Marsh and Staunton comprises:
- A price index series, and
 - A dividend yield series.
280. More specifically, for the **price data** Officer (1989) provides summary statistics for the return to the market portfolio of equities and for bond yields and uses:²⁰²
- The Commercial and Industrial Index from January 1882 to June 1936
 - The Sydney All Ordinaries Index from July 1936 to December 1957
 - An index of 50 leading shares drawn from the AGSM price file from January 1958 to December 1974, and
 - The AGSM value-weighted index from January 1975 to December 1987.

¹⁹⁶ AER, *Draft decision, Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20*, Attachment 3: Rate of return, November 2014, p. 40 (PDF version).

See also: AER, *Rate of Return Guideline*, Explanatory Statement, Appendices, December 2013, pp. 84 and 103.

¹⁹⁷ 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. 25.

¹⁹⁸ 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. 25.

¹⁹⁹ Dimson, E., P. Marsh and M. Staunton, *Credit Suisse Global investment returns sourcebook 2014*, Credit Suisse, February 2014.

²⁰⁰ NERA, *The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines* A report for the Energy Networks Association, October 2013, p. 14.

²⁰¹ Officer, R., *Rates of return to shares, bond yields and inflation rates: An historical perspective*, in Ball, R., P. Brown, F. Finn and R. Officer (Eds), *Share markets and portfolio theory*, Second edition, University of Queensland Press, 1989.

NERA, *The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines* A report for the Energy Networks Association, October 2013, p. 14.

²⁰² NERA, *The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines* A report for the Energy Networks Association, October 2013, p. 5, footnote 22.

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281. Dimson, Marsh and Staunton (2002) provide summary statistics for the return to the market portfolio of equities and for bond yields and use:²⁰³
- The Commercial and Industrial Index from December 1899 to June 1936
 - The Sydney All Ordinaries Index from July 1936 to December 1957
 - An index of 50 leading shares drawn from the AGSM price file from January 1958 to December 1974
 - The AGSM value-weighted index from January 1975 to December 1979, and
 - The Australian Stock Exchange (ASX) All Ordinaries Index from January 1980 to December 2000.
282. Finally, Brailsford et al. (2008) provide summary statistics for the return to the market portfolio of equities and for bond yields and use:
- The Commercial and Industrial Index from January 1883 to June 1936
 - The Sydney All Ordinaries Index from July 1936 to December 1979, and
 - The ASX All Ordinaries Index from January 1980 to December 2005.
283. In a number of reports for the AER, Handley has updated the results of Brailsford et al.
284. All of these authors draw data for the Commercial and Industrial Index from January 1875 until June 1936 and for the Sydney All Ordinaries Index from July 1936 to December 1957 from Lamberton (1958) and the Sydney Stock Exchange Official Gazette (1958).²⁰⁴
285. And for the **yield data** Officer (1989) uses:²⁰⁵
- The Lamberton yield series from January 1882 to December 1957
 - The yield on an index of 50 leading shares drawn from the AGSM price file from January 1958 to December 1974, and
 - The yield on the AGSM value-weighted index from January 1975 to December 1987.

²⁰³ NERA, *The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines* A report for the Energy Networks Association, October 2013, p. 5.

²⁰⁴ Lamberton, D. McLean, *Share Price Indices in Australia*, 1958, Law Book Company of Australasia, Sydney, NSW, referenced in: 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. 26, footnote 67.

Lamberton, D., *Security prices and yields*, Sydney Stock Exchange Official Gazette, 14 July 1958. Sydney, NSW reference in: 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. 26 footnote 67.

²⁰⁵ Officer, R., *Rates of return to shares, bond yields and inflation rates: An historical perspective*, in Ball, R., P. Brown, F. Finn and R. Officer (Eds), *Share markets and portfolio theory*, Second edition, University of Queensland Press, 1989, referenced in: NERA, *The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines* A report for the Energy Networks Association, October 2013, p. 10.

286. Dimson, Marsh and Staunton (2002) use:²⁰⁶
- The Lambertton yield series from January 1900 to December 1957
 - The yield on an index of 50 leading shares drawn from the AGSM price file from January 1958 to December 1974
 - The yield on the AGSM value-weighted index from January 1975 to December 1979, and
 - The yield on the ASX All Ordinaries Index from January 1980 to December 2000.
287. Finally, Brailsford, Handley and Maheswaran (2008) use:²⁰⁷
- A series that is 0.75 times the Lambertton yield series from January 1883 to December 1957
 - A series that is 0.75 times the Sydney Stock Exchange yield series from January 1958 to December 1964
 - A series that is around 0.67 times the Sydney Stock Exchange yield series from January 1965 to December 1973
 - The Statex series from January 1974 to December 1979, and
 - The yield on the ASX All Ordinaries Index from January 1980 to December 2005.
288. The Lambertton series is an equally weighted average of the yields of stocks that pay dividends. According to Brailsford, Handley and Maheswaran point, this series will provide upwardly biased estimates of the yield on the market portfolio of equities for two reasons.²⁰⁸ First, the series omits stocks that pay no dividends. Second, the average is equally weighted. Of those stocks that pay dividends, high-market-capitalisation stocks tend to have lower yields and low-market-capitalisation stocks tend to have higher yields.
289. The authors of the Brailsford et al. papers state that they exchanged several emails with an employee of the ASX and that the employee provided them with a dividend yield series which was based, to a significant extent, on a series created by Lambertton, although a reducing multiple of 0.75 has been applied to the relevant underlying data.²⁰⁹
- Brailsford et al. (2008)*
290. References are provided to two email messages between the authors of the study and an ASX employee dated 11 April 2003 and 26 May 2004.²¹⁰

²⁰⁶ Dimson, E., P. R. Marsh, and M. Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns*, 2002, Princeton University Press, Princeton, NJ referenced in: NERA, *The Market, Size and Value Premiums*, A report for the Energy Networks Association, June 2013, p. 24, footnote 57.

²⁰⁷ NERA, *The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines*, A report for the Energy Networks Association, October 2013, pp. 10–12.

²⁰⁸ Brailsford, T., J Handley and K. Maheswaran, *Re-examination of the historical equity risk premium in Australia; Accounting and Finance 48 (2008) 73-97*, p. 75.

²⁰⁹ Brailsford, T., J Handley and K. Maheswaran, *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance 48 (2008) 73-97, p. 80.

²¹⁰ Brailsford, T., J Handley and K. Maheswaran, *Re-examination of the historical equity risk premium in Australia; Accounting and Finance 48 (2008) 73-97*; pp. 79 and 80.

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291. The only part of this correspondence that is quoted by the authors is an excerpt from the second email to the following effect:²¹¹

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.

292. The paper by Brailsford et al. accepts the 0.75 multiplier having considered the following four matters:

- That they had received the data adjusted in that way from the ASX. Brailsford et al (2008) says that the 'stock exchange itself, whose staff carefully considered the issue and ultimately decided on an adjustment factor of 0.75.'²¹²
- That there are several studies that suggest that US dividend yields, 'to the extent that the US observations are relevant to the Australian market'²¹³ would be consistent with the 0.75 multiplier.
- That there is a UK study that would deliver an even lower multiplier.²¹⁴
- Having tested just one month of data for 590 stocks, the month that decimal currency was introduced, that test is consistent with a 0.75 multiplier.²¹⁵

293. Dimson are evidently aware of the Brailsford et al. work but have determined that this work would not lead them to adjust their published MRP estimates for Australia based on the Officer (1989) data. In Credit Suisse Global Investment Returns Sourcebook, 2015, Dimson notes:²¹⁶

The data for equities were provided by the author of Officer (1989). He uses Lamberton's (1958a,b) data, linked over the period 1958-74 to an accumulation index of 50 shares from the Australian Graduate School of Management (AGSM) and over 1975-79 to the AGSM value weighted accumulation index. Subsequently, we use the Australia All-Ordinary index. Brailsford, Handley, and Maheswaran (2008) argue that pre-1958 dividends are overstated by Lamberton, but do not present alternative annual dividend estimates, and we continue to use Officer's dataset.

294. In 2013, NERA examined this issue and undertook seven tests spaced ten years apart from each other and, on the basis of these tests, recommended that, instead of assuming that the adjustment factor would be 0.75 throughout the period, adjustment factors should vary over time according to the figures derived from their seven tests.²¹⁷

²¹¹ Brailsford, T., J Handley and K. Maheswaran, *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance 48 (2008) 73-97, p. 80.

²¹² Brailsford, T., J Handley and K. Maheswaran; *Re-examination of the historical equity risk premium in Australia*; Accounting and Finance 48 (2008) 73-97, p. 80.

²¹³ Brailsford, T., J Handley and K. Maheswaran; *Re-examination of the historical equity risk premium in Australia*; Accounting and Finance 48 (2008) 73-97, p. 81.

²¹⁴ Brailsford, T., J Handley and K. Maheswaran; *Re-examination of the historical equity risk premium in Australia*; Accounting and Finance 48 (2008) 73-97, p. 81.

²¹⁵ Brailsford, T., J Handley and K. Maheswaran; *Re-examination of the historical equity risk premium in Australia*; Accounting and Finance 48 (2008) 73-97, p. 81.

²¹⁶ Dimson, E., P. Marsh and M. Staunton, *Credit Suisse Global investment returns sourcebook 2015*, Credit Suisse, February 2014, p. 61.

²¹⁷ NERA, *The Market, Size and Value Premiums*, prepared for the Energy Networks Association (ENA) by NERA Economic Consulting, June 2013.

295. The explanatory statement accompanying the guideline²¹⁸ and the draft Jemena Gas Determination state that the AER has considered both the Brailsford et al. data and the alternative presented to it by NERA and has adopted the Brailsford adjustment, not the NERA adjustment.²¹⁹
296. The AER's basis for preferring the Brailsford et al. material appears to stem from three aspects:
- The apparent robustness of the testing and analysis undertaken by Brailsford et al.
 - That the material has been sourced from the ASX
 - The publication of the material in a peer reviewed journal.
297. The AER's basis for rejecting the work by NERA appears to be a lack of certain characteristics in the study that the AER presents as unique to Brailsford et al.²²⁰ These characteristics are presented as:
- Perceived, unacceptable, differences in approach to the data and its preparation
 - Differences in the frequency of data collection
 - Unachievable accuracy requirements pursued by NERA through seven data points (contrasted with the one data point of Brailsford et al.).
298. We have investigated these issues further and has made the following findings.

Published in a peer reviewed academic journal

299. As a basis for adopting the Brailsford et al. approach, the AER puts weight on the fact that the work of the authors is published in 'a peer reviewed academic journal'.²²¹ There is no evidence that the AER has made inquiries to understand what that peer review process entailed in this instance. Certainly, the journal did not require the email correspondence to be set out in the published paper, and nor did it require the authors of the email to be identified by name, position or title.
300. It is also apparent from the published paper itself that the peer review process did not challenge the authors' reliance on international comparisons between countries at very different stages of economic and political development and with very different industry structures. The process evidently did not challenge the authors' use of a single month's data to establish an average adjustment factor to be applied to data extending over a time interval of more than half a century. Nor did the peer review process challenge the choice of the month in question being the month in which decimal currency was adopted. No questions were posed as to whether, at that time, companies or investors might have behaved differently.
301. United Energy approached²²² the Accounting and Finance Journal to understand the Journal's peer review process, but a positive response was not forthcoming.²²³ The Accounting and Finance Journal's website identifies that peer review is now undertaken by 'ScholarOne Manuscripts', but that this method appears to have been implemented since 2011, a year which falls between the publication of the Brailsford et al. articles, and

²¹⁸ AER, *Rate of Return Guideline*, Explanatory Statement, December 2013, p. 83.

²¹⁹ AER, *Draft decision, Jemena Gas Networks (NSW) Ltd.*, Access arrangement 2015–20, Attachment 3: Rate of return, November 2014; section B.5, p. 3-197.

²²⁰ AER, *Draft decision, Jemena Gas Networks (NSW) Ltd.*, Access arrangement 2015–20, Attachment 3: Rate of return, November 2014; section B.5, p. 3-197.

²²¹ AER, *Draft decision, Jemena Gas Networks (NSW) Ltd.*, Access arrangement 2015–20, Attachment 3: Rate of return, November 2014; section B.5, p. 3-198.

²²² Nick Taylor, *Letter to Professor Steven Cahan*, Editor-in-Chief, 2 January 2015.

²²³ Steven Cahan, *Email to Prudence Smith*, 10 February 2015.

which is also subsequent to the article which describes the ‘comprehensive study’ that was undertaken.²²⁴ There are no instructions provided to prospective authors other than that it is assumed that the work is original. United Energy does not doubt that the Brailsford et al. work is in some respects original. United Energy submits that Brailsford et al. purport in their original article that the dividend yield adjustment can be traced back to the ASX. However, there is no evidence in the journal of any communication about the adjustment having taken place between the authors of the articles, and either the journal editors or external referees.

302. The fact that a paper has been published in a peer reviewed journal does not mean that it should be permanently determinative even after errors or inaccuracies in its data source have been identified, and subsequent work has expanded upon the scope of the material that has been considered. This is especially the case where the peer review process did not extend to any examination of the source data, and Brailsford et al. have not provided any primary material upon which they rely, whereas NERA has certainly done so in the context of its study.²²⁵
303. By contrast, NERA was briefed to follow the strict obligations set forth in *Practice Note CM 7, Expert witnesses in proceedings in the Federal Court*. The guidelines for expert witnesses are explicit on matters concerning the sourcing of data, the requirement to pose all relevant questions and the requirement to express an unbiased opinion.

‘ASX endorsed’

304. As noted above, Brailsford et al. state:²²⁶

stock exchange itself, whose staff carefully considered the issue and ultimately decided on an adjustment factor of 0.75. [Emphasis added]

305. The term ‘carefully considered’ is a qualitative assessment that the authors appear to have made based on the emails received from the employee of the ASX. However, the only part of the email that is quoted suggests that if the consideration was ‘careful’ it certainly was not one that prompted the staff member to express a great deal of confidence in the robustness of the 0.75 multiplier.²²⁷

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. [Emphasis added]

306. The email appears to be a very heavily qualified one that explicitly suggests that the 0.75 scaling factor was only used for want of further information on the proportion of companies with no dividend yields to guide their approach.

307. Associate Professor Lally states that:²²⁸

Clearly, NERA’s process is superior to that of Brailsford et al (2008) because NERA examine results for seven years rather than only one month.

²²⁴ Accounting and Finance Journal, *Instructions to Authors*, accessed 1 April 2015. <http://www.afaanz.org/publications/7-afaanz/16-accounting-and-finance#Instructions to Authors>.

²²⁵ All of the data from the NERA study for the ENA was provided to the AER on electronic media, on two occasions, in June 2013 and again in November 2013.

²²⁶ Brailsford, T., J Handley and K. Maheswaren, *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance 48 (2008) 73-97, p. 80.

²²⁷ Brailsford, T., J Handley and K. Maheswaren, *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance 48 (2008) 73-97, p. 80.

²²⁸ Lally, M., *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, 12 March 2014.

308. Nevertheless, Handley (one of the authors of the Brailsford paper) states:²²⁹

the adjustment was not something which BHM [Brailsford et al.] took upon themselves to apply to the Lamberton data. Rather, the data that the ASX provided to BHM had already been adjusted by the ASX. In other words, the ASX had many years earlier decided in their knowledge and wisdom that some adjustment was necessary and it was the ASX who determined the amount and adjusted the data accordingly. BHM simply sought to confirm their understanding of the data series provided by the ASX by reconciling it back to original sources.

309. Handley does not quote any additional correspondence other than the emails referenced in the two Brailsford et al. papers.

310. Despite the assertions of Handley, there is no indication in the passage quoted from the ASX staff member's email that the ASX gave its corporate endorsement to the series as has been asserted by Handley. The AER appears to have taken the Handley assertion at face value when it describes the data as having been sourced from.²³⁰

[t]he ASX, which we consider to be a credible source, provided and adjusted the earlier data.

311. It does not appear that the AER has sought or reviewed the relevant emails, and nor has the AER made contact with the ASX to ascertain whether the ASX does indeed uphold the 0.75 multiplier. United Energy has made enquiries of the ASX and has obtained a letter.²³¹

312. Mr Brian Goodman of the ASX is the Exchange's Product Development Manager and he has provided the enclosed letter which states.²³²

*The method that you have described for adjusting Lamberton's series of dividend yields, which involves multiplying the dividend yields by 0.75, produces another series of amended dividend yields. **ASX holds no view on whether Lamberton's series should be adjusted this way.***
[Emphasis added]

313. All of the ASX published series have been reviewed and none of them present a series containing the 0.75 adjustment.

314. As part of interactions, Mr Goodman of the ASX noted²³³ that much information from the period after 2000 relating to index management and methodology was transferred from the ASX to S&P. S&P have advised United Energy that they are unable to endorse any indices or adjustments which were instigated or made prior to 2000²³⁴.

²²⁹ Handley, J. *Advice on the return on equity*, Report prepared for the Australian Energy Regulator, University of Melbourne, 16 October 2014, p. 79.

²³⁰ AER, *Draft decision, Jemena Gas Networks (NSW) Ltd., Access arrangement 2015–20*, Attachment 3: Rate of return, November 2014, section B.5, p. 3-197.

²³¹ Brian Goodman, *Letter to Jeremy Rothfield*, 18 March 2015.

²³² Brian Goodman, *Letter to Jeremy Rothfield*, 18 March 2015.

²³³ Brian Goodman, *Letter to Jeremy Rothfield*, 18 March 2015.

²³⁴ Douglas Been, *Email to Prudence Smith*, 26 February 2015.

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315. For completeness, Jones Day (retained by United Energy) has also approached S&P which took custody of the ASX data. S&P has also stated in response to the question as to S&P's views as to whether an adjustment to the series is warranted, that:²³⁵

S&P has no view on the issue.

316. Exhibit 1 also records that the ASX has been unable to recover the emails (specifically an email dated 11th April 2003 and another dated 26th May 2004) identified by Brailsford et al. as the source of the 0.75 adjustment figure.²³⁶ Mr Goodman suggests that the ASX records from the relevant dates in 2003 and 2004 were not maintained due to the ASX's archival system.
317. At this stage, therefore, there is no opportunity to scrutinise the work of the original authors, or to examine their correspondence with a view to assessing the extent of the "careful consideration" that was exercised by the ASX employees working on the data.
318. In any event, NERA has undertaken an analysis of dividend yield data for seven individual time periods, namely December 1891, December 1901, December 1911, December 1921, December 1931, December 1941, and December 1951.²³⁷ NERA has examined the relationship between weighted and unweighted dividend yield series for those particular months. In the context of the qualifying comment provided by the (unknown) writer of the ASX email, the seven verified data points calculated by NERA would almost certainly have been used in preference to an 'average' reducing adjustment of one quarter (25%), in circumstances in which no other dividend yields were said to be available to serve as a guide.
319. In summary, there is no evidence that the ASX has ever published a Lamberton/Sydney Stock Exchange dividend yield series that incorporates a 75 per cent adjustment factor. NERA reports, on the issue of the origin of the yield adjustment, that:²³⁸

Neither Brailsford, Handley and Maheswaran (2008) nor Brailsford, Handley and Maheswaran (2012) cite any publication produced by either the ASX or the SSE that uses the adjustment. We have been similarly unable to find a publication authored by either the ASX or the SSE that uses the adjustment.

320. The product development manager for the ASX, Mr Brian Goodman, has expressly disavowed the 0.75 adjustment factor. The ASX has therefore declined to endorse a series of transformed dividend yields upon which Handley, and, by implication, the AER, have been relying.
321. The peer review process for the journal in which the Brailsford et al. paper is published verifies that the work is, in some sense, original. The research has prompted a subsequent round of work (by NERA) which has sought to establish a robust set of transformations for unweighted dividend yields. There is, however, no evidence that the peer review and editorial function incorporated any process for authentication or ratification of information sources. There is also no evidence that the peer review process extended to the qualitative descriptions of the source information, and an assessment of the rigour surrounding the particular numeric adjustments proposed in the Brailsford et al. paper.

²³⁵ Douglas Been, *Email to Prudence Smith*, 26 February 2015.

²³⁶ Brian Goodman, *Letter to Jeremy Rothfield*, 18 March 2015.

²³⁷ NERA, *The Market, Size and Value Premiums*, prepared for the Energy Networks Association (ENA), June 2013, Table 2.1, p. 12. In addition, NERA made use of Brailsford, Handley and Maheswaran's (2008) analysis of yield data for February 1966. Interpolation methods were applied.

²³⁸ 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. 30.

322. In light of this evidence, the AER should retract its statements that the Brailsford et al. 0.75 adjustment has the support of the ASX. The AER should also re-assess whether any comfort can be drawn from the peer review on this occasion. Certainly, there is no basis to conclude that the peer review has, in some way, enhanced the quality and robustness of the work, or bolstered the credibility of components of the data that have not been properly sourced and attributed.
323. Accordingly, the Brailsford et al. 0.75 adjustment must be approached with considerable caution and indeed, the method does not provide a safe basis upon which to establish an arithmetic mean for the MRP for regulatory purposes.
324. In place of the Brailsford et al. adjustment, the AER has two options:
- To use the unadjusted series to establish an arithmetic mean MRP for the period from 1883 to the present. Note that Dimson, Marsh and Staunton use the unadjusted dividend yield data for the earlier time periods,²³⁹ or
 - To apply the NERA adjustment when calculating the arithmetic mean.
325. In our view the latter option would be acceptable and appropriate. To adopt such a course of action would, under the AER’s approach, deliver a lower bound to the range of values for the MRP of 6.56%. The upper bound of 8.29% would still be drawn from the updates by SFG to the DDM numbers.²⁴⁰ The AER can also gain comfort from Lally’s preference for the NERA adjustment over the Brailsford et al. adjustment.

(B) Dividend discount models

326. Although it is the historical MRP data that the AER gives the most weight, it has had next most regard to the outcome of the DGM and in particular the data in Table 3–5.

Table 3–5: MRP estimates from the DDM

Growth rate	2-stage model (%)	3-stage model (%)
4.0	6.6	7.0
4.6	7.2	7.4
5.1	7.7	7.8

²³⁹ Dimson, E., P. Marsh and M. Staunton, *Credit Suisse Global investment returns sourcebook 2015*, Credit Suisse, February 2014, p. 61.

²⁴⁰ SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, A 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, 18 February 2015, para. 23, p. 5.

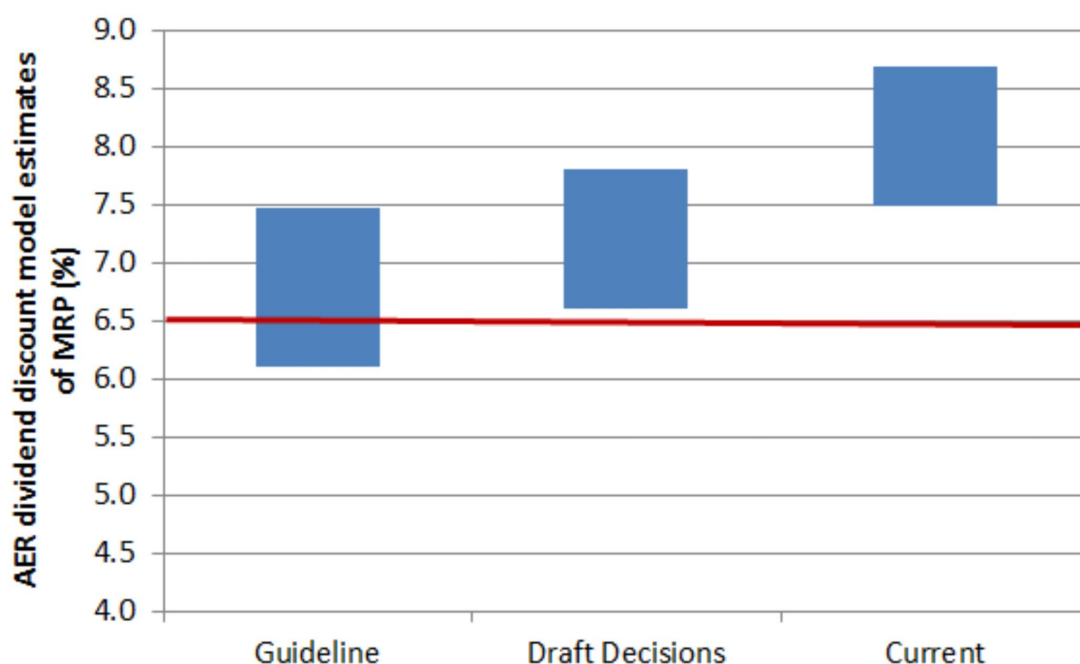
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Source: SFG.²⁴¹

327. SFG²⁴² has advised that the 7.8 figure in the above table should, on the latest available data, be 8.71. As depicted by the image below:²⁴³

the AER's own estimates of the contemporaneous MRP have risen materially since the publication of the Guideline. The AER's estimates of the contemporaneous MRP were uniformly above the allowed 6.5% at the time of the draft decisions and are even more materially above the 6.5% allowance now. In our view, there is no logic to an approach that would simply maintain a fixed 6.5% allowance that reflects the long-run historical average conditions (over the long-run historical period that was used to estimate it) in the face of the mounting evidence from the AER's own estimates of the MRP in the prevailing market conditions. To do so would be an error.

Figure 3–2: Range of AER MRP estimates from the dividend discount model



Source: SFG.²⁴⁴

²⁴¹ AER, *Draft decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20*, Attachment 3: Rate of Return, November 2014, p. [3-201].

²⁴² SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, table 4 at para. 115.

²⁴³ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, para. 115.

²⁴⁴ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015.

(C) Survey evidence

328. The AER also has regard in the explanatory statement accompanying its guideline to the survey data in Table 3–6.

Table 3–6: MRP estimates from survey evidence

Survey	Responses	Mean (%)	Median (%)	Mode (%)
Fernandez (2013)	73	5.9	6.0	-
KPMG (2013)	19	-	6.0	6.0
Fernandez (2013)	17	6.8	5.8	-
Asher & Hickling (2013)	46	4.8	5.0	6.0
Fernandez (2014)	93	5.9	6.0	-

Source: SFG.²⁴⁵

329. There are a number of significant problems with this data. Surveys can be extremely unreliable and the surveys in question in this case do not appear to have been undertaken applying the appropriate protections such as those set out in the Federal Court guidelines for conducting surveys. Certainly our business was not accorded the opportunity to be consulted on the questions before they were administered to the participants. As such, they should not be accorded any weight—particularly when there is an extensive range of more reliable evidence available.

(D) Other Regulators

330. The regulators' views in Table 3–7 cannot rise to be of any higher value than the strength of the underlying evidence and the current energy network regulatory process has thoroughly investigated this material. A not insignificant minority of that material has indeed been prepared after the regulatory determinations and therefore cannot have been taken into account by the regulators in question when they made their determinations.
331. Further, we would caution that many of the judgements exercised by those regulators contains errors and should not be adopted.

Table 3–7: MRP estimates from regulatory decisions

Regulator	Decision date	Sector	MRP
QCA	Aug 2014	General/ policy	6.5
IPART	Jul 2014	Rail	Midpoint WACC using 5.5-6.5 (LR), 7.6-8.7 (Current)
Utilities Commission	Apr 2014	Electricity	6.0
IPART	Jun 2014	Water	Midpoint WACC using 5.5-6.5 (10 year), 7.2-8.6 (40 day end 12 May 2014)
ERA	Jul 2013	Rail	6.0
ESC	Jun 2013	Water	6.0

²⁴⁵ AER, *Draft decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20*, Attachment 3: Rate of Return, November 2014, pp. [3-205] – [3-206].

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Regulator	Decision date	Sector	MRP
IPART	Jun 2013	Water	Midpoint WACC using 5.5-6.5 (LR), 7.6 (SR)
ESCOSA	May 2013	Water	6.0
IPART	May 2013	Water	Midpoint WACC using 5.5-6.5 (LR), 7.4 (SR)
QCA	Apr 2013	Water	6.0
ERA	Mar 2013	Water	6.0
ERA	Nov 2013	Electricity	6.0
ESC	Jun 2012	Rail	6.0
IPART	Jun 2012	Water	5.5-6.5
IPART	Jun 2012	Water	5.5-6.5

3.1.3.8 The AER's flawed use of expert reports

332. The AER performs a 'cross check' for its beta estimates against expert reports (reports prepared for the purpose of stock market valuations in the context of takeovers). It is relevant to note that the question posed to these experts is whether a specific takeover offer is 'fair'—i.e. *sufficient* to be fair. This is not the same question that the AER is required to answer.
333. Incenta has examined the AER's reasoning and found it to be significantly wanting.
334. The first issue concerns whether the Ibbotson inspired approach reflects current equity market expectations. In this regard Incenta reports the following:²⁴⁶
- The AER has compared the risk premium over the "spot" risk free rate that independent experts have applied to the risk premium over the spot risk free rate that it applies, and so implicitly assumed the risk premium that experts apply has remained (and will remain) constant in the face of large changes in the risk free rate. However, this masks the actual behaviour of independent experts, with almost 90 per cent having adjusted the risk free rate and / or the market risk premium in response to changes in the risk free rate.*
335. The AER gives particular attention to the Grant Samuel report concerning APA's unsuccessful takeover of Envestra. Grant Samuel itself has expressed serious reservations about how its report has been interpreted and used by the AER, both in relation to the MRP and other issues such as the beta adopted and whether in fact experts use the SL-CAPM.
336. In essence, the AER sought to gain support from the report for the use of the CAPM to the exclusion of other approaches. Grant Samuel states:²⁴⁷

[O]ur approach ... is to form an overall judgement as to a reasonable discount rate rather than mechanically applying a formula. The fact is that, particularly in some market circumstances, the CAPM produces a result that is not commercially realistic. When this occurs it is necessary and appropriate to step away from the methodology and use alternative sources of information to

²⁴⁶ Incenta, *Further update on the required return on equity from Independent expert reports*, 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 PowerNetworks, and United Energy, February 2015, p. 1.

²⁴⁷ Grant Samuel, Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid, 12 January 2015, pp. 4–5.

provide insight as to what is, after all, an unobservable number that can only be inferred. In our view, Envestra was clearly a case in point.

In using the Envestra report, the AER seems to be trying to co-opt the parameters that we used for calculating the initial CAPM based rate to bolster its own case while trying to find ways to justify not having to recognise the fact that for the valuation of Envestra Limited's assets, we actually selected a different rate (i.e. 6.5-7.0% or, more correctly 6.5-8.0%, rather than 5.9-6.5%).

337. The AER expresses concerns about the transparency of Grant Samuel's methodology but Grant Samuel responds as follows:²⁴⁸

In view of the apparent importance of the Envestra Report in supporting the AER's findings we are surprised that, if there were such transparency issues, the AER did not approach us for clarification. To our knowledge, we have never been approached to discuss any aspects of our discount rate or other valuation approaches.

338. The AER asserts that:²⁴⁹

[T]he return on equity and equity risk premium estimates contained in Table 3- 20 are the final values used in the independent valuation report and reflect any uplifts applied.

339. However, Grant Samuel disavows that assertion:²⁵⁰

This statement is simply not true as the table, at least in the case of Grant Samuel's reports for Envestra Limited, DUET Group and Hastings Diversified Utilities Fund, only reflects the calculated post tax WACCs ignoring the uplifts and adopts midpoints for post tax WACC and return on equity, an approach which Grant Samuel considers inappropriate.

340. And in a similar vein:²⁵¹

the AER claims that the implied adjusted equity risk premium range in three of the four uplift scenarios referred to by Grant Samuel in Appendix 3 of the Envestra Report justifying its uplift is consistent with its foundation model premium of 4.55%. We do not know how the AER determined this but our calculations indicate that in fact the 4.55% is well in the range in only one of the scenarios, is right at the bottom of the range in one other scenario and is outside the range in the other two

341. Indeed, Incenta reaches the following conclusions with respect to the AER's whole approach to expert reports:²⁵²

Taken together, our findings indicate strongly that were the AER to continue to apply the same mechanistic SL-CAPM approach that was applied in its draft decision, with JGN's current averaging period risk free rate at 2.64 per cent, the resulting estimated rate of return on equity will fall materially short of the required rate of return in the market that is implied by a consideration of

²⁴⁸ Grant Samuel, Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid, 12 January 2015, p. 6.

²⁴⁹ AER, Draft decision, Jemena Gas Networks (NSW) Ltd Access arrangement 2015–20, Attachment 3: Rate of return, November 2014 [3-93].

²⁵⁰ Grant Samuel, Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid, 12 January 2015, pp. 6–7.

²⁵¹ Grant Samuel, Letter from Grant Samuel & Associates Pty Limited to the Directors of Transgrid, 12 January 2015, page 7.

²⁵² Incenta, *Further update on the required return on equity from independent expert reports*, 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 PowerNetworks, and United Energy, February 2015, p. 1.

independent expert reports, and not be commensurate with the efficient financing costs a benchmark entity will face over the access arrangement period.

3.1.3.9 Inconsistent treatment of the imputation adjustment

342. In Attachment 6–4, we discuss our approach to the valuation of imputation credits (or gamma). However, it is important to recognise that there is an inter-relationship between the regulatory estimates of the required return on equity and gamma. This relationship is most apparent in the AER's PTRM. The PTRM requires the regulator's estimate of the with-imputation required return on equity. It then removes the regulator's assumed value of imputation credits, leaving an estimate of the ex-imputation required return on equity. Allowed revenues are then based on this ex-imputation required return. The idea is that the firm requires sufficient revenue to provide investors with their ex-imputation required return, which is supplemented by imputation credits to provide them with their total required return.
343. The first step in this process requires an estimate of the with-imputation required return on equity. The AER's approach to this task is to 'gross up' its estimates of MRP to include the AER's assumed value of imputation credits. For example, when implementing its DGM approach for estimating MRP, the AER grosses-up forecast future dividends to include its estimate of the value of the imputation credits that will be attached to those dividends.
344. That is, adjustments for imputation credits are made in two places in the AER's estimation process:
1. The assumed value of imputation credits is **added** to produce an estimate of the with-imputation required return on equity, and then
 2. The assumed value of imputation credits is **subtracted** to produce an estimate of the ex-imputation required return on equity.
345. Internal inconsistency problems arise when the assumed value that is added in step 1 is different from the assumed value that is subtracted in step 2. In the AER's recent draft decisions, the value that is added in step 1 is materially lower than the value that is subtracted in step 2—creating a downward bias to the allowed return on equity. On this point [Entity] simply submits that the AER should ensure that the same adjustment for imputation credits should be applied in both steps of the AER's estimation approach.
346. A simple check for internal inconsistency can be performed as follows. First note that the AER's two-step approach (set out above) ultimately produces an estimate of the ex-imputation required return on equity. There is another way to produce an estimate of the ex-imputation required return on equity—simply avoid grossing-up the MRP estimate for imputation credits. That is, an ex-imputation estimate of MRP will produce an ex-imputation estimate of the required return. If this direct estimate of the ex-imputation required return on equity is materially different from the estimate obtained by the AER's two-step process, there is an internal inconsistency problem to be resolved.

3.1.3.10 Summary

347. The AER's approach to establishing an allowed return on equity is ill conceived in almost every conceivable respect. Consequently we depart from the guideline in all respects other than the identification of the relevant models. Our approach is described in the next section.

3.1.4 RATE OF RETURN ALLOWANCE PROPOSED IN PLACE OF THE AER GUIDELINE

348. For all the above reasons, we consider that the approach in the guideline cannot appropriately be remedied through adjustments correcting isolated errors and instead a new ground-up assessment of each of the inputs and how they are combined needs to be undertaken. SFG has conducted such an evaluation including with the

assistance of work undertaken by other experts. Our proposal, described in the next section, is based on that work.

349. Instead of the approach adopted in the guideline, we propose to establish a rate of return giving real weight to all the relevant models and inputs by:
- Identifying the relevant rate of return models (which are, in fact, the same as those identified by the AER)
 - Identifying the relevant evidence which may be used to estimate the parameters within each of the relevant return on equity models
 - Estimating model parameters for each relevant return on equity model, based on relevant market data and other evidence
 - Separately estimating the required return on equity using each of the relevant models, and
 - Synthesising the modelling results as a weighted average of the individual estimates with the weights that avoid double-weighting any of the key conceptual elements of the models.

3.1.5 ESTIMATE THE PARAMETERS FOR USE WITHIN EACH OF THE FOUR MODELS

350. Between them, the four relevant financial models require estimates of the following parameters:

- A risk free rate of return
- A required rate of return on the market portfolio (or an MRP to combine with the risk free rate)
- An equity beta (for the two CAPM models)
- A zero-beta return (for the Black-CAPM), or zero-beta risk premium
- Market exposure, size and book to market factor premiums and sensitivities (FFM only), and
- A risk premium for comparable firms (for use with the DDM only).

351. The proposed source of each of these parameters is discussed below.

3.1.5.1 Risk free rate averaging period

352. We accept the approach to setting the risk free rate proposed in the guideline which is for the AER to select a minimum of 20 business day averaging period agreed as close as practically possible to the start of the 2016 EDPR period. For illustrative purposes, the figures presented in this proposal are calculated using a 20 business day period ending on 30 January 2015.
353. Attachment 9-2 sets out our proposed averaging period for estimating the risk-free rate in the final determination.

3.1.5.2 Required return on the market portfolio (or its corollary, the MRP)

354. A number of the four models include a MRP which is simply the required return on the market portfolio less the risk free rate. In the past the AER has adopted the approach of using long run average excess returns (i.e., the returns of a representative portfolio above the risk free rate) as Ibbotson calculates an MRP. It is noted that there are other ways to estimate an MRP including historical data using an approach championed by Wright, the estimates derived from a dividend growth model, and estimates from independent experts and surveys. Wright did not develop an alternative implementation of the SL-CAPM. Wright simply proposed an alternative method of estimating the MRP from historical stock return data for use in the SL-CAPM—as the difference between (a)

the historical average real market return adjusted to reflect current expected inflation and (b) the current risk free rate—on the basis that real market returns may be more stable over time than excess returns.

355. SFG note that the Ibbotson approach involves adding an effectively constant MRP to the contemporaneous risk-free rate to produce an estimate of the required return on equity that varies one-for-one with changes in the risk-free rate:²⁵³

the Ibbotson approach implies that equity is more expensive than average during economic expansions and bull markets (the late 1990s and mid 2000s) and cheaper than average during financial crises (the pronounced reduction in 2008).

356. It is counter-intuitive that the required return on equity should be lower during financial crises than during periods of economic expansion. This should be taken into account when the AER considers how to best employ historical stock return data to inform estimates of MRP. In the guideline, the AER uses historical stock return data only via the Ibbotson approach (which leads to these counter-intuitive results) and places no weight on the Wright method for processing the historical stock return data. By contrast, SFG recommend that both methods provide relevant evidence in which case both should be given regard.
357. The guideline proposes that the AER would consider all this material and determine an MRP using ‘regulatory judgment’. The guideline provides a worked example as at December 2013 but the AER would not necessarily exercise judgment in the same way in our regulatory proposal. We consider that there are a number of flaws in the worked example as detailed by SFG. The detailed analysis is summarised as follows:²⁵⁴

[I]n some places the Guideline relies on dated evidence that has now been updated, in other places it relies on inaccurate data that has since been corrected, and in other places it makes improper comparisons (e.g., where estimates that include the benefit of imputation credits and estimates that exclude the benefit are compared as equals).

358. Our proposal adopts SFG’s view as to the appropriate manner in which the AER should exercise judgment establishing the MRP. To a significant extent it relies on similar information—although certain information, such as inherently unreliable surveys, were not used. There are, however, other important differences in the details of how the other sources would be used to address flaws that SFG identify. SFG notes (updated using estimates from its later report) that it would:²⁵⁵

have regard to the following evidence:

- a) *First, we note that historical returns can be processed in two ways – by assuming that MRP is constant in all market conditions (Ibbotson approach or by assuming that real required returns are constant in all market conditions (Wright approach). We apply equal weight to each of these approaches, producing an estimate of MRP from historical returns of [7.78%];*
- b) *The estimate of MRP from dividend discount models of [8.73%]; and*
- c) *The estimate of MRP from independent expert reports of [6.93%].*

²⁵³ SFG, *The required rate of return on equity for regulated gas and electricity network businesses*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend, and SA PowerNetworks, 6 June 2014, para. 224, p. 56.

²⁵⁴ SFG, *The required rate of return on equity for regulated gas and electricity network businesses*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend, and SA PowerNetworks, 6 June 2014, para. 157, p. 44.

²⁵⁵ Earlier report: SFG, *The required rate of return on equity for regulated gas and electricity network businesses*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend, and SA PowerNetworks, 6 June 2014, para. 340, p. 6.

Later report: SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, p. 33.

359. The same report illustrates why the outcome is not sensitive to the weightings given to the three sources. The relevant evidence is discussed in detail in that report.
360. SFG's current estimate of the required return on the market (in the later report) comprises the following (each grossed up for a theta estimate of 0.35):²⁵⁶
- A historical average of excess returns above the contemporaneous risk free rate from 1883 to 2013 (of 6.56%) added to the current risk free rate (of 2.64%) to deliver an estimate of 9.20%
 - A historical average market return using the Wright approach to deliver an estimate of 11.64%
 - A DDM estimate to deliver an estimate of 11.37% and
 - Independent expert valuation reports to deliver an estimate of 9.57%.
361. SFG synthesises this information to provide a single point estimate of 10.81% as the mid-point between the first two of the above historical estimates, which is also a figure that is very similar to the other two estimates.
362. The other inputs suggested in the guideline are not used because there are no reliable surveys upon which to rely and recycling past regulatory decisions does not provide any additional insight to prevailing market conditions.

3.1.5.3 Equity beta

363. We consider the reduction of the equity beta from 0.8 to 0.7 proposed by the guideline to be incorrect on the basis of the following considerations emerging from work undertaken by SFG:²⁵⁷
- a) *The estimate of 0.7 is the outcome of a convoluted multi-stage approach whereby:*
 - i) *A sub-set of the relevant evidence ... is used to constrain the range of possible estimates to 0.4 to 0.7;*
 - ii) *The other relevant evidence that is considered in the Guideline ... all supports an estimate above 0.7, but the first stage of the process constrains the maximum estimate to be 0.7; and*
 - iii) *There is relevant evidence that is not considered in the Guideline ...;*
 - b) *The subset of evidence that is used to produce the constraining range of 0.4 to 0.7 is not sufficiently reliable to be used for that purpose because: the beta estimates vary wildly ... across firms;... over time; ... depending on which sampling frequency is used;... depending on which regression specification is used; and ...depending on the day of the week and month on which they are computed;*
 - c) *The evidence from international comparable firms suggests an equity beta materially above 0.7;*
 - d) *To the extent that the 0.7 estimate has been influenced by the AER's conceptual analysis, it is wrong. The AER concludes that the conceptual analysis supports an equity beta materially below 1, but it does not. In this regard:*

²⁵⁶ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, p. 33

²⁵⁷ SFG, *Equity Beta*, Report for Jemena Gas Networks, ActewAGL and Networks NSW, 12 May 2014, para. 10, pp. 3–4.

- i) *The Frontier Economics (2013) report does not support an equity beta below 1 ... ; and*
- ii) *The McKenzie and Partington (2012) report sets out two pieces of empirical evidence. One suggests that energy networks have equity betas materially above one, and the other suggests that finance risk is the primary component of beta for utilities;*
- e) *To the extent that the 0.7 estimate has been set to match the equity beta that the ACCC uses for water utilities, it is wrong. Regulatory estimates of beta for water utilities are based on regulatory estimates of beta for energy networks (which introduces circularity) and on international water utilities...*

364. Additionally, the modelling of the equity beta is flawed in that the sample is too small and the estimate too variable in response to the choice of statistical method. Further, irrelevant water utility data is included instead of relevant international data on the energy network sector.

365. We—based on SFG’s expert opinion—²⁵⁸ submit that the most appropriate estimate for the equity beta is [0.82] on the following basis.²⁵⁹

One way of having regard to the range of relevant models and evidenced is to estimate the required return on equity under each of the relevant approaches and then to determine an allowed return on equity after having regard to the relative strengths and weaknesses of each approach. Under such a multi-model approach, we would adopt a Sharpe-Lintner CAPM beta of 0.82 – the raw estimate of beta that does not reflect any evidence other than the historical statistical relationship between stock returns and market returns for the relevant set of comparable firms.

366. The AER’s consultant concludes:²⁶⁰

In the opinion of the consultant, the majority of the evidence presented in this report, across all estimators, firms and portfolios, and all sample periods considered, suggests that the point estimate for β lies in the range 0.3 to 0.8.

367. Adopting 0.7 is not supported by any empirical evidence.

3.1.5.4 Return on a zero beta asset

368. SFG have estimated the return on a zero beta asset by adding a 3.34% zero beta premium to the risk free rate of 2.64% to give an estimated return of 5.98% return on a zero beta asset.

369. This is within the reasonable range in the guideline and for that reason this issue does not warrant a detailed treatment in this identified document.

3.1.5.5 FFM market exposure, SMB and HML factors

370. Because the guideline does not use the FFM, there is no relevant departure from the guideline in relation to these factors.

²⁵⁸ SFG, *Equity beta*, Report for Jemena Gas Networks, ActewAGL and Networks NSW, 12 May 2014, para. 195, p. 42.

²⁵⁹ SFG, *Equity Beta*, Report for Jemena Gas Networks, ActewAGL and Networks NSW, 12 May 2014, para. 195, p. 42.

²⁶⁰ Henry, *Estimating β : An update*, University of Liverpool Management School, April 2014, p. 63.

371. Recent regressions conducted by SFG have concluded that the best estimates for the three relevant FFM factors are:
- Market exposure: 6.33%—calculated as the product of an 8.17% MRP and a 0.78 beta estimated for the FFM (as opposed to the SL-CAPM)
 - Size exposure: -0.19%, and
 - Book to market exposure: 1.15%.

372. SFG's report fully substantiates these figures.²⁶¹

3.1.5.6 Risk premium for use in the DDM

373. SFG has estimated the risk premium for relevant comparable firms at 94% of the over-all market returns.

3.1.5.7 Separately estimate the required return on equity using each of the relevant models

374. Using the above parameter estimates, SFG²⁶² estimates for the four models using an indicative averaging period spanning the 20 business days to 30 January 2015:
- SL-CAPM: 9.32%
 - Black-CAPM: 9.93%
 - FFM: 9.93%
 - DDM: 10.32%.

375. We propose combining these estimates using a simple average to get a return on equity estimate of 9.87%. This compares to the 9.95% if SFG's recommended weights are used.

376. In the current circumstances there is no evidence to demonstrate that any one model is clearly superior to others, or that one model contains all relevant information. Given that there is no clear basis to distinguish one method or model over others in terms of its likelihood of producing outcomes that contribute to the rate of return objective, it would be appropriate to give equal weight to each model or method. We note that this is consistent with the approach previously taken by the Tribunal to deciding between alternative models or methods.²⁶³

377. This approach is also consistent with the AER's approach to estimating the return on debt in its recent draft decisions.²⁶⁴ Faced with two relevant independent third data providers, the AER adopted a simple average of return on debt estimates from each. We see no reason why the same logic should not apply to estimating the return on equity, especially given the evidence before the AER clearly shows that each model has strengths and weaknesses.

378. We consider that either of these weighting approaches would be appropriate in light of the strengths and weaknesses of each model, but in this revised proposal has chosen to adopt an equal weighting approach. Our

²⁶¹ SFG, *The Fama-French Model*, A report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA PowerNetworks; 13 May 2014.

²⁶² SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks, 25 February 2015, p. 35.

²⁶³ *Application by ActewAGL Distribution* [2010] ACompT 4, [78]. In that case, the Tribunal was considering alternative methods for estimating the return on debt. The Tribunal noted that if there was no basis to distinguish the alternative methods, then taking an average would be appropriate.

²⁶⁴ AER, Draft decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of Return, November 2014.

position is that the weighting of each model should reflect its relative strengths and weaknesses. We consider that both the SFG weights and our proposed weights reflect this, and we note that the estimates produced by the two approaches are similar. On the basis of the updated estimates set out in this revised proposal, the difference between the weighting proposed in the original proposal, and the weighting proposal in this revised proposal is 0.08%.²⁶⁵

379. We consider that the approach to estimating the return on equity as set out in this revised proposal gives effect to the requirements of the NER that in determining the allowed rate of return regard must be had to relevant estimation methods, financial models, market data and other evidence. Having identified the material that is relevant to estimating the return on equity, and having examined and compared the merits of this material, all of the relevant material is given an appropriate role in the calculation of the return on equity.

380. Our rate of return proposal (of 7.18%), including our return on equity proposal (of 9.87%), is set out in section 7.

3.1.6 IF OUR SIMPLE AVERAGE OF ALL FOUR MODELS IS REJECTED

381. It is the firm position of JEN that the approach to establishing the return on equity set out in the guideline is not consistent with the NER and is not the best possible estimate of the required rate of return for equity. In particular, we are concerned that the approach set out in the guideline does not meet the requirements of the new Rules that regard must be had to 'relevant estimation methods, financial models, market data and other evidence'.

382. Accordingly, we do not agree with the approach in the guideline that an estimate for the return on equity in compliance with the NER can be generated using the SL-CAPM as a 'foundation model' (or indeed any foundation model). We submit that there are three preferable approaches to the AER's 'foundation model' approach consistent with the NER including:

1. Applying differing weightings to the four models
2. Applying an even weighting to the four models, or
3. Correctly identifying the parameters for use in the SL-CAPM.

3.1.6.1 Weighting the four relevant equity return models

Specific weighting to each model

383. We do not accept that using the SL-CAPM to constrain the estimate of equity returns enables proper regard to be had to the point estimates delivered by the Black-CAPM and the DDM. Nor should the three factor insights of the Fama-French Model be disregarded when establishing single point estimate for the return on equity.

384. SFG points out that:²⁶⁶

- The two CAPM estimates rely on common theoretical elements and to give them each the same weighting as the other two models could be viewed as according the common theoretical elements double weighting, and
- The two CAPM differ, however, in that the Black-CAPM delivers an estimate of the intercept while the SL-CAPM delivers a lower bound.

²⁶⁵ SFG, *The required return on equity for the benchmark efficient entity*, February 2015, section 5. SFG calculates a return on equity based on its unequal weighting approach of 9.95%. Based on the equal weighting approach, the return on equity is 9.87%.

²⁶⁶ SFG, *The required return on equity for regulated gas and electricity network business*, A report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks, 6 June 2014, para. 26, p. 9.

385. Accordingly, we submit that a better way to have regard to all the relevant information is to establish a weighted average of the four estimates that these matters identified by SFG.²⁶⁷
386. In this way, the models are used to deliver the correct measure. SFG recommends²⁶⁸ using the following specific weights:
- 25% to the DDM and 75% to the three asset pricing models
 - Half of the 75% should be accorded to the FFM (i.e., 37.5%)
 - The remaining 37.5% assigned to the capital asset pricing models should be divided two thirds to the Black-CAPM—which provides an estimate of the intercept, 25%—and one third to the SL-CAPM—which provides a lower bound to the intercept, 12.5%.
387. On that basis and drawing on SFG's data,²⁶⁹ the single point estimate for the required return on equity would currently be 9.95%.

Equal weighting to each model

388. An alternative, and in our view, a preferred approach, is to weight all four estimates equally. On that basis and drawing on SFG's data,²⁷⁰ the single point estimate for the required return on equity would currently be 9.87%. This is our proposal.

3.1.6.2 Use of parameters within the SL-CAPM

389. As noted elsewhere in this attachment, SFG²⁷¹ has identified at least two significant flaws in the SL-CAPM being that it is downwardly biased for both low beta assets and value assets. SFG has separately estimated three CAPM²⁷² equity betas using each of the other models to correct for these biases. The Black-CAPM in particular addresses the issue of the bias for low beta assets, the FFM addresses the issue of the bias for value assets and the DDM uses contemporaneous evidence.
390. We thereby submit that if the employment of the SL-CAPM as a foundation model is pursued, the correct parameters as identified by SFG are:
- The weighted average of the betas is 0.89, and

²⁶⁷ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks; 25 February 2015, p. 35.

²⁶⁸ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks; 25 February 2015, p. 35.

²⁶⁹ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks; 25 February 2015, p. 35.

²⁷⁰ SFG, *The required return on equity for the benchmark efficient entity*, A report for Jemena Gas Networks, ActewAGL Distribution, Ergon, Transend and SA Power Networks; 25 February 2015, p. 35.

²⁷¹ SFG, in referring to the extensive empirical research in this respect, such as the work of Black, Jensen and Scholes (1972), Friend and Blume (1970) and Fama and Macbeth (1973) in SFG, *Cost of equity in the Black Capital Asset Pricing Model*, A report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks, 22 May 2014, pp. 6–10.

²⁷² SFG, *Using the Fama-French model to estimate the required return on equity*, 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, 13 February 2015.

SFG, *Beta and the Black Capital Asset Pricing Model*, 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, 13 February 2015.

NERA, *Empirical Performance of the Sharpe-Lintner and Black CAPM*, A report Jemena Gasworks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SAPower Networks and United Energy, February 2015.

3 — RETURN ON EQUITY

- The required return on the market to be 10.81% using a 2–30 January averaging period for the risk-free rate.
391. Accordingly, for a risk-free rate of 2.64%, an asset with a beta of 0.89, and an over-all required rate of return for the market of 10.81%, SFG calculate the required return on equity using the SL-CAPM model to be 9.87%.

4. RETURN ON DEBT

392. Section 2 identifies the changing risk profile for electricity distribution businesses. As described below, the benchmark efficient firm facing this level of risk and a 60:40 leveraging ratio would have a credit rating of no higher than BBB. Further, the previous section explains how the AER's approach delivers a substantially below market return on equity and, in that situation and our concerns with the AER's approach to debt discussed below, it would put further downward pressure on the effective benchmark credit rating.
393. Our concerns are discussed as part of our explanation of each of the relevant aspects of establishing an allowed rate of return for debt are as follows:
- Establish the tenor of the benchmark debt (section 4.1)
 - Establish (in section 4.2) whether it is ultimately efficient debt management strategy on the basis that the benchmark entity:
 - Refinances all debt at the beginning of each regulatory period (the 'on the day' method)
 - Maintains a staggered debt portfolio with no interest rate swap overlay (the trailing average method), or
 - Maintains a staggered debt portfolio with an interest rate swap overlay—the effect of which is to reset some portion (i.e. x%) of the benchmark entity's base rate of interest at the beginning of each regulatory period (the hybrid debt management strategy)
 - Decide whether to undertake annual updating or set a single benchmark each regulatory determination with a 'look back' if a trailing average is to be used (section 4.2)
 - Determine what transition (if any) should apply (section 4.3)
 - Establish a credit rating for the benchmark business (section 4.4.1)
 - Identify a data source (section 4.4.2)
 - Select averaging periods (section 4.5), and
 - Assess debt raising costs and the cost of the new issue premium and any other transaction costs (section 4.6).
394. Each of these aspects is discussed below. The first set of relevant reports provided as part of the consultation on the guideline provide a helpful background in the matters discussed below.²⁷³

²⁷³ Kanangra Ratings Advisory Services, Howell, D, *Credit ratings for regulated energy network services businesses*, June 2013.
 CEG, *Debt strategies of utility businesses*, June 2013.
 CEG, *Estimating the debt risk premium*, June 2013.
 PwC, *Energy Networks Association: Debt financing costs*, June 2013.
 PwC, *Energy Networks Association: Benchmark term of debt assumption*, June 2013.
 PwC, *Energy Networks Association: Potential impact of the ERA's DRP methodology*, June 2013.
 PwC, *Responding to AER's criticism of PwC's report on the benchmark term of debt*, 2 October 2013.
 CEG, *Mechanistic cost of debt extrapolation from 7 to 10 years*, October 2013
 CEG, *Review of Lally and Chairmont Reports*, October 2013.
 CEG, *Transition to a trailing average approach*, October 2013.

4.1 TENOR OF THE BENCHMARK DEBT INSTRUMENT

395. The guideline²⁷⁴ adopts a 10 year tenor for the debt portfolio of the benchmark efficient firm based on a review by the AER of actual debt portfolios of comparable businesses and this is accepted by JEN.
396. However, in its the recent draft determinations the AER states that ‘if anything, this assumption is more likely to overstate than understate the debt term of a benchmark efficient entity’.²⁷⁵ The draft decisions go on to state that the AER will monitor the average debt term at issuance of regulated network service providers against the benchmark term and that the AER may consider the information in the context of debt transaction cost assessments or any proposed adjustment to the foundation model estimate of the return on equity.
397. We do not accept the caveats upon the 10 year tenor.
398. Benchmark efficient finance practices are to raise debt with a long term tenor to control refinancing risk within the useful lives of long run network capital investments.²⁷⁶ This principle can be seen played out in practice: in the guideline development process the data presented to the AER showed that the simple/weighted average term at issue for debt, including bank debt, was 11.0/10.7 years for privately owned businesses regulated by the AER.²⁷⁷
399. The AER modified CEG’s calculations by:
- Assuming some callable debt had a maturity at its first call date
 - Ignoring cash and cash equivalents, and
 - Including debt issued by 100% government SPIAA (now SGSPAA, parent of Jemena) and Dampier to Bunbury Pipeline (which was not originally included by CEG as it was not regulated by the AER).
400. Based on these amendments the AER estimated an 8.7 year weighted average term of debt (the AER did not report the simple average which CEG consistently estimated to be higher than the weighted average).
401. In terms of the maturity of bonds issued, the AER estimated bonds issued by the privately owned businesses these had an average term of 9.7 years for bonds issued off-shore and 9.6 years for Australian issued bonds and this is as close to the 10 year benchmark as is practicable when dealing with a small sample with lumpy debt raising requirements facing a range of practical constraints on when debt can be issued.²⁷⁸

Diamond, N & Brooks, R.B., *A review of measures of Australian corporate credit spreads published by the Reserve Bank of Australia*, Esquant Statistical Consulting, 19 May 2014.

²⁷⁴ AER, *Rate of Return Guideline*, December 2013, section 6.3.1.

²⁷⁵ For example, see: AER, *Draft decision on access arrangement 2015-20, Jemena Gas Networks (NSW) Ltd – Attachment 3: Rate of Return*, November 2014, p. 3-129.

²⁷⁶ See: Meredith, *Witness statement of Gregory Damien Meredith*, 31 January 2009;

Buek Khim, *Witness statement of Sim Buek Khim*, undated;

Watson, *Witness statement of Alistair Watson*, 30 January 2009;

Noble, *Witness statement of Andrew Noble*, undated.

²⁷⁷ Hird, *Letter from Dr Tom Hird (Director of CEG) to Mr Warwick Anderson (GM Network Regulation Branch of the AER)*, 11 November 2013.

²⁷⁸ See: Meredith, *Witness statement of Gregory Damien Meredith*, 31 January 2009;

Buek Khim, *Witness statement of Sim Buek Khim*, undated;

Watson, *Witness statement of Alistair Watson*, 30 January 2009;

Noble, *Witness statement of Andrew Noble*, undated.

402. While bank debt is raised at somewhat shorter terms—that is, 4.3 years according to the data collected for the guideline process—bank debt forms a relatively small proportion of the total debt raised by the private businesses bank debt should not be, or should not fully be, included in establishing an average tenor for benchmark regulatory purposes. As explained by CEG, short term bank debt is used to fund, at least in part, cash and cash equivalent assets which act as liquid funds for working capital and are necessary for efficient operation of a firm. Working capital is an asset above and beyond the regulated asset base which has no provision for working capital.

403. The explanatory statement to the guideline discuss this issue, however, the discussion involves a series of non-sequiturs:²⁷⁹

We do not agree with CEG's submission that a portion of short-term debt (bank debt and commercial paper) may be excluded as negative cash. We consider that a cash balance will reflect a number of items, including receivables and the proceeds of asset sales, which are not debt transfers. We understand that short-term debt is primarily used by the businesses to fund new capital expenditure, until such time as a marketable parcel (approximately \$500 million) is accumulated that may be refinanced by issuing longer-term (bond) debt. We also understand that businesses try to have enough residual bank debt drawn to maintain competition between a pool of banks in order to provide competitively priced capex facilities. We therefore do not consider that it is appropriate to discount short-term debt by an amount equal to cash and cash equivalents.

404. Here the AER is, in essence, repeating CEG's view that cash and cash –equivalents are in the nature of working capital. But rather than drawing CEG's conclusion that the term of debt used to fund working capital should not be included in an estimate of the term of debt used to fund the RAB the AER reaches the opposite conclusion.

405. Consistent with CEG's advice, it is unreasonable to include debt used to fund *short* term working capital requirements in the estimation of the average term of debt used to fund the *long* term assets included in the RAB. If the AER to do so, it should—as a matter of consistency—expand the definition of the RAB to include working capital.

406. In any event, even with this debt included, the average tenor is well above 5 years and substantially closer to 10 years than to 5.

407. Any consideration of the transactions cost component of our costs should similarly be consistent with the principle established above—that debt is raised on a long term basis—and that the principal source of debt financing for use in funding the regulated asset base (**RAB**) is through bond issues with tenors very close to the 10 year benchmark adopted in the guideline.

408. The draft decisions do not explain how there is a conceptual linkage between the tenor for debt and the foundation model for equity—or for any adjustments to it. As such, it would be wholly unacceptable if the issue of the tenor for debt were reopened by the AER as an attempt to claw back any adjustments to the flawed foundation mode for equity.

4.2 TRAILING AVERAGE PORTFOLIO APPROACH

409. The trailing average portfolio approach recognises that in practice the benchmark firm's actual return on debt will be determined by historical rates at the time of debt issue. In addition, it recognises that energy networks do not raise all their capital at one time and instead have staggered debt maturities. In practice, energy network

²⁷⁹ AER, *Rate of return guideline, explanatory statement*, p.145.

businesses need to balance a number of considerations when determining how much debt to refinance at what times, including:

- Diversification of debt instruments and maturities
- Liquidity management
- Changes in the aggregate capital required as new investments are made contributing to a growth in the RAB and as aging assets are depreciated
- Credit metrics, and
- Market conditions, including access to foreign and domestic markets and the ability to hedge interest rate movements.

410. For this reason, firms will have different amounts of debt maturing at different points in time. It is not the case as the AER has asserted in current draft NSW electricity distribution determinations that a benchmark efficient entity would hold an evenly staggered portfolio of long-term (10 year) debt where exactly 10 per cent of the debt is refinanced each year.²⁸⁰ Due to the considerations set out above, a benchmark efficient entity would make decisions as to the amount of debt to be refinanced in any given year to minimise its debt financing costs and these amounts may vary each year.
411. Nevertheless, the trailing average portfolio approach is likely to more closely align with the staggered approach to refinancing a debt portfolio than the 'on the day' method, noting that the trailing average method is a substantial simplification of what actually occurs. The trailing average portfolio approach significantly reduces the risk that the allowed return on debt might be higher or lower than the actual return on debt simply because the 'on the day' rate for their particular service provider occurred at a high or low point in interest rate movements.
412. We therefore accept the concept of the 10 year trailing average portfolio approach set out in the guideline, provided that certain transitional and implementation issues are addressed.

4.3 TRANSITIONAL ARRANGEMENTS

4.3.1 THE GUIDELINE TRANSITION

413. The guideline proposes that the new trailing average method be introduced gradually.²⁸¹ In the first year, the rate for debt would be set in the manner that applied in the previous determination—the 'on the day' method). In the second regulatory year of the control period, a weighted average will be calculated with 90% weight accorded to the figure determined at the outset of the regulatory period and 10% weight given to the prevailing interest rate at the time of the second regulatory year.²⁸² In the third year, the weighted average will be calculated with an 80% weight accorded to the figure determined at the outset of the regulatory period, 10% in the second year of the regulatory period and 10% at the time of the third year and so on.
414. After a 10 year transition period—that is, by the end of the second regulatory control period—the rate for debt would be set using a weighted average in which the current year and each of the preceding nine years would each have a 10% weighting.

²⁸⁰ See: AER, Draft determination, Essential Energy 2015–19 - Overview, November 2014, p. 43.

²⁸¹ AER, *Rate of Return Guideline*, December 2013, section 6.3.2.

²⁸² A proxy for the prevailing interest rate in any regulatory year will be taken by measuring the return on debt over an averaging period in the prior year.

415. We do not consider the transition in the guidelines meets the requirements of the rules.
416. Rule 6.5.2(j) provides that the allowance for debt may be determined using the ‘on the day’ method, on the basis of an average of the costs of debt raised over a historical period prior to the determination or a combination of the two. Rule 6.5.2(k) provides that the allowance would take account of any impacts on the benchmark efficient firm arising from a change in methodology.
417. Under the previous regulatory arrangements, the benchmark efficient entity would have had to manage as best it could:
- Refinancing risk—the risk that it may not be possible or economic to refinance a business’s entire debt portfolio at one time or a substantial part of it, and
 - The risk of disparities between interest rates between the averaging period used for the ‘on the day’ methodology and the interest rates prevailing at the time debt was actually raised.
418. The first of these two considerations effectively required that a benchmark efficient business raise debt progressively over time even though the regulatory framework established a return on debt each five years shortly before the regulatory determination.
419. The benchmark efficient business would then control interest rate risk as best it could by purchasing hedging instruments (the simplest of which is an interest rate swap) to manage the risk of disparities between the regulatory allowance and the actual time the debt was raised.
420. In 2009, as part of consultation on the AER’s WACC parameter reset determination, the corporate treasurers of the Envestra (paragraphs 5.16, 5.17, 6.4 and 6.5),²⁸³ Jemena (see paragraph 5.19, 5.23 and 5.25),²⁸⁴ SP Ausnet (paragraphs 4.9 to 4.15 and 5.1 to 5.9)²⁸⁵ and Citipower and Powercor (paragraphs 5.2, 5.4, 7.1 and 7.2)²⁸⁶ each provided the AER with statements explaining how under the previous rules no business would prudently raise all its debt in the ‘on-the-day’ averaging period. Rather all businesses sought to stagger their maturities to avoid refinancing risk and then generally undertook hedging transactions to control their exposures to interest rate movements as well as they reasonably could.
421. Although there is an actively traded market for interest rate swaps referenced to the prevailing yields on short term highly rated bank debt, there is no equivalent for generic BBB debt and therefore it is not possible to hedge movements in the debt risk premium. Indeed an ability to better manage volatility in the debt risk premium is one of the principal advantages of ultimately moving to the trailing average method.
422. This has been acknowledged by the AER:²⁸⁷

For an Australian efficient operator there is no market to effectively, and in a cost efficient manner, hedge their DRP.

²⁸³ Meredith, *Witness statement of Gregory Damien Meredith*, 31 January 2009

²⁸⁴ Byej Khim, *Witness statement of Sim Buek Khim*, undated.

²⁸⁵ Watson, *Witness statement of Alistair Watson*, 30 January 2009

²⁸⁶ Noble, *Witness statement of Andrew Noble*, undated.

²⁸⁷ AER, *Better Regulation, Explanatory Statement, Rate of Return guideline*, December 2013, p. 122.

423. The AER has argued that this is how an efficient benchmark firm would have managed its debt portfolio at that time.²⁸⁸

*Given the observed practices of regulated network businesses and the definition of the benchmark efficient entity, we consider that the following practice is likely to constitute **an efficient debt financing practice of the benchmark efficient entity** under the current 'on the day' approach:*

- *holding a debt portfolio with staggered maturity dates and using swap transactions to hedge interest rate exposure for the duration of a regulatory control period... [Emphasis added]*

424. The above finding was restated in other parts of the explanatory statement (e.g. pages 121–122),²⁸⁹ in the draft Ausgrid determination (e.g. page 3-115)²⁹⁰ and in the other regulatory decisions being made concurrently.

425. Under the previous rules, the 'on-the-day' methodology was mandatory and the flexibility concerning whether and how the AER might recompense the businesses for their efficient costs was constrained.

426. Under the new rules, however, the AER has greater flexibility in setting the returns on debt. However:

- It is mandatory under rule 6.5.2(a) and (b) to determine the debt allowance consistent with the rate of return objective which requires that the allowed rate of return to be commensurate with the efficient financing costs of the of a benchmark efficient entity, and
- Where there is discretion to be exercised that it be done in accordance with the revenue and pricing principles of the NEL including providing network businesses with a reasonable opportunity to recover at least its efficient costs.²⁹¹

427. Having made the factual finding that it is efficient under the previous rules for a business to raise debt on a staggered basis and hedge to the averaging period, it would be an error not to establish the rate of return on a basis that enables the businesses to recover the efficient costs of doing so.

428. The transition path in the guidelines is not established on that basis and will fail to comply with the rule 6.5.2(b) and the section 16 of the NEL unless the transition path in the guideline provides *at least* as high a return as a transition path that is explicitly calculated on the basis of the costs of a business with a portfolio of debt with staggered maturities and hedging.

429. It is clear that an approach consistent with the NEL would be for the AER to make a determination that directly employs its finding concerning the efficient debt portfolio of a benchmark efficient business and for that reason this proposal establishes its costs on the basis set out above.

430. This means that the benchmark efficient firm would enter the 2016-2020 Victorian distribution regulatory period with:

- A trailing average DRP, and
- A floating rate exposure for the proportion of its portfolio base rate of interest (that it was efficient to hedge).

²⁸⁸ AER, *Better Regulation, Explanatory Statement, Rate of Return guideline*, December 2013, p. 107.

²⁸⁹ AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, pp. 121–122.

²⁹⁰ AER, *Ausgrid Draft Determination*, November 2014, [3-115].

²⁹¹ NEL, section 16.2.

431. Therefore in making its draft and final decisions for JEN, the AER should not adopt the guideline position on transitional arrangements for the return on debt. Rather, the AER should adopt a position that is consistent with the new analysis it has undertaken and the expert advice it has received on this issue.

4.3.2 A BETTER TRANSITION OR TRANSITIONS

432. In light of the AER's findings in the NSW draft decisions, a 'hybrid' transitional arrangement would be more appropriate. That is:

- **Hedged base component.** For that proportion of the portfolio that it is assumed the benchmark efficient entity would have, using interest rate swaps, hedged to the beginning of the regulatory period there should be a ten-year transition to a trailing average plus transaction costs of associated interest rate swaps, and
- **Unhedged component.** There should be no transition for:
 - **DRP**—the debt margin (or DRP) component. That is, the AER should immediately move to a trailing average estimation of the debt risk premium component. This means that for the first year of the forthcoming regulatory period, the debt risk premium would be estimated as a ten-year trailing average, and this trailing average estimate would be updated in each subsequent year.
 - **Unhedged base component**—the proportion of the portfolio that it is assumed the benchmark efficient entity would not have hedged to the beginning of the regulatory period.

433. This approach would provide for an estimate of the return on debt which reflects the required return on debt for the benchmark efficient entity. As noted above, under the efficient financing strategy identified by the AER in the NSW draft decisions, 100% of the base interest rate component of the benchmark efficient entity's actual return on debt would have been matched with the regulatory allowance set using an 'on-the-day' rate, but the debt risk premium component each year would have reflected the historical (or trailing) average of the debt risk premiums over the previous ten years. Under this approach, 100% of the base rate of interest would be subject to a transition and only the DRP would be set immediately consistent with a trailing average.

434. Accordingly, we submit that—consistent with its own definition of the benchmark efficient entity's historical debt management strategy—the AER should not adopt the guideline position on transitional arrangements for the return on debt. Rather, the AER should adopt the hybrid transitional arrangement described above. Moreover, we note that the above quote from the AER's explanatory statement and the logic as set out in the most recent draft decisions proceeds on the basis that it is appropriate to define the efficient financing costs of a benchmark efficient entity on the assumption that they are regulated and as a function of the type of regulation that they are/have been subject to.

435. For example, consistent with the previous AER quote, at page 3-115 of the JGN draft decision the AER states:

Based on the above, we consider a staggered debt portfolio with interest rate swaps was an efficient financing practice of the benchmark efficient entity under the on-the-day approach.
[Emphasis added]

436. It is not obvious that such a construction of the ARORO is correct. There is, inevitably, an element of circularity in this construction—with the efficient debt management strategy depending on the regulatory policy rather than the regulatory policy depending on the efficient debt management strategy. Dr Hird has made this 'circularity' point previously.²⁹²

437. However, even if the benchmark efficient debt management strategy can be conceived of as the one that most efficiently matched past regulatory practice, it does not follow that this involves hedging 100% of the base rate

²⁹² CEG, *Efficiency of staggered debt issuance*, February 2013, pp. 29 to 32

of interest using interest rate swaps. This is only correct if the level of the prevailing DRP was independent of the level of the prevailing swap rates. If the prevailing DRP and the prevailing swap rates tend to be inversely related—just as the prevailing MRP and risk free rates tend to be—then leaving some portion of the debt portfolio unhedged would have more efficiently matched the benchmark efficient entity's cost of debt to the on the day allowance.

4.4 ESTIMATION PROCEDURE

4.4.1 BENCHMARK CREDIT RATING

438. The guideline considers that the benchmark credit rating should be BBB+.²⁹³ Further, the AER has rejected CEG's position with respect to the appropriate credit rating for a benchmark efficient firm in its NSW gas and electricity distribution decisions.^{294,295} CEG found that each year from 2009 to late 2013, the median credit rating of energy network service providers was BBB, amid a clear trend of downgrades in the industry.
439. The AER repeated CEG's analysis for 2013 and found that at that moment in time, the median had risen to BBB+. However, we consider that with such a very small sample of comparators, it is not reasonable to take an 'on the day' credit rating which can oscillate considerably in response to a ratings change for a single firm and instead the credit rating needs to be established over a reasonable period such as that used by CEG.
440. Over that timeframe—approximately five years—the information before the AER clearly provides sufficient weight to warrant a departure from the guideline and a reduction in the median credit rating relied on.
441. In relation to the comparator group used to determine the median credit rating, while the AER has deleted Ergon Energy Corp Ltd from its comparator group on the basis that its credit rating is obviously influenced by government ownership, the AER has taken the view that its comparator set should include both AusNet Services and SGSP Australia Assets Pty Ltd, even though clear evidence exists that Singaporean Government ownership in these businesses has significant effect on the consideration of their credit ratings by credit rating agencies. For example both companies were placed on negative watch when the Singapore Government proposed to dilute its ownership in 2013.
442. The AER has also taken the view that even if it were to consider Singapore Government ownership in AusNet Service and SGSP, some time has passed since the dilution of Singapore Government ownership (which is evidence of the effect of the ownership on the rating), and it therefore considers that credit rating agencies have had time to revise their credit ratings.²⁹⁶ This statement seems to misunderstand the issue that the continuing effect of Singapore Government ownership is to provide greater comfort to credit rating agencies as to key issues relevant to their consideration of the appropriate credit rating, such that the credit rating applied to these companies is not one that would be applied to a pure play, regulated energy network business operating within Australia (which is defined as the benchmark efficient entity in the guideline). Evidence of dilution of government ownership having a negative effect on a credit rating agency's views of the risk of a downgrade in a credit rating serves to support this proposition.

²⁹³ AER, *Rate of Return Guideline*, December 2013, section 6.3.3.

²⁹⁴ For example, see: AER, *Draft determination for Jemena Gas Networks 2015-20 - Attachment 3 – Rate of Return*, November 2014, p. 3-296.

²⁹⁵ For example see: AER, *Draft determination for Jemena Gas Networks 2015-20, Attachment 3 – Rate of Return*, November 2014, [3-296]; and AER, *Draft determination for Essential Energy 2014-19, Attachment 3 – Rate of Return*, November 2014, [3-315].

²⁹⁶ AER, *Draft determination for Jemena Gas Networks 2015-20, Attachment 3 – Rate of Return*, November 2014, [3-296].

443. Further the AER appears to take comfort in the fact that the credit rating of SGSP has changed since the dilution to assert that government ownership has not been sufficient to maintain an A- credit rating.²⁹⁷ The issue however is that government ownership has maintained the credit rating at a higher level that it would otherwise be over this period, and therefore the credit rating of this business is not reflective of the credit rating of an efficient private service provider—which is the standard that informs the definition of a benchmark efficient entity.
444. Attachment A shows the credit ratings for the corrected comparators over a five year. This shows that:
- With the exception of 2014, 2002 and 2003, the median credit rating has been below BBB+ over the 2002 to 2014 period
 - The median credit rating has been BBB across all firms for the longest time period examined and for the last 5 years
 - While the median credit rating in 2014 was BBB+ if all firms (identified by the AER) are include, the median credit rating is BBB/BBB+ once the firms with sovereign government ownership are excluded—namely, AusNet Services (A rated), SPI (A- rated) and Electranet (BBB+ rated).
445. Moreover, historical credit ratings do not reflect the extremely low equity buffer that would result if the AER's proposed approach to compensation for the return on equity is implemented in current market circumstances. Specifically, in circumstances where nominal CGS yields are at unprecedentedly low levels and the AER's methodology would pass that through 'one for one' to an unprecedentedly low return on equity allowance. Similarly, the AER's proposed transition to a trailing average return on debt will, at prevailing DRPs, under-compensate the benchmark efficient entity who will have to pay the higher trailing average debt risk premium on its efficiently issued staggered debt portfolio. This under-compensation will further compress cash-flow buffers for the benchmark efficient entity.
446. Separately, ActewAGL presented analysis by CEG of cash-flow metrics implied by the AER's draft decision for that company.²⁹⁸ The methodology was based on that set out in Moody's 2014 guide: Rating methodology for Regulated Electric and Gas Networks. CEG estimated that credit metrics for ActewAGL were BBB- even if all of the AER's assumptions about efficient costs were considered to be accurate and achievable. However, if the AER's assumption about the return on debt was replaced by a trailing average then the credit metrics fell to sub investment grade BB+.
447. CEG also applied Moody's qualitative rating framework to arrive at an overall credit rating. This tended to lift the credit rating above that implied by the metrics alone. On the other hand, CEG's conclusion was that, even if all of the AER's assumptions about efficient costs, including debt costs were achievable, the overall credit rating would be BBB. Further, if a trailing average cost of debt were assumed to be efficient the overall credit rating fell to BBB-.
448. We consider that the AER should review the appropriate criteria for businesses to be included in its comparator set and remove those businesses who do not reflect the risk profile of a benchmark efficient firm due to government ownership (full or partial) or other relevant factors such as implicit support from parent companies which improves subsidiary individual credit ratings. The AER should also establish its credit rating over a longer period than a simple 'on the day' rating established when the regulatory determination happens to be made and have regard to CEG's 'first principles' analysis. Taken together, all this material supports a BBB not BBB+ credit rating.

²⁹⁷ AER, *Draft determination for Jemena Gas Networks 2015-20, Attachment 3 – Rate of Return*, November 2014, [3-297].

²⁹⁸ CEG, *Efficient debt financing costs, A report for ActewAGL*, January 2015.

4.4.2 SOURCE OF DATA

4.4.2.1 The guideline

449. The guideline did not express a definitive proposal as to the source of the data for the benchmark return on debt and as such it is not a matter of accepting the guideline or proposing a departure. The AER has noted that the use of independent third party estimates may be less controversial where the published source is already available and not explicitly constructed for the regulatory process.²⁹⁹

4.4.2.2 Available sources

450. There are currently two principal options for independently published BBB yield estimates under consideration. Namely, the Bloomberg BBB BVAL curve and the RBA published aggregate measure of 10 year Australian BBB corporate debt.³⁰⁰
451. The RBA measure of the cost of debt is a month end measure. The AER's approach—as most recently seen in the NSW electricity draft decisions and other draft decisions reached at the same time—has been to interpolate the end of month results for the RBA measure of the spread to CGS. That simplistic approach is not supported by any statistical analysis. An analysis by ESQUANT, using an ARIMA model, in May 2014,³⁰¹ showed that interpolation between the end of month figures was not an accurate method of estimating the cost of debt for the intervening days of the month. We will be exploring whether and how this issue can best be addressed as the revenue reset consultation proceeds.
452. Although neither curve publishes an estimate for 10 year debt, the Bloomberg service produces a 7 year fair value estimate, and the RBA's publication provides a fair value estimate for a 'target tenor' of 10 years but, because most bonds in its sample are less than 10 years, this is generally associated with a published 'effective tenor' of less than 10 years. Extrapolation can be used to arrive at a 10 year figure for both published yield estimates.
453. CEG has reviewed two methods for extrapolation—which it calls the AER and SAPN methods.³⁰² At the time of writing, the difference in the two approaches was not material but it is possible that it may be in the future. To minimise the difference between the allowance established from the extrapolated data and the commensurate market returns, we consider that the results of the two extrapolation methods should both be calculated and used in the manner discussed below.
454. The SAPN extrapolation formula is set out in Box 4–1.

²⁹⁹ AER, *Rate of Return Guideline, Explanatory Statement*, December 2014, p.127

³⁰⁰ RBA, *Aggregate Measures of Australian Corporate Bond Spreads and Yields*, Table F3.

³⁰¹ Diamond, N & Brooks, R, *A Review of Measures of Australian Corporate Credit Spreads published by the Reserve Bank of Australia*, 2014, pp. 33–34.

³⁰² CEG, *Critique of the AER's JGN draft decision on the cost of debt*, February 2015, pp. 38–40 and Appendix B.

Box 4–1: Extrapolation

For each service provider the average slope of the DRP with respect to changes in maturity at each point on the published yield curve at or above 1 year maturity is estimated as the slope coefficient using ordinary least squares (OLS) regression on observations of fair value DRP against maturity with an intercept term. That is, the formula below:

- Average slope = $\frac{\sum_{i=1}^n (DRP_i - \overline{DRP})(M_i - \bar{M})}{\sum_{i=1}^n (M_i - \bar{M})^2}$

where:

- DRP_i = published yield at target maturity of 'i' years less the swap rate at maturity 'i' based on data published by the relevant service provider;
- \overline{DRP} = the mean of all DRP_i for 'i' greater than or equal to 1;
- M_i = is the maturity of 'i' years associated with DRP_i (in the context of the RBA publication this is effective maturity);
- \bar{M} = the mean of all M_i for 'i' greater than or equal to 1;
- n = the number of observations of fair value DRPs with maturity greater than or equal to 1.

If i_{max} is a value less than 10 years, the extrapolated DRP at 10 years is given by:

- $DRP_{10} = DRP_{i_{max}} + (\text{Average slope}) \times (10 - i_{max})$

where i_{max} is the longest maturity associated with a published yield.

If i_{max} is a value greater than 10 years is then DRP_{10} is determined by linear interpolation between the published DRP_i for the i that is closest to, but less than, 10 years and the DRP_i for the i that is closest to, but greater than 10 years

The extrapolated yield at 10 years is given by:

- Extrapolated yield = 10 year swap rate + DRP_{10} .

The RBA publishes the DRP to swap at each maturity and the yield at each maturity, so the implied swap rate at each maturity to be used for RBA data can be calculated as:

- $\text{Swap}_i = \text{Yield}_i - DRP_i$

Bloomberg publishes swap rates that can be sourced through the ADSWAP fields within the Bloomberg environment. For example, 'ADSWAP1 Index' is the field for Australian swap rates with 1 year to maturity.

4.4.2.3 Recent AER decisions

455. In the draft Ausnet determination the AER has recognised that neither of these services uses an ideal data set nor an ideal method for curve selection but, on the basis that each service had theoretical advantages and disadvantages against the other, the AER was unable to express a preference for either service. On that basis, it adopted a simple arithmetic average of the two.
456. We do not consider that the AER's simple averaging of the two services is consistent with the current rules or the guidance from the Tribunal on how to assess these services.

457. Previous case law (*ActewAGL*³⁰³) only endorsed a simple average when there was no basis for preferring one service over the other. However, the Tribunal considered that the following tests should be undertaken with a view to selecting the preferable service:
- An examination of the data set used and curve selection methodologies
 - An examination of the past performance of the service provider's curves, and
 - A contemporaneous comparison of the published benchmark against traded bond data.
458. The AER has undertaken the first two of these tests and found that it could not rank either of the service providers ahead of the other. However, the AER does not undertake a contemporaneous comparison of the published benchmark against traded bond data and indeed rejected JGN's proposal to undertake a contemporaneous comparison. The AER rejected the JGN proposal on the basis that the AER characterized that approach as 'indirect' when compared with a 'direct' examination of the data set used by the services and their curve selection methodologies.
459. The AER's 'direct'/ 'indirect' distinction is not found in any of the previous Tribunal cases and in our view, it is ill conceived. In fact the purpose of selecting a service provider's product is to provide a benchmark rate of return for debt that is 'commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk'. Examining market trading data is in fact the most direct means of observing a commensurate cost and any reporting service is necessarily at least at one degree of separation from the market in that it applies a selection and curve computation exercise.

4.4.2.4 Our proposal

460. For these reasons we consider that the average of the two services' extrapolated figures—that is, four data points being each of the RBA and Bloomberg curves, extrapolated using each of the AER and SAPN methods—can be used only when the highest and lowest of the four data points are delivering results within 60 basis points of each other.
461. The initial averaging period, falling prior to the beginning of the AER's final determination for JGN, affords the ability to undertake a more detailed bespoke analysis tailored to the data and evidence available at that time. This is particularly important should the AER's proposed transition actually be implemented—in which case this averaging period would be given a very high weight (80%) over the course of the regulatory period.
462. However, in each subsequent averaging period, if the divergence between the four data points is greater than 60 basis points, then there is a significant probability that the reported data from one (or both) services, using one (or both) extrapolation methods, has diverged significantly from the underlying market data and the rate of return objective would not be met.
463. For example, the following kinds of problems that have arisen in the past:
- Third party in question may at any time cease to publish the series—indeed at one time the series most commonly used in regulatory decision making was a series published by the Commonwealth Bank of Australia (the 'CBA Spectrum' series) and it ceased publication in 2010, and
 - It is not always transparent how the third party performs its calculations and in the past flaws have been discovered in the way the calculations are performed after the regulatory decision has been made—for example, flaws in the CBA Spectrum service lead to the revocation and substitution of several revenue determinations in 2005.

³⁰³ *Application by ActewAGL Distribution* [2010] ACompT4. In a subsequent case, one service was preferred over the other and so a simple average was not used. See: *Application by Jemena Gas Networks (NSW) Ltd (No 5)*[2011] ACompT 10.

464. Therefore, the following process should apply when the spread between the RBA and Bloomberg curves, on an annualised basis, is greater than 60 basis points:

1. **Identify data sources.** All independent data sources with relevant data available during the nominated averaging period should be identified (and where there is no 10 year data and extrapolation is required, separate data points for each extrapolation method should be identified).³⁰⁴ An independent data source with relevant data is one that publishes yield information for corporate bonds on estimated yields for corporate bonds in the BBB credit rating band up to at least a seven year term to maturity for at least one business day during the nominated averaging period. For the purpose of the following steps, the average of the RBA and Bloomberg curves is treated as an independent data source.
2. **Select best fit data source.** Select the independent data source, or a simple average of all the available services, that best fits the underlying market data as follows:
 - a) a sample of bonds is to be formed for the nominated averaging period, comprising all bonds for which there are yield observations available from the Bloomberg BVAL pricing source for each Business Day of the averaging period, and which have the following characteristics:
 - i) Issued by an entity or entities domiciled in Australia
 - ii) Issued in Australian dollars, United States dollars, Euros or British pounds
 - iii) Issued by corporations in any industry, excluding sovereign entities, regional and local government entities, government agencies, supranational entities and government development banks, and
 - iv) Have a credit rating from Standard & Poor's of BBB-, BBB or BBB+ on the final day of the averaging period.
 - b) for each bond in the sample, the average observed yield across the nominated averaging period is to be calculated using the Bloomberg BVAL pricing source:
 - i) For bonds with embedded options, option adjusted yields are to be derived by adding interest rate swaps interpolated to the maturity of the bond to the option adjusted spreads sourced from the Bloomberg BVAL pricing source
 - ii) For bonds issued in United States dollars, Euros or British pounds, yields are to be converted to Australian dollar equivalents by use of interest rate swaps and cross-currency basis swaps in a methodology that is well accepted within the finance industry
 - c) for each independent data source, or simple average of data sources, a sum of the weighted squared differences across all the bonds in the relevant bond sample will be calculated as follows:
 - i) **Step one**—for each bond in the relevant bond sample, a corresponding estimated yield for each of the independent third party yield curves at the bond's average time to maturity will be calculated using linear interpolation across business days
 - ii) **Step two**—for each bond in the relevant bond sample, a squared difference between the observed yield of the bond and the yield of each of the independent third party interpolated yield curves, or simple average of curves, at the same maturity will be calculated
 - iii) **Step three**—the squared difference for each bond in the relevant bond sample will be weighted using a Gaussian kernel with a mean of 10 years and a standard deviation of 1.5 years—the

³⁰⁴ As at the date of this proposal, the Bloomberg BBB BVAL and RBA series would be tested. If a new service commences publication, it too would be included for testing.

purpose of using a Gaussian kernel weighting is to give greater weight to observations that are close to the benchmark term to maturity (10 years), and

- iv) **Step four**—for each independent third party data source, the sum of the weighted squared differences across all the bonds in the relevant bond sample will be calculated from the independent data source where the best fit is the independent data source, or simple average of sources, with the lowest sum of weighted squared differences.

3. **Annualise yields.** For the purposes of applying the determination of best fit in the preceding steps, all yield data is to be sourced on an annualised basis. Where a data source publishes yield estimates or observations for a nominated averaging period on a semi-annual basis, these estimates are to be converted to annualised yields in accordance with the following formula:

a)
$$R_{ia} = 1 + \frac{R_{is}}{2}^2 - 1$$

- i) where:

- R_{ia} is the annualised yield; and
- R_{is} is the semi-annual yield.

465. JGN—which is the principal gas distributor in NSW—proposed a similar curve testing approach in its regulatory proposal and substantiated why this was appropriate.
466. The formula for testing which independent service provider to use is set out in Box 4–2.

Box 4–2: Formula for testing independent service providers

If the maximum pair-wise differences taking each of the AER and SAPN extrapolation methods of $|ITP_{RBA} - ITP_{Bloomberg}|$ 60 basis points,

$$\text{Then: } R_t = \frac{ITP_{RBA} + ITP_{Bloomberg}}{2}$$

where:

- R_t is the yield determined for year t
- ITP_{RBA} is the annualised yield on the RBA BBB yield curve extrapolated to 10 years
- $ITP_{Bloomberg}$ is the annualised yield on the Bloomberg BBB BVAL yield curve extrapolated to 10 years.

Otherwise, the formulae for testing which independent service provider to use is:

For each service provider, and for a simple average of all the available service providers:

- $R_t = R_t$ of ITP_y

where ITP_y satisfies:

- S_{ITP_y} = minimum of all available independent third parties' S_{ITP_x} , and

- $S_{ITP_x} = \sum_{i=1}^n \frac{(B_i - Y_i^{ITP_x})^2}{2\pi \cdot 1.5} \cdot e^{-\frac{(m_i - 10)^2}{2 \cdot (1.5)^2}}$

where:

- S_{ITP_x} is the sum of the weighted square differences of the bond sample and the corresponding yield for the independent third party ITP_x (each independent service provider taken separately and also the simple average of both independent service providers)
- $B_1, B_2, B_3, \dots, B_n$ is the bond sample, and B_i is each bond in the bond sample
- m_i is the remaining time to maturity of bond i
- $Y_i^{ITP_x}$ is the calculated corresponding yield for bond B_i for the independent third party ITP_x .

4.5 AVERAGING PERIOD

467. Attachment 9–3 proposes details of the averaging period for the first year of the regulatory period. For the other years, it would be preferable for us to select the averaging period shortly before the commencement of each regulatory year because this:

- Provides real flexibility for service providers to align the averaging period with efficient refinancing requirements
- Reduces the risk of the averaging periods, which are commercially sensitive, becoming known, and
- Provides greater certainty and reduced risk of mismatch between efficient financing costs and the allowed return on debt.

4 — RETURN ON DEBT

468. This is a departure from the guideline that JGN has engaged on with the AER and stakeholders in detail about the merits of this approach as part of its consultation process. We trust that the AER will approve it as part of its final determination for JGN and that further debate on this point will not be required.
469. The mechanics will work as follows:
1. We will submit an averaging period notice to the AER for the purposes of calculating the annual return on debt observation for each calendar year of the 2016 EDPR period, other than the 2016 calendar year
 2. The averaging period notice must nominate the averaging period to be used for calculating the annual return on debt observation for the relevant calendar year
 3. The averaging period notice must be lodged with the AER at least 50 business days prior to the start of the calendar year in which the nominated averaging period occurs
 4. The averaging period must:
 - a) Be a period of at least 10 consecutive business days, and
 - b) Fall entirely within the calendar year immediately prior to the calendar year for which it is to be used to calculate the annual return on debt observation.
 5. Within 20 business days of us submitting an averaging period notice to the AER, the AER must notify us of its determination as to whether it agrees to the nominated averaging period.
 6. The AER must agree to the proposed averaging period unless it concludes that the proposed averaging period cannot achieve the rate of return objective.

4.6 NEW ISSUE PREMIUM

470. The proposed sources of debt data (i.e. the RBA and Bloomberg series) are observations of the secondary debt market—that is the market in which debt issued in the past, but which has not yet reached maturity, is sold from one bond holder to another. Alternatives to the RBA and Bloomberg series were identified in the AEMC rule change³⁰⁵ and AER guideline processes³⁰⁶ but these sources are also derived from the secondary market.
471. By contrast, when network businesses raise debt it is by issuing new bonds to bond holders. This is known as the primary market. There are a number of differences between the primary and secondary bond markets. For example, the quantum of debt that is the subject of an issue is much greater than the later secondary trade in bonds with only a small proportion (if any) re-traded each business day.
472. The difference between the costs facing a business issuing bonds into the primary debt market and trading in the secondary debt market is commonly referred to as the 'new issue premium'. It is accepted that this premium is, on average, positive—due to reasons identified in the literature including market liquidity constraints asymmetric information held between borrowers and lenders
473. CEG has prepared a report detailing its views on the extent of the new issue premium.³⁰⁷ The new issue premium is measured as the change in yields from issue relative to changes in yields of a bond market index.

³⁰⁵ For example, see SFG, *Rule change proposals relating to the debt component of the regulated rate of return*, 21 August 2012, Table 2, p. 13.

³⁰⁶ AER, *Rate of Return guideline, Explanatory Statement*, December 2014, p.126.

³⁰⁷ CEG, *New Issue Premium*, October 2014.

Both the Bloomberg BBB BVAL fair value curve and the RBA BBB fair value curve are calculated based on Bloomberg indicative yields.

474. CEG's report notes that economic logic suggests that compensation for the return on debt should be based on the cost of issuing debt into primary (issuance) markets. This is because this is the market which determines the actual yield paid by an issuer on debt raised. Further, the Rules are consistent with this conclusion. The allowed rate of return objective states:³⁰⁸

The allowed rate of return objective is that the rate of return for a Distribution Network Service Provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the Distribution Network Service Provider in respect of the provision of standard control services (the allowed rate of return objective).

475. CEG finds that the best estimate of the new issue premium that is relevant to a benchmark debt management strategy of issuing 10 year BBB rated debt is 27 basis points.³⁰⁹
476. In addition to the CEG Report, other contemporary studies have reached findings consistent with those reached by CEG. In particular, Ronn and Goldberg (2013) have found a new issue premium exists of approximately 22.5 basis points in the positive direction, using a sample of 1,494 non-finance investment grade bonds newly issued from 2008 to January 2012.³¹⁰
477. The guideline did not explicitly determine whether or not a new issue premium should be include in the cost of capital allowance and, on one view, to now consider and include an additional allowance to account of the new issue premium is not a departure from any explicit provision of the guideline. On the other hand, it could be argued that to provide an additional increment for the new issue premium is a departure by addition and to the extent that this is the case, our proposal departs from the guideline.

4.7 ANNUAL UPDATE FORMULA

478. NER 6.5.2(l) requires that if the debt allowance is to differ within the revenue period from one year to the next:³¹¹

...then a resulting change to the Distribution Network Service Provider's annual revenue requirement must be effected through the automatic application of a formula that is specified in the distribution determination...

479. For clarity, in addition to the formula required under NER 6.5.2(l), we have also included other formulae to describe other aspects of our proposal. Above we have provided the formula for extrapolation of the services and for testing and selecting between the various services. Box 4-3 sets out the formula for updating the allowed return on debt for each of year of the regulatory period. The transitional values (denoted T_t) are explained in section 4.7.1.

³⁰⁸ NER, Rule 6.5.2(c).

³⁰⁹ CEG, *New Issue Premium*, October 2014, p. 54.

³¹⁰ Ronn, E.I. and Goldberg, R.S, *Quantifying and Explaining the New-Issue Premium in the Post-Glass-Steagall Corporate Bond Market*, *The Journal of Fixed Income*, Vol. 23, No. 1, 2013 page 48.

³¹¹ Schedule 2 of the NEL provides that the above reference to a single formula also includes a reference to formulae in the plural see section 11(4)(a).

Box 4-3: Formula for updating the annual allowed return on debt

The return on debt for each Year of the Revenue Period is to be calculated as follows:

- For year 2016: $kd_{2016} = T_{2016}$
- For year 2017: $kd_{2017} = 0.9 \times T_{2017} + 0.1 \times R_{2017}$
- For year 2018: $kd_{2018} = 0.8 \times T_{2018} + 0.1 \times R_{2017} + 0.1 \times R_{2018}$
- For year 2019: $kd_{2019} = 0.7 \times T_{2019} + 0.1 \times R_{2017} + 0.1 \times R_{2018} + 0.1 \times R_{2019}$
- For year 2020: $kd_{2020} = 0.6 \times T_{2020} + 0.1 \times R_{2017} + 0.1 \times R_{2018} + 0.1 \times R_{2019} + 0.1 \times R_{2020}$

where:

- kd_t is the return on debt for year t of the 2016 EDPR period
- T_t is the return on debt that feeds into the calculation of kd_t and is not yet matured. The numbers below for T_{2016} to T_{2020} are based on the placeholder estimate for 2015 so may change
 - T_{2016} is 5.39%
 - T_{2017} is 5.60%
 - T_{2018} is 5.82%
 - T_{2019} is 5.82%
 - T_{2020} is 5.66%
- R_t is the annual return on debt observation for each year t of the 2016 EDPR period (other than 2016), calculated according to the methodology set out in section 4.4.2.4.

480. Box 4-4 sets out the corresponding formula for updating the annual revenue requirement.

Box 4–4: Formula for updating the annual revenue requirement

For each of the four years 2017–2020, the annual revenue requirement will be updated by adjusting the return on capital building block for that year as follows:

$$\text{RocBlock}_t = \text{cod} \times 60\% \times \text{oRAB}_t$$

where:

- RocBlock_t is the adjustment to the return on capital building block in regulatory year t
- cod is the change in the trailing average cost of debt in regulatory year t determined in accordance with the process set out in this section 4.4 of the proposal relative to the cost of debt for that year applied by the AER in making its distribution determination, and
- oRAB_t is the opening RAB in year t set out in the distribution determination.
- Note: The 60% represents the gearing ratio assumed for the benchmark firm

4.7.1 TRANSITIONAL VALUES

481. The transitional value for each year is calculated as the sum of:

- The average of swap rates for swaps that would be in place in that year—that is, for swaps that would be used by the benchmark efficient entity to hedge against base interest rate risk during the ten year transition period
- The historical average DRP for debt that would have been raised prior to the start of the transition period and which would be yet to mature, and
- The transaction costs of entering the swap transactions.

482. For example, in year one of the access arrangement period, the transitional value—which is equal to the return on debt in that year—is the sum of:

- The average of the one to ten year swap rates, and
- The historical average DRP for the years 2006 to 2015.

483. By the second year of the access arrangement period, the one year swap will have expired and the debt raised in 2006 will have matured. Therefore the transitional value for that year will reflect the sum of:

- The average of the two to ten year swap rates, and
- The historical average DRP for the years 2007 to 2015.

484. This transitional value for the second year will be given a 90 per cent weighting in the return on debt formula, with 10 per cent weighting given to the new return on debt observation for that year. The transitional values for subsequent years are calculated in a similar manner. These transitional values are given a progressively lower weighting through the access arrangement period.

485. In order to calculate the transitional values, estimates of the historical DRP and one to year swap rates are required. These estimates (provided by CEG) are set out in Table 4–1 and Table 4–2 below.

Table 4–1: Historical DRP values

Financial year	– DRP (%)
2006	0.650
2007	1.052
2008	3.005
2009	3.922
2010	2.778
2011	2.814
2012	3.084
2013	2.869
2014	2.051
2015 (2–30 January 2015)*	1.816

(1) The value for 2015 is based on a placeholder averaging period (2–30 January 2015). This will be updated once return on debt data for JEN's actual averaging period becomes available. Values are semi-annual.

Source: CEG, Table 21.

Table 4–2: Swap rates*

Term of swap	– Swap rate
1 year	2.62
2 year	2.51
3 year	2.51
4 year	2.53
5 year	2.60
6 year	2.68
7 year	2.76
8 year	2.83
9 year	2.89
10 year	2.95

(1) The value for 2015 is based on a placeholder averaging period (2–30 January 2015). This will be updated once return on debt data for JEN's actual averaging period becomes available. Values are semi-annual.

Source: CEG, Table 17.

486. The estimate of transaction costs is based on CEG's estimate of the cost of entering into swap contracts.³¹² CEG refers to two estimates of the expected cost of entering into swap contracts—an estimate of 14.5 basis points, from a report by Evans and Peck for the Queensland Competition Authority, and an estimate of 23 basis points, from a recent UBS expert report. CEG recommends adopting the upper end of the range defined by these two estimates, including because prevailing transaction costs are likely to be higher than these historic

³¹² CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015, section 3.4.

estimates. Therefore in the calculation below, we adopt an estimate of swap transaction costs of 23 basis points. This is consistent with a recent report by UBS.³¹³

- 487. JEN's calculation of the transaction costs to be included in the transitional values does not include any allowance for a new issue premium. As noted in section 4.6, there is evidence that an upward adjustment (i.e. a new issue premium) should be added to reflect the transaction costs associated with issuing new debt. These transaction costs will not be reflected in the yield estimates produced by sources that reflect trades in the secondary market (such as Bloomberg or the RBA).
- 488. Given that there is no allowance made for a new issue premium, the estimate of transaction costs used in these calculations is likely to be highly conservative, in the sense that it is more likely to understate the financing costs (including transaction costs) faced by the benchmark efficient entity.
- 489. The transitional values for each year are calculated in Table 4–3 below.

Table 4–3: Transitional return on debt values

Year	– Historical average DRP (%) (semi annual)	– Average swap rate (%) (semi annual)	– Transaction costs (%) (semi-annual)	– Transitional value (%) (semi-annual)	– Transitional value (%) (annual)
2016	2.40	2.69	0.23	5.32	5.39
2017	2.60	2.70	0.23	5.52	5.60
2018	2.79	2.72	0.23	5.74	5.82
2019	2.76	2.75	0.23	5.74	5.82
2020	2.57	2.79	0.23	5.58	5.66

(1) The historical average DRP for 2016 is the simple average of the 2006 to 2015 DRP values shown in Table 4–1. The historical average DRP for 2017 is the simple average of the 2007 to 2015 DRP values and so on through to 2020.

(2) The average swap rate for 2016 is the simple average of the 1–10 year swap rates shown in Table 4–2. The average swap rate for 2017 is the simple average of the 2–10 year swap rates and so on through to 2020.

(3) The annualised transitional value for each year is the sum of the historical average DRP, average swap rate and transaction costs for each year in columns two to four, shown in column five, and annualised in column five.

- 490. As noted above, the swap rates and the DRP value for 2015 that are used for these calculations are based on a placeholder averaging period. Therefore, each of the transitional values will need to be updated once data for JEN's actual averaging period becomes available.

³¹³ UBS, *Transaction costs and the AER return on debt draft determination*, A report for Jemena Gas Networks and Jemena Electricity Networks, 27 March 2015.

5. DEBT RAISING COSTS

491. A number of NSW distribution businesses have already identified that the process of raising debt finance incurs significant transaction costs that should be recognised in regulated revenue allowances.³¹⁴ Further, Incenta has researched market data on debt raising transaction costs and has found that the benchmark efficient debt raising costs for Australian corporate entities incorporate the following:³¹⁵
- **Costs of issuing bonds**—this includes arrangement fees, bond master program costs, legal fees, credit rating fees, issuance fees etc
 - **Costs of establishing and maintaining bank facilities required to meet Standard & Poor’s liquidity requirements and maintain an investment grade credit rating**—bank facilities are required in the event that bond markets suddenly lose liquidity and funds are still required for operations, and
 - **Costs of refinancing debt**—or indeed initial financing of capital expenditure or lump operating expenditure—3 months ahead of refinancing date, which is required by Standard & Poor’s as a condition of maintaining investment grade credit rating.
492. On the latter point, while Standard & Poor’s views a 3 month overlap in refinancing as the minimum level of overlap necessary for investment grade businesses, it is evident that a prudent benchmark efficient business would maintain a more significant overlap of approximately six months. The AER already has material before it which evidences the necessity of refinancing with a six month overlap to ensure that the business continues to meet Standard & Poor’s conditions of maintaining an investment grade credit rating.
493. We direct the AER to previous signed statements, which it has received from:
- Andrew Noble, Senior Treasury Analyst at CitiPower and Powercor,³¹⁶ and
 - Gregory Damien Meredith, Treasurer at Envestra.³¹⁷
494. Andrew Noble notes that Citipower and Powercor’s shared liquidity policy requires the businesses have refinancing arrangements in place at least six months prior to maturity which he considers is relatively prudent for a regulated business and is acceptable to the rating agencies. In particular, Andrew refers Section 4.6 of the Treasury Policy which requires that the business ensure ‘undrawn committed facilities are available to cover debt maturing within the next six months’.³¹⁸
495. Gregory Meredith states that while six months in advance used to be the accepted term to arrange refinancing, equity markets now require businesses to refinance maturity’s 12 months to two years out. Gregory also confirms that credit rating agencies want businesses to have everything refinanced at least six months prior to maturity to mitigate refinancing risk.³¹⁹
496. We note that Balchin et al have also considered each of these types of costs, adopting the AER’s characterization of these costs as direct—establishment fees, legal fees, etc—and indirect—early financing costs and commitment fees associated with the maintenance of liquidity reserves—financing costs.³²⁰ In

³¹⁴ See Ausgrid, *Regulatory Proposal*, May 2014 p. 78.

³¹⁵ See Incenta, *Debt raising transaction costs – Ausgrid*, May 2014.

³¹⁶ Statement of Andrew Noble, undated.

³¹⁷ Statement of Gregory Damien Meredith, 31 January 2009.

³¹⁸ Statement of Andrew Noble, undated, p. 2.

³¹⁹ Statement of Gregory Damien Meredith, 31 January 2009, p. 7.

³²⁰ Balchin, J, et al., M, *Energy Networks Association: Debt financing costs*, May 2010, p. 12.

dismissing the AER's previous finding that indirect fees double counted the existing allowance provided through the direct debt raising cost allowance,³²¹ Balchin found that a benchmark efficient network service provider should be entitled to recover both types of costs as 'the indirect costs associated with early refinancing and the direct costs of debt financing are separate costs that do not overlap'.³²²

497. As noted in Attachment 8–2, we propose debt raising costs of 17.8 basis points per year, based on the Incenta report prepared for JGN.³²³ We intend to update this estimate for JEN in our revised proposal to reflect the market data available at that time.

³²¹ See AER, *South Australia distribution determination 2010-11 to 2014-15*, May 2010, p. 384.

³²² Balchin, J, et al., M, *Energy Networks Association: Debt financing costs*, May 2010, p. 23.

³²³ Incenta, *Debt raising transaction costs, updated report*, 25 February 2015.

6. EXPECTED INFLATION

498. Rule 6.4.1 requires that the AER prepares and published a PTRM, which is used to establish the revenue allowance each year during the regulatory period. Under rule 6.4.2(b)(1), the post-tax revenue model must include:

...a method that the AER determines is likely to result in the best estimates of expected inflation.

499. The guideline does not explain how the AER proposed to determine the rate of inflation, instead leaving that question to be determined in each individual revenue determination.
500. Since the AusNet Services transmission determination in 2009, the AER has established the expected inflation rate by taking a simple average of the RBA forecasts of short-term inflation extending out to two years and the mid-point of the RBA's target inflation band for the remaining years in the 10 year period. At the time of that determination, the AER noted that it would monitor the situation to see if the reasons for adopting the change might reverse.
501. At this stage, we do not oppose the AER's current approach to determining the expected rate of inflation. However, we note that very recently in Australia and globally, expectations concerning inflation (or in fact fears of significant deflation) appear to be volatile and it may be that the best method for estimating inflation may evolve during the period that our revenue proposal is being considered.³²⁴
502. We will continue monitoring these developments during the review period. If there is a mismatch between market expectations and the results of applying the AER's current approach, then we propose that an alternative approach that better matches those expectations is used—such as the implied inflation from comparing nominal and real CGS yields.
503. Using the AER's current method, the relevant inflation rate would be 2.52% based on the most recent monetary policy statement from the RBA. Our calculation of this is set out in Attachment 9–1.

³²⁴ For instance, see: Australian Financial Review, *IMF warns Australia faces low-inflation trap*, 15 April 2015, available here: <http://www.afr.com/news/economy/monetary-policy/imf-warns-australia-faces-lowinflation-trap-20150414-1mkw9o>.

Australian Financial Review, *Australian bonds print first ever negative yield*, 16 April 2015, available here: <http://www.afr.com/markets/australian-bonds-print-first-ever-negative-rate-20150416-1mmgql>.

Guy Debelle, *Global and domestic influences on the Australian bond market*, 16 March 2015.

7. ILLUSTRATIVE CALCULATIONS

504. Using the indicative averaging period spanning the 20 days to 30 Jan 2015, our proposed allowed rate of return is 7.18%. The components are set out below.
505. Table 7–1 sets out our proposed return on equity to apply in each year of the regulatory control period, calculated using the SFG approach outlined above.

Table 7–1: Proposed return on equity

Model	Risk free component	Risk premium	Weight	Return on equity
SL-CAPM	2.64%	6.68%	25.00%	9.32%
Black CAPM	2.64%	7.29%	25.00%	9.93%
FFM	2.64%	7.29%	25.00%	9.93%
DDM	2.64%	7.68%	25.00%	10.32%
Overall return on equity	2.64%	7.23%	100.00%	9.87%

Source: SFG for estimates, JEN for weights.

(4) Estimates are for the period 2–30 January 2015. These will update for future averaging periods.

506. Table 7–2 sets out the proposed return on debt for the first year of the 2016 EDPR period, calculated by CEG. For subsequent years of the regulatory control period, the return on debt will be updated in accordance with the formula set out in Box 4-3 above.

Table 7–2: Proposed return on debt for the first year of the 2016 EDPR period

Input	Rate
Trailing average DRP (semi-annual)	2.69%
Swap rates (semi-annual)	2.40%
Transaction costs (semi-annual)	0.23%
Overall return on debt (annualised)	5.39%

Source: CEG.

(1) Estimates are for the period 2–30 January 2015. These will update for future averaging periods.

(2) The semi-annual historical DRP, swap rates, and transaction costs are summed and annualised.

7 — ILLUSTRATIVE CALCULATIONS

507. Table 7–3 sets out our proposed rate of return for the first year of the 2016 EDPR period. For subsequent years of that period, the rate of return will be updated at the time of updating the return on debt.

Table 7–3: Proposed rate of return for the first year of the 2016 EDPR period

Input	Rate
Overall return on equity	9.87%
Overall return on debt	5.39%
Leverage	60.00%
Gamma	25.00%
Rate of Return	7.18%

(1) Estimates are for the period 2–30 January 2015. These will update for future averaging periods.

508. Also, as we have explained, we do not consider that the foundation model is appropriate to use. However, if it were to be used in the manner re-specified as per SFG’s advice, then Table 7–4 shows that the equity beta for use in the SL-CAPM should be 0.89.

Table 7–4: Alternative estimate of the equity beta

Model	Implied SL beta
SL-CAPM	0.82
Black CAPM	0.89
FFM	0.89
DDM	0.94
Simple average beta	0.89

Source: SFG.

Attachment A
Credit ratings over 2002 to 2014

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Table A 1: Credit ratings over 2002 to 2014

End of year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Median over all years	Median over last 5 years
APT Pipelines								BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB
ATCO Gas Australian LP										BBB	BBB	A-	A-	BBB	BBB+
AusNet Services	A	A	A	A	A	A	A-	A-	A-	A-	A-	A-	A-	A	A-
DBNGP Trust			BBB	BBB	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB	BBB-
DUET Group		BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-			BBB-	BBB-
ElectraNet Pty Ltd	BBB+	BBB+	BBB+	BBB+	BBB+	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-	BBB-	BBB-	BBB-/BBB	BBB-
Envestra Ltd	BBB	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB	BBB+	BBB-	BBB-
ETSA Utilities	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
Powercor Utilities	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	A-	A-
SPI (Australia) Assets Pty Ltd							A-	A-	A-	A-	A-	BBB+	BBB+	A-	A-
The CitiPower Trust	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	A-	A-
United Energy Distrib. Pty Ltd	A-	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB
Median	A-	BBB+	BBB/BBB+	BBB/BBB+	BBB/BBB+	BBB/BBB+	BBB+	BBB	BBB	BBB	BBB	BBB/BBB+	BBB+	BBB	BBB

Source: Bloomberg.