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Rate of Return on Equity: Proposal for the 2016 to 2020 Regulatory Period

Attachment to UE Regulatory Proposal

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1. Introduction

1.1 Applying a new framework for setting the allowed rate of return

Electricity distribution networks are capital intensive with long lived assets and therefore a key aspect of the Australian Energy Regulator's (**AER**) distribution determination is the allowed rate of return on the capital invested in United Energy's business. Rule 6.12.1 provides[1] 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].

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]

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, then network businesses will be unable to attract the investment capital that is needed to promote efficient investment in electricity services for the long-term interests of consumers.

As a result of reforms introduced by the Australian Energy Market Commission, (**AEMC**) in 2012, the Rules governing the AER's allowed rate of return decisions, set out in Rule 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. The principle is enunciated through 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 ...."*

The new Rules require the AER to have regard to all relevant models and other available inputs,[6] and not just the subset of material that the Rules previously required. With respect to equity, the new Rules require[7] 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 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. The new Rules do not alter the requirements

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1 AEMC; *National Electricity Rules Version 71* (the **National Electricity Rules**) Rules, Rule 6.12.1(5), pages 711 – 714.

2 National Electricity Rules; Rule 6.5.2 , pages 6662 - 665.

3 Ibid; Rule 6.5.2(i), page 663.

4 Oxera, 2015, "*Aiming high in setting the WACC: framework or guesswork?*" The asymmetry is also an important reason as to why the revenue and pricing principles in section 7A (2) of the NEL are consistent with the NEO.

5 National Electricity Rules; Rule 6.5.2(c), pages 662 to 663.

6 Ibid; Rule 6.5.2(e)(1), page 663.

7 Ibid; Rule 6.5.2(g), page 663.

8 Ibid; Rule 6.5.2 (i), page 663.

of the National Electricity Law (**NEL**)[9], which provides 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 investment 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 in complying with their regulatory obligations.

The same AEMC Rule reform resulted in a withdrawal of the tightly specified requirements for the AER to use the "on the day" method for determining the allowance for debt, and to adopt the SL-CAPM for establishing the permitted return on equity.[10] Furthermore, the previous requirement for there to be persuasive evidence before the AER could depart from its choice of model parameters was similarly excised from the Rules. Instead the AER is now required to consider all of the available models and evidence when producing a decision.

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.

As required by the Rules, the AER issued a Rate of Return Guideline[11] (the **Guideline**) which set out the AER's proposed approach to applying the new Rules. In November 2014, the AER issued concurrent draft decisions for the NSW and ACT electricity distributors, for the transmission businesses Directlink and Transgrid, and the gas distribution business, Jemena Gas Networks.

United Energy is concerned that the AER's approach, as set out in the Guideline and draft decisions does not conform to the new Rules and would not provide a sufficient allowed rate of return on capital. This submission explains that although the AER reviewed reports prepared by experts 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. Furthermore, the AER's method is delivering returns on equity that are at lower levels than would reasonably be predicted by prevailing conditions in the market for funds. The AER continues to apply the SL-CAPM as its foundation model which acts as a filter through which all other material must pass before the material can be accorded any weight.

In its recent regulatory decisions, the AER has applied methods which closely resemble those used in the past.[12] The AER has calculated a blended rate of return (which gives a 40 per cent weighting to equity, and a 60 per cent weighting to debt) by applying the AER's own "Ibbotson" inspired specification of the SL-CAPM. The value for the equity beta has been set at an unprecedentedly low level. The application of the AER's recent approach to current market data would not result in an efficient rate of return. The distinguishing feature of the Ibbotson approach to measuring the historical market risk premium (**MRP**) for use in the SL-CAPM (the **Ibbotson Approach**) is that the resulting estimates for the rate of return on equity track the risk free rate in perfect parallel. This means that in current circumstances, the estimates of the return on equity have plummeted one-for-one as the yields on Commonwealth Government Securities (**CGS**) have declined.

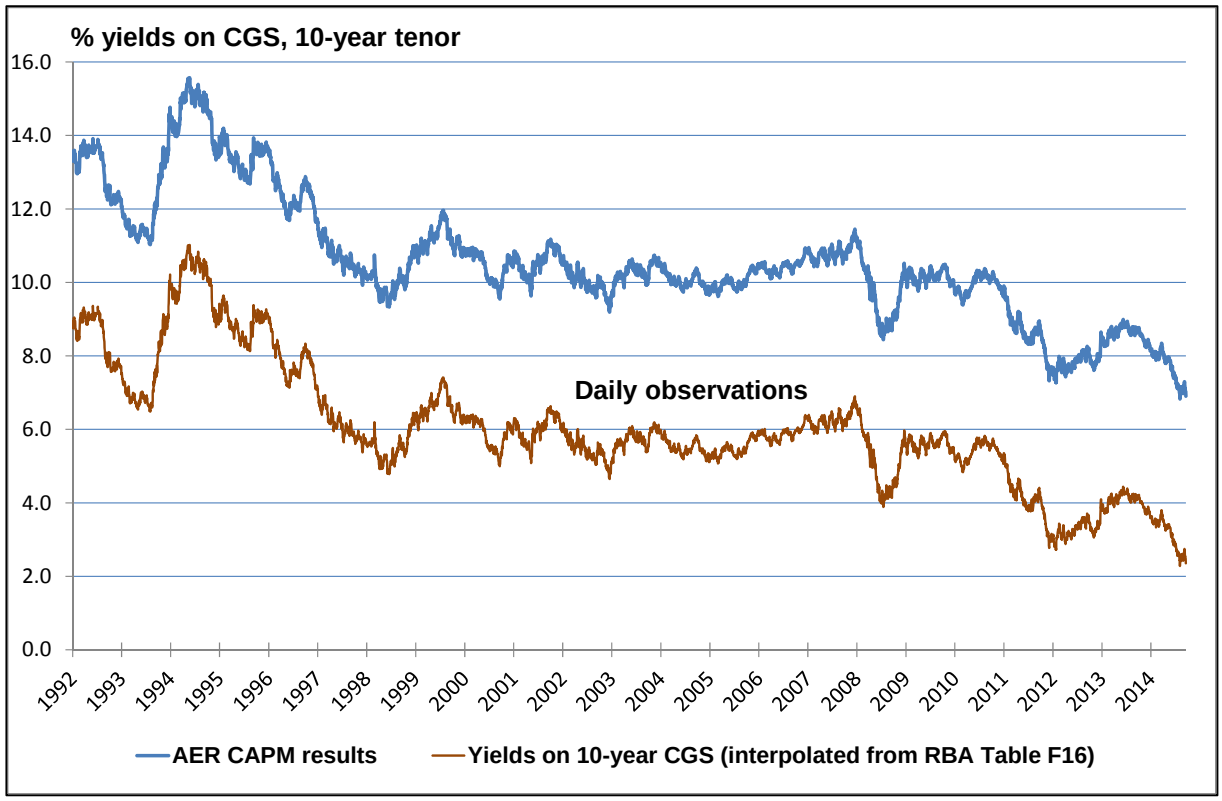
9 *The National Electricity Law, a Schedule to the National Electricity (South Australia) Act 1996*; (the **National Electricity Law**), Schedule 2, Part 3; sections 16(1) (a) and 16(2) (a).

10 AEMC 2012*, Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services,* Final Position Paper, 29th November 2012, Sydney.

11 As part of the **Better Regulation reform program**, the AER released its Better Regulation, Rate of Return Guideline; December 2013 on 17th December 2013 (pdf version).

12 For example, AER; Draft decision, *Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of return*; November 2014, (pdf version) pages 8 and 21.

Figure 1.1: The results from application of the AER's method for the return on equity



There are a number of ways in which the AER's regulatory settings for the return on equity allowance have altered over the last five years.[13] Nevertheless, when assessing whether the current approach is sensible and robust, there is value in considering what rate of return allowances the method would have delivered if it had been employed over a number of years. Figure 1.1 above illustrates how the AER's current approach to setting the allowed rate of return is directly related to the yields on 10-year CGS. The brown line shows the yields on CGS (in per cent) and the blue line shows the estimated returns using the AER's method.[14] The fundamental problem with this approach is that there is no reason to suppose that investors' required rates of return have dropped in synchronicity with the fall in CGS yields and the reduction in the AER allowance for the rate of return on equity. To ensure that the allowed rate of return is commensurate with market expectations of returns, the AER should broaden the estimation methods that it takes into account and ought to give them real weight.

In fact, the reduction in permitted returns is even more pronounced because the AER has also presided over a lowering of the equity beta to levels below those used in the past. Compared with previous determinations the AER's current approach to the model inputs, and the resulting rate of return for equity, are as shown below in Table 1.1.

Table 1.1: AER's current approach to model inputs

	Last ESCV determination (2005)	First AER final determination for United Energy (October 2010)	Current draft AER determination for NSW DBs (Oct 2014)
Risk free rate	2.64% (Real)	5.08% (Nominal)	3.55% (Nominal)

[13] For instance, for the 2011 to 2015 regulatory period, the AER's determination employed a 6.0% market risk premium (compared with 6.5% today), and a 0.8 equity beta compared with an equity beta of 0.7 today.

[14] That is, the allowed rate of return = risk free rate + beta x market risk premium = 10-year CGS yield + 0.7 x 6.5. The CGS yields are sourced from statistics available from the RBA's website (RBA Table F16).

Beta	1.0	0.8	0.7
MRP	6.0%	6.5%	6.5%
Post-tax nominal return on equity	11.42%	10.28%	8.10%
Post-tax real return on equity	8.64%	7.51%	5.46%

Source: Electricity Distribution Price Review, 2006-10, *Final Decision Volume 1, Statement of Purpose and Reasons*, Essential Services Commission, (ESCV), Final Decision, October 2005; Table D.92, WACC for United Energy, page 697. Note: The ESCV published the real return on equity. The nominal return on equity was inferred by applying the then inflation forecast (of 2.56%).

Source: AER (2010), *Final decision, Victorian electricity distribution network service providers, Distribution determination 2011–2015*, October 2010. See also: AER (2012), United Energy Distribution, Distribution determination 2011–2015, Pursuant to Orders of the Australian Competition Tribunal in *Application by United Energy Distribution Pty Limited (No 2)*, [2012] ACompT8, September 2012; Table 13. AER (2015), *Draft decision, Ausgrid distribution determination, 2015–16 to 2018–19*, Attachment 3: Rate of return, Australian Energy Regulator, November 2014.

In summary, United Energy's principal objections to the way in which the AER's Guideline and recent draft determinations set allowances for equity are that:

- The AER does not correctly assess the degree of risk to which electricity distributors are exposed and, as such, the AER's approach under-compensates equity holders for the risks that they incur when investing in a business such as United Energy. Accordingly, the AER is not correctly applying the rate of return objective with respect to risk.
- The AER should not give any model, least of all the SL-CAPM, a central or "Foundation model" role in setting an allowed rate of return for equity and, instead, all of the relevant models should be used, with a weighted average then calculated of the model results. The latter approach would be consistent with Rule requirements.
- The SL-CAPM relies on just three inputs (the risk free rate, the equity beta, and a value for the market risk premium). The AER has made significant errors in relation to at least two of these variables, and the rate of return objective cannot therefore be fulfilled. The AER's practice is also incompatible with the revenue and pricing principles.
- Furthermore, the AER's favoured SL-CAPM model is known to produce results for the return on equity which are significantly downwardly biased for stocks with an equity beta of less than 1.0. Notwithstanding the denials by the AER, there is considerable evidence of the low beta bias from recent research published in leading journals. A subset of the research has recently been reviewed by NERA Economic Consulting in a report prepared for a consortium of energy network businesses.[15] There is therefore no basis for the AER to conclude that its approach of selecting an equity beta and a value for the MRP from the upper end of the respective ranges for these two variables will compensate for the low beta bias. Hence, the achievement of the rate of return objective will be undermined, and the regulated network service provider will not be given an opportunity to satisfy the revenue and pricing principles.
- In addition, consideration should be given to both the Ibbotson and Wright methods when establishing values for the key "market risk premium" parameter. This is because there is validity in both approaches, with the calculations able to be performed on the same set of consistent historical data. The Ibbotson method focuses on excess returns to the market portfolio over periods in the past, while the Wright approach measures the historical average real return to the market portfolio, and then applies a current measure of inflation expectations. The Wright approach can produce an MRP result if the risk-free rate is subtracted from the expected, nominal return on equity. The results from both

[15] NERA (2015); 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, prepared by NERA Economic Consulting, March 2015 **(NERA 2015)**.

the Ibbotson and Wright techniques can be incorporated into the SL-CAPM, and into other asset pricing models. The AER provides commentary to convey the impression that it is giving due consideration to the Wright approach, but the regulator fails at the critical stage of actually factoring in the numbers into its assessment of the MRP.

On the subject of setting the allowance for the return on debt, the AER accepts that, in practice, prudently managed businesses work to ensure that debt is raised on an evenly staggered basis, which means that maturities are evenly spaced through time. The AER proposes to gradually phase in a trailing average rate of return on debt over an extended 10 year transition period. Towards the end of that period, there would, ordinarily, be reductions in the variability of the return on debt allowance and in the differential between the regulatory allowance and the actual costs of debt. The AER's preferred transition method, is, however, flawed. For the first regulatory period in which the transition is commenced, the return on debt allowance would be set according to a method which fundamentally resembles the "rate on the day" approach that was the prescribed method under the previous regulatory regime. United Energy supports the principle and practice of a trailing average rate of return on debt, on the proviso that an appropriate transitional method is applied for the full period of the transition. UE acknowledges the findings of the AER in relation to the efficient debt financing practices of a benchmark efficient entity under the "on the day" approach.[16] However the AER has proposed a transition which is from regulatory practice rather than from benchmark efficient practice.

UE considers that the AER's transition is inappropriately designed and conceived. In its place, UE proposes to apply the hybrid form of the transition to a trailing average return on debt. The hybrid transition will provide a closer match to current and past debt raising practices of the firm. In particular, a benchmark efficient entity in the circumstances of UE would currently be bearing a legacy portfolio of debt, which would include debt instruments issued in the past at times at which the debt risk premiums being paid were comparatively high.

An added consideration is that the AER's adoption of an overly optimistic BBB plus credit rating for a 60% leveraged benchmark efficient entity depresses the permitted rates of return below a truly market reflective return, which should be based on a BBB credit rating (from Standard and Poor's).

Table 1.2 below provides an illustration of how the return on debt allowance for the first year of the 2016 to 2020 regulatory period would decline under the AER's proposed transition methodology, by comparison with the return on debt outcome from the last regulatory decision for UE.

Table 1.2: First year return on debt allowance under the AER's proposed transition methodology

	Last ESCV determination (2005)	First AER final determination for United Energy (October 2010)	Current draft AER determination for NSW DBs (Oct 2014)
Risk free rate	2.64% (Real)	5.08% (Nominal)	3.55% (Nominal)
Credit rating	BBB+	BBB+	BBB+
Debt risk premium	1.425%	3.89%	2.96%
Nominal pre-tax return on debt	6.73%	8.97%	6.51%
Real pre-tax return on debt	4.07%	6.23%	3.91%

Source: Electricity Distribution Price Review, 2006-10, *Final Decision Volume 1, Statement of Purpose and Reasons*, Essential Services Commission, (ESCV), Final Decision, October 2005; Table D.92, WACC for United Energy, page 697. Note: The ESCV published the real return on equity. The nominal return on debt was inferred by applying the then inflation forecast (of 2.56%). The debt risk premium shown (for the ESCV decision) also incorporated debt-raising costs of 0.125%.

Source: AER (2010), *Final decision, Victorian electricity distribution network service providers, Distribution determination 2011–2015*, October 2010. See also: AER (2012), United Energy Distribution, Distribution determination 2011–2015, Pursuant to Orders of the Australian Competition Tribunal in *Application by United Energy Distribution Pty Limited (No 2)*,

[16] AER. The Guideline, December 2013; section 7.3.3, (pdf version). AER Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; section 7.3.3, pages 102 to 111 (pdf version).

[2012] ACompT8, September 2012; Table 13. AER (2015), *Draft decision, Ausgrid distribution determination, 2015–16 to 2018–19*, Attachment 3: Rate of return, Australian Energy Regulator, November 2014.

The AER's post tax revenue model (**PTRM**) applies the allowed rate of return to the asset base to deliver an allowance in pecuniary terms. An important variable in the PTRM that is used for establishing the rate of return allowance in the second and subsequent years 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, United Energy will monitor this issue and will put forward further analysis about whether the current approach still meets the requirements of the Rules.

1.2 Summary table: Departures of this regulatory proposal from the Guideline

The Rules require that United Energy's proposal identify the particular issues in relation to which departures have been proposed from the Rate of Return Guideline. The tables presented below explain the points of differentiation. Table 1.3 addresses return on equity issues.

Table 1.3: Departures of this regulatory proposal from the Guideline: Equity

Guideline	Regulatory Proposal	Rationale
Relevant models to consider: SL-CAPM, Black CAPM, Fama French Three Factor Model and the Dividend Growth Model.	Adopts the approach in the Guideline.	These are relevant models for estimating the required return on equity (see sections 2.5. and 2.6 in *Rate of Return on Equity: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Which models should be used in setting the allowance: SL-CAPM, Black CAPM and the Dividend Growth Model. The AER does not consider or produce empirical estimates from the Black CAPM, and makes only limited use of the DGM. No regard is had to empirical estimates from the Fama French Three Factor Model.	Diverges because UE would use all four models.	The Fama French Three Factor Model provides valuable insights and corrects for well-documented biases that are not explicitly considered by the other models (see sections 2.5. and 2.8.3.1 in *Rate of Return on Equity: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
How the information gleaned from the models should be synthesised: The SL-CAPM, implemented in the way the AER has done in the past, should (continue) to play the central role. Any other information should take a secondary role, at most being used to inform the estimate of one of the SL-CAPM parameters. 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.	All of the relevant information (i.e. all four models including the two principal ways to approach the SL-CAPM) should contribute directly to the allowed rate of return on equity, calculated as an average which has been weighted according to the specific contributions that each model can make.	There is no correct basis for the AER's Ibbotson inspired implementation of the SL-CAPM to be given the greatest weight, nor for it to constrain the extent to which other inputs can affect the computation of the allowed rate of return for equity (see sections 2.6 and 2.7 in *Rate of Return on Equity: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Implementing the SL-CAPM: The SL-CAPM should be implemented using a current risk free rate, an equity beta of 0.7 and a market risk premium of 6.5% that is largely guided by historical estimates.	The beta should be at least 0.8 and equal weighting should be given to the Ibbotson and Wright approaches to estimating the MRP.	Network businesses have greater systematic risk than the AER assumes and the SL-CAPM is downwardly biased for low beta stocks. The SL-CAPM also does not accurately capture the returns

	When implementing the Ibbotson approach, the market risk premium should be the arithmetic average for the longest available series – that is 6.56%. The appropriate role for the DGM is as a model to be employed directly in delivering an estimate for the return on equity for a group of stocks which are comparators for the benchmark efficient entity. The AER uses the DGM to inform the choice of an estimate of the MRP from within a range.	for stocks with high book-to-market ratios. The Ibbotson and Wright approaches for estimating MRP are based on the same historical data but different methodologies return different results – and, as such, regard should be given to both. When seeking to employ the Ibbotson approach, the AER identifies a range for the historical MRP of 5.1% to 6.5%. The low end of this range is flawed in that it relies on an incorrectly adjusted dividend yield series, and irrelevant geometric averages (see section 2.7, pages 57-83 in *Rate of Return on Equity: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).

Table 1.4 provides a summary of departures from the Guideline on debt issues, but does not seek to discuss components of the cost of debt that were omitted from the Guideline altogether. By way of example, the new issue premium, optimal hedging ratios, and swap transaction costs are issues that were not properly considered by the AER when it prepared the Guideline. There is no reference to these components in the table below, however any premium or transaction cost that is payable by the benchmark efficient entity is discussed and evaluated in the main part of UE's regulatory proposal, and in supporting documents for the return on debt.

Table 1.4: Departures of this regulatory proposal from the Guideline: Debt

Guideline	Regulatory Proposal	Rationale
Trailing average, "on the day" method or a hybrid: Leaving aside the issue of transition (discussed below), ultimately the return on 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.	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 (see section 3 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Tenor for benchmark debt portfolio: 10 years	Adopts the approach in the Guideline.	There are good reasons for issuing debt with a long term to maturity, and 10 years is the longest tenor that is common in the Australian marketplace (see section 2.1 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Credit rating from Standard and Poor's: BBB+	BBB	In both cases the credit rating is established on the basis of a median of a group of comparator entities, but UE would exclude AusNet services from the group on the basis that it is majority government owned (see section 2.2, pages 7 to 10

		in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Form of the transition to a trailing average cost of debt: There would be a transition towards the trailing average over two five year regulatory periods. 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 be reduced 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 a 10% weighting assigned to each of the ten most recent years.	A hybrid approach has been adopted. 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.	The hybrid approach has been developed to correspond with the debt-raising and hedging practices of privately-owned, regulated distribution businesses (see section 4.2 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
The weights used in a trailing average cost of debt computation should remain constant at 10%. The weights have been chosen to correspond with the benchmark tenor of debt.	UE has investigated the use a varying weights trailing average model, but does not propose to depart from the Rate of Return Guideline. Thus, UE has maintained the use of an equal and fixed weight of 10% for the spot cost of debt observations from each contributing year.	A varying weights trailing average calculation would, potentially, offer advantages by allowing generic hedging methods to be applied rather than forward starting swaps. The AER's preferred transition method is not forward-looking (see section 4.2 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Source of third party data for the cost of debt used in historical calculations: 50% RBA corporate bond spreads, Table F3 50% Bloomberg BFV or BVAL curve for BBB rate bonds	The historical values for the spread-to-swap used in the assessment of the hybrid approach to the trailing average will draw upon the reported, past values from the Bloomberg BFV curve, and the RBA measures of corporate bond spreads. An average will be taken of the results from both indicator series.	The two third party indicator series provide reasonable historical data (see sections 5.1 and 5.2 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Source of third party data for cost of debt calculations during prospective averaging period: 50% RBA corporate bond spreads, Table F3 50% Bloomberg BVAL curve for BBB rate bonds	Third party estimates of the cost of debt will be subject to extrapolation. Different methods will be applied to the task. The extrapolated results will be tested against market data. Results will be chosen from the third party data source that performs best when tested against the underlying market data that is observed or recorded over the relevant reference period.	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. To make better use of the observed bond data, yield curves and par yield curves will also be estimated (see sections 5.1 and 5.2 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
Nomination of averaging periods for the cost of debt.	Averaging periods will be nominated in advance. However, UE does not propose to choose the periods for all future years before or	UE does not believe that there is merit in selecting reference periods for time intervals which may be 4 or 5 years hence (see

The AER requires averaging periods to be nominated for each of the constituent years of the regulatory period. Specifically: The period must be specified prior to the commencement of the regulatory control period. 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. A period needs to be specified for each regulatory year within a regulatory control period.	during the first regulatory year of the new regulatory control period.	sections 6.1 and 6.2 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).
The length of the averaging period and timing of when it occurs. An averaging period of 10 or more days should be used. The period should be nominated in advance, but the days should be chosen so as to leave minimal time between the averaging period *per se*, and the commencement of each regulatory year in a regulatory control period.	For clarity, UE proposes to choose averaging periods prospectively, covering time intervals which have not already lapsed.	(See section 6.1 in *Rate of Return on Debt: Proposal for the 2016 to 2020 Regulatory Period, Attachment to the UE Regulatory Proposal*).

1.3 Report outline

This report is structured as follows:

- **Risk:** The changing risk profile for electricity distribution businesses (sections 2.2 and 2.3);
- **Allowed rate of return for equity:** Overview of the AER's approach (section 2.4);
- Identifying and comparing return on equity models that are fit for purpose (section 2.95);
- A discussion of the AER's approach, and a detailed exposition of the flaws inherent in the AER's method (sections 2.6 and 2.7);
- **Rate of return allowance** proposed in place of the AER Guideline (section 2.8);
- **Establishing a real allowed rate of return:** A discussion of **the** expected inflation rate is provided (section 2.9); and
- **Conclusion:** Calculations establishing a return on debt using data from the period 2 to 30 January 2015 (section 2.10).

2. The changing risk profile for electricity distribution businesses

2.1 Introduction

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 offered that adequately rewards the investors for the risks of committing equity capital. For consumers, it is important that regulatory decisions do not over-compensate 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).

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. The assets in any electricity network potentially last for about 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 of the key customer categories, considered over the relevant time interval, grid connection may not be able to continue to compete with these new technologies.

The AER's draft decisions[17]proceed on the basis that the businesses are regulated natural monopolies. 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 an equity beta of 0.7) with a return on debt allowance that has been established for a benchmark entity with a credit rating of BBB plus. The draft decisions and the Guideline that they apply are largely based on an analysis of risk by the AER itself, with input provided by a report from Frontier Economics.[18] The AER's consideration of risk formed part of the development process for the Rate of Return Guideline.

It is simply not the case that an adequate compensation for risk can be provided in the manner suggested by the AER.

The AER Guideline[19] concluded that electricity and gas networks were low risk with justification provided by the report from Frontier Economics[20]. However, as was mentioned in paragraph 105 of the 2014 equity beta

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17 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).

18 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.

19 AER; *Better Regulation, Explanatory Statement, Rate of Return Guideline (Appendices)*, December 2013 (**Guideline Appendices**); page 42 (pdf version).

20 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, pages 21 – 26.

report from SFG Consulting,[21] the Frontier Economics document does not provide support for an equity beta which is below 1.0 and, indeed, Frontier Economics does not state that the beta should be below that figure.

The AER's use of the Frontier Economics observations that energy network businesses are less risky than the market average fails to acknowledge:

- 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. Note that the service innovations were not fully apparent at the time of the Frontier Report. For the first time in a century, the combined effect of technological developments is throwing into doubt the scale, design, direction for growth and longevity of electricity network investments. The developments are discussed further in section 2.2.
- The implications for the required rate of return on equity when the benchmark business is presumed to be geared at 60%, which implies a proportion of debt funding that is somewhat above the average for many businesses, including businesses operating in competitive markets. The implications of higher gearing were not evaluated quantitatively by Frontier Economics, even though the Frontier report examined financial risks and gearing, albeit in a limited fashion.

Furthermore, the draft determinations suggest that in addition to recompensing the business for risk through the product of the equity beta (0.7) and the market risk premium (6.5%), the business is further insulated from risk because:

- There is limited 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); and
- The regulatory determination will adopt a revenue cap as opposed to a price cap (which was not considered by Frontier Economics).

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 in moderating the amplifying effect of a high leveraging assumption. An important consideration is that the number of disconnections may call into question the willingness or ability of the remaining customers to pay, not only for 'common use' assets but potentially even for stranded assets that were put in place solely to service customers which have since disconnected.

[21] SFG Consulting; *Equity beta, Report for Jemena Gas Networks, ActewAGL and Networks NSW*; 12 May 2014, page 22.

2.2 Evolving operational risk profile

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. Over the 20 years for which economic regulation has applied through the NEM, demand has been consistently growing in a way that is less volatile than in many other industries while technological change has proceeded gradually. In some ways the regulatory framework has assisted in reducing risk.[22]

However, the risks of electricity network businesses have changed significantly in the recent past, in ways that were not considered in the 2013 report commissioned by the AER from Frontier Economics, in the context of the Guideline consultation process. Essentially, electricity distribution businesses are now confronted with two possible future scenarios, one in which United Energy evolves and survives, and the other in which United Energy's network progressively becomes redundant. In this section of the submission, United Energy explains how the risks that it faces have substantially changed.

First, United Energy considers solar panels as one of the the main examples of the major developments in distributed generation.[23] Solar panels have been available since the 1970s but they played almost no part in supplying electricity to the grid-connected mass market in the ensuing 30 years because the technologies used to manufacture them were price prohibitive. In recent times, the prices of solar cells have been falling rapidly. From 1998 to 2013, reported solar system prices fell by 6% to 8% per annum, on average, and, within that period, by 12% to 15% from 2012 to 2013, depending on system size.[24] This change largely occurred because of government policies in Germany and Italy[25] to encourage the installation of solar panels. With vastly increased sales volumes, manufacturers in Europe and China invested heavily in technology to reduce solar panel costs, and simultaneously invested in larger scale, lower cost manufacturing facilities. Since 2008, prices of the panels themselves have dropped by 80%.

The Lawrence Berkeley National Laboratory has reported that "*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."*[26]

These declining prices are portrayed in Figure 2.1 below.[27]

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22 For example, chapter 6 of the Rules, and the provisions in Schedule 6.2 in particular, (from page 759), serve to constrain any write-offs or write-downs (also known as 'optimisation').

23 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.

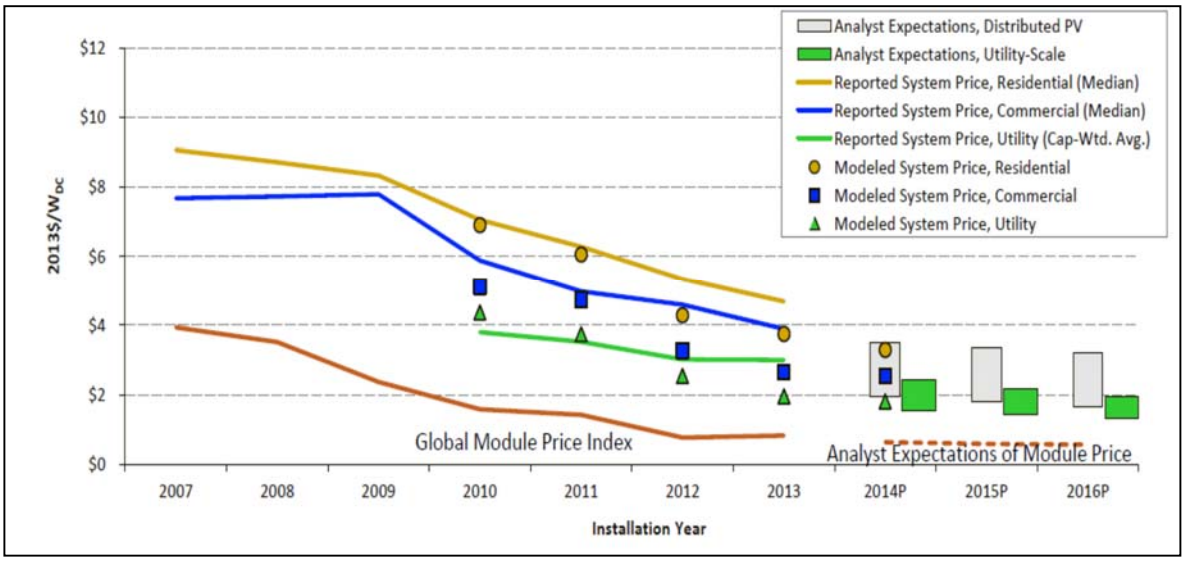
24 See D Feldman, G Barbose, R Margolis, T James, S Weaver, N Darghouth, R Fu, C Davidson, S Booth, and R Wiser *Photovoltaic System Pricing Trends, Historical, Recent, and Near-Term Projections,* 2014 Edition September 22, 2014 U.S. Department of Energy (DOE) SunShot.

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

26 G Barbose, S Weaver and N Darghouth; *Tracking the Sun VII An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2013* September 2014 Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory; page 15.

27 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 (DOE) SunShot.

Figure 2.1: The declining prices for solar installations



The effect of dramatically lower global solar installation prices is that global businesses are aggressively marketing solar systems in Australia.[28]

The second significant development concerns so-called "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, smart technologies have been conceptualised as being a means of improving 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. Some smart grid projects have been launched in Australia already,[29] and United Energy can only anticipate that more projects will be undertaken in future. Smart meters have been rolled out comprehensively in Victoria, and consumers can elect to be billed on a "flexible pricing" basis,[30] which allows consumers to better manage their energy usage and thereby reduce their energy bill.

Indicative of the effect of these technologies, for the first time, since before the advent of economic regulation, AEMO[31] has reported lower demand:[32]

> *"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."*

The third significant factor to consider is power storage, notably batteries and super capacitors. As Paul Graham, chief economist of the CSIRO Energy Flagship has commented, it is unclear how long it will be before power storage systems can be said to be affordable,[33] and thus game-changing. The Future Grid Forum's report states:

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28 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,* Renew Economy, 29th April 2014.

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

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

31 AEMO; *South Australian Electricity Report*; August 2014.

32 AER; *State of the Energy Market*; 2014 page 5.

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

> *"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."*[34]

> *"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."* [35]

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:

> *"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."*[36]

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.

For example, European Union air quality directives have contributed to the City of Paris and the City of London letting contracts for shared car schemes, with each city planning to utilise 3,000 electric cars[37] to replace 22,000 privately owned petrol vehicles in their cities. The French based global power storage conglomerate (Bollore) 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.

Bollore'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.).[38]

Australia is a member of the OECD's sister organisation, the International Energy Agency, which published an authoritative report last year[39] recognising that energy storage is beginning to play a part in mainstream electricity supply. A key conclusion of the report is that:

> *"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)*

Clearly businesses are already investing large 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

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

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

36 Mr T. Werner, CEO of SunPower, per *SunPower says Australia could be global leader in local generation* Renew Economy, 29th April 2014.

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

38 International Energy Agency; *Technology Roadmap: Energy Storage;* 2014, page 18.

39 International Energy Agency; *Technology Roadmap: Energy Storage;* 2014.

is being undertaken by Tesla Motors. Tesla Motors is investing over $5bn into the Tesla "Gigafactory"[40] – a battery manufacturing facility in the United States due to begin producing Lithium-ion batteries in 2020. Interestingly, Tesla has a history of releasing its patents to the public,[41] [42] and perhaps Tesla will release its 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. These innovations are a direct challenge to United Energy's business model, and tangibly increase the risk of operating in the industry.

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. When each development is considered in isolation, one can 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.

However, when these three factors combine, a reasonable question to be posed is 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.

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 some other form of distributed generation, combined with battery storage. This could be done either on an individual basis, or by clusters of customers or premises linked to new micro-grids. The important point is that the future is uncertain. While energy network businesses generally consider that they will provide a valuable service to a large number of customers on an ongoing basis for years to come, there are other possible scenarios that also weigh on investors' minds. To the extent that these scenarios are ascribed any material probability of occurring, then they will negatively affect the extent to which network business revenues are considered certain.

The NEM's Consumer Advocacy Panel funded the preparation of a report *What Happens When We Un-Plug*[43] that studied whether there might be cost benefits for consumers in Bendigo, Werribee and Melbourne to disconnect individually or in clusters. The study reported that disconnection might already be financially viable for some customers, and would become viable for others before 2020. United Energy does not agree that the report's scenarios, as described, will actually transpire, but United Energy cannot prove to lenders and investors that there is a nil probability of the scenarios occurring.

United Energy considers that other, more moderate scenarios are more likely but these too predict significant new off-grid competition. There may certainly be groups or categories of customers which consider that grid connection is no longer a financially viable option. Hence, there will potentially be a significant change to United Energy's business model over the life of the assets in relation to which UE is expected to make investments today.

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

41 See Tesla Motors, <http://www.teslamotors.com/blog/all-our-patent-are-belong-you>.

42 *The Guardian*, 'Tesla Motors to open source its technology' (13 June 2014) <http://www.theguardian.com/technology/2014/jun/13/tesla-open-source-technology>

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

Certainly, there are other businesses which are making investments on the understanding that certain projects will provide off-grid solutions which enable customers in particular categories to by-pass network operators altogether[44]:

> *"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)*

Investment analysts are already downgrading electricity utility bonds in other countries in response to this risk:[45]

> *"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)*

The comments from Barron's Income Investing convey a sense of the difficulties that are intrinsic to the task of forecasting the number and speed of disconnections, because disconnections are influenced by unpredictable technological changes, prompted in part by government environmental policies in other countries as well as local geography and local government policies.

Indeed the business of UE would become less risky if the company knew that certain customers would choose to become self-reliant from a particular date, whilst others would continue to gain value from staying connected. If such certainty existed, then United Energy could design its network augmentations and replacement programme on that basis.

The Guideline also suggests that United Energy's business is low risk because United Energy's assets are not subject to being "optimised" (in other words, written off to the extent that the assets are being less than fully utilised).[46] Additionally, through the mechanism of tariff classes, United Energy is able to differentiate in pricing, to some extent, so as to provide incentives for marginal customers to stay connected. However, that mechanism only operates effectively if a further narrower range of customers can carry all of the redistributed costs of the unused infrastructure, an outcome which is by no means assured.

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44 Mr T. Werner, CEO of SunPower; per *SunPower says Australia could be global leader in local generation* Renew Economy; 29 April 2014

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

46 AER; *Better Regulation, Explanatory Statement; Rate of Return Guideline*; December 2013, (pdf version) (**Explanatory Statement**) pages 39-40: "For electricity network service providers, once the assets are included in the RAB, assets cannot be optimised out under the NER."

Each of the above mechanisms assumes that United Energy continues to have a large, connected customer base that can absorb these costs. Electricity industry commentators[47] [48] often identify a "tipping point", a "point of inflection", or even a "death spiral", whereby the regulated pricing system becomes unsustainable and an endless spiral of disconnections commences. The "death spiral" theory posits that if a significant number of customers found that distributed generation and power storage were more cost effective than staying connected, then the prices for those who remained connected would have to increase so as to recover the costs of the infrastructure no longer used by the customers that had disconnected. As the prices were raised, then there would be an incentive for another group of customers to disconnect, and another cycle of price increases would take place until the customer base had fallen to the point of being insufficient to enable recovery of the costs of the whole system.

Again, the point here is not that United Energy subscribes to the notion that its business will die off, but rather, that: (a) The future is uncertain and no scenarios can be ruled out; and (b) An assumption cannot genuinely be made that the regulatory system, will continue, in its current form, to be effective at redistributing the costs of stranded assets amongst United Energy's customers. In other words, there is a good chance that the existing regulatory system may not survive over the life of the assets in which United Energy is being asked to commit investment capital.

A particular risk that United Energy faces in Victoria arises from the high levels of gas penetration which, at more than 90%, eclipse the rates in any other State or Territory.[49] When a dwelling or building has gas heating, hot water and cooking, a smaller number of PV panels will be sufficient to satisfy the likely lower electricity demand compared with the situation for a dwelling in which all of the major appliances are electrical. Moreover, a smaller battery storage capacity would enable disconnection from the grid altogether. Similarly, if there are disconnections from the grid, then the regulatory arrangements would seek to recover the stranded costs from the remaining customers and, because most of those customers would also have gas connections, then there might be substitution effects at the margin which would create further incentives for disconnection. There would also be income distribution effects associated with a downward spiral.

47 See, for example, the article by Faye Griffiths, writing in "Business Spectator", 23rd April 2014.

48 See, for example, Accenture 2013, *Forging a Path toward a Digital Grid, Global perspectives on smart grid opportunities*; page 21.

49 See AER 2014, *State of the Energy Market*, page 110.

2.3 Summary concerning the evolving risk profile

The rate of return objective stipulates that the allowed rate of return should 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 (DNSP). Accordingly, a responsibility is placed upon the AER to engage with the arguments about the emerging risks to electricity network businesses, and to identify how the risks should be accommodated within the overall allowed return on capital.

In particular, the AER should take heed of the following cautions:

- Forward looking risk assessments should not be based entirely upon historic information.
- Nor should an inference be drawn from the Frontier Report[50] that a benchmark business with a 60% gearing ratio has an equity beta below 1.0.
- The National Electricity Rules that provide for the imposition of a revenue cap, and that mitigate against the optimisation of the regulatory asset base, may assist in the amelioration of some risks. However, there is no evidence to suggest that these factors will contribute to the result of an equity beta below 1.0.
- There is a progressively increasing trend in the financial, strategic and operational risks which confront the business of United Energy, however the evidence from the trend of AER decisions is that the regulator is seeking to provide progressively less compensation; and
- There is a strong likelihood, in view of the AER's past practice, that permitted returns will fall materially below market rates of return, if the regulator fails to acknowledge the heightened risks in the business environment that were described in the previous report section. The regulator would show that it was oblivious to technological and industry developments if it were to maintain its past practice of applying the SL-CAPMSL-CAPM with parameter estimates such as the equity beta drawn only from historical data. The SL-CAPMSL-CAPM is known to deliver downwardly biased estimates of the return on equity for stocks for which the equity beta is less than one.[51]

In contrast, United Energy's proposal for the rate of return on equity makes use of all of the relevant models and the principal methods of implementing them. A number of the approaches make use of contemporaneous or forecast information, and can therefore be characterised as forward looking, whilst other methods draw upon historical data. In contrast to the outcomes from the application of the AER's usual methods, the application of the approaches put forward by UE will not drive the regulatory process in a direction which appears to be inconsistent with the underlying evolution of the risks facing the business.

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50 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.

51 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, prepared by NERA Economic Consulting, March 2015.

2.4 Evaluation of the return on equity

2.4.1 Overview of the AER's approach

The general presumption is that a benchmark efficient entity in United Energy's position would be efficiently financed using 40% equity and 60% debt. Therefore, the AER needs to set an allowed rate of return which properly represents the costs of equity capital employed in the business, and the costs of debt capital. Stock markets (and equity markets more generally) are notoriously volatile and unpredictable, however academics and finance market experts have developed models to assist with the task of establishing benchmark rates of return.

Two principal ways in which benchmark returns can be measured are through capital asset pricing models or dividend growth models. In the past, Australian regulators have used capital asset pricing models while US regulators have tended to use dividend growth models.

As was noted in the introduction to this report (section 1.1), 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. In this section, United Energy will expound its argument on the shortcomings of the AER's approach as it was presented in the Guideline, and as it has been revealed in recent draft decisions. The AER's method for evaluating and using the available material is deeply flawed and UE believes that a very different approach is warranted.

In the past, the AER has always used the SL-CAPM for setting rates of return for electricity distribution businesses, but there is now a wide array of evidence that points to the deficiencies of the SL-CAPM while highlighting the superior performance of other models. The failings of the SL-CAPM, and of the AER's implementation of the model, are exacerbated in the current context of low government bond yields. The AER uses a measure of the market risk premium which relies heavily on historical excess returns, but for most of the periods in history that are used in the evaluation of the MRP, government bonds yields were higher than they are at present. The SL-CAPM is inadequate at explaining why expectations for the return on equity may change over time, and the model produces estimates that are systematically downwardly biased for stocks with equity betas of less than one, and for stocks, such as utilities, with high book-to-market ratios. The benchmark efficient entity resembles an electricity utility and would therefore be expected to have a high book or accounting value relative to the market valuation of its equity.

Under the old Rule 6.5.2, the AER was required to implement the SL-CAPM in a fairly tightly prescribed way, although there was sufficient latitude available to the AER to make choices about the way in which the MRP had been evaluated. The previous Rules also specified that the yields on CGS had to be measured using the interpolation method. However, according to the current Rule 6.5.2, the AER has a broader degree of discretion as to which models and other inputs to use. The AER can exercise this discretion to give significant weight to methods that do not suffer from the flaws of the SL-CAPM, which are particularly apparent when the model has been implemented using current CGS yields and a long run average value of the market risk premium.

The AER's Guideline and recent draft decisions indicate that the regulator continues to give primary weight to the SL-CAPM. The AER's method 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 cost of equity. The AER reports in its Guideline that it followed due process, and that it examined in detail the various submissions that it received, however the evidence of the way in which the AER evaluates the return on equity suggests that the regulator has not taken account of the actual content of the submissions. The AER's method brings the SL-CAPM to the forefront, elevating its status to that of a primary model. Other information is either given no weight or else is used in a highly constrained way with the result that there is very little impact on the final result.

United Energy is concerned that the AER has not complied with its statutory obligations because the regulator continues to apply methods that have changed little from the practices of the past:

- The AER continues to accord most prominence to the SL-CAPM, which, empirically, is the worst performing of the available models. The SL-CAPM is given a central position as the "foundation model".
- The AER has insufficient regard for much of the information that has been put to it. In some cases, such as with the Fama French Three Factor model, the AER expressly assigns a zero weight to the material. In other cases, the approach taken by the AER limits the ability of the new information to contribute meaningfully to the "bottom line" rate of return for equity. By way of example, the DGM and the Black CAPM are only used indirectly, and so the scope for these models to make an impact is seriously impaired.
- The SL-CAPM has been employed as a screening device through which all other information must first pass before it can have any bearing on the permitted rate of return. The AER's method thus curtails the manner and degree to which the other information can contribute to the allowed rate of return; and
- Errors are made by the AER in its application of the SL-CAPM.

This section explores these issues in detail as follows:

- section 2.5 introduces the models that are relevant in estimating the return on equity;
- section 2.6 summarises the approach in the guideline;
- section 2.7 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 2.8 sets out United Energy's proposed approach to the return on equity; and
- section 2.10 provides a full set of calculations, underpinned by current market data.

2.5 Identify and compare the relevant models and any other relevant evidence

The AEMC reported that the rate of return estimation should not be formulaic, and should not be driven by a single financial model or estimation method. According to the AEMC, the estimation approach to equity and debt components should include consideration of available estimation methods, financial models, market data and other evidence to produce a robust estimate that meets the overall rate of return objective[52]. As the AEMC observed:

> *All of the models appear to have some weaknesses. All models that have been advanced have been criticised for either the underlying assumptions required or lack or correlation of modelling results with empirical test. Even the CAPM has been criticised in academic literature.*[53]

The AEMC further noted, with reference to a report from the LMR panel[54], that[55]:

> *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.*

Thereafter, the AEMC decided that Rule 6.5.2(e) should require the AER to have regard to all of the relevant estimation methods, financial models, market data and other available evidence.

The stipulation about having regard to all of the relevant models and other inputs is new. Therefore, in addition to considering the issue from first principles, there are benefits in examining how the same exercise occurs in the United States. 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:

> *"the return to the equity owner should be commensurate with the return on investments in other enterprises having corresponding risks."*[56]

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52 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, page 47 (**AEMC Draft Rule Determination**).

53 AEMC, Draft Rule Determination: National Electricity Amendment (economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (price and revenue Regulation of Gas Services) Rule 2012, August 2012, page 47 (**AEMC Draft Rule Determination**).

54 LMR Panel, Review of the Limited Merits Review Regime, Stage One Report, Report for the SCER, 29th June 2012, page 42.

55 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, page 47 (**AEMC Draft Rule Determination**).

56 *FRC v Hope Natural Gas Co*., 320 U.S.591 (1944) at [603] page 5.

The US Supreme Court also explained how this should be applied in order to meet broader policy concepts that, under the Australian system, appear in the NEO and the Revenue and Pricing Principles:

> *"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."*[57]

Since that time the predominant financial model used in the United States has been the Dividend Discount Model. The model is believed to be capable of producing results that satisfy the "commensurate" standard. However, other economic and financial models have also been applied in US regulatory proceedings, including those described below. United Energy agrees with the conclusions of the Guideline that the models that are currently relevant for consideration include the:

- SL-CAPM;
- Black-CAPM;
- Fama French Three Factor model;[58] and
- Dividend Discount Model.

SFG Consulting provides a good summary as to why these four models constitute the relevant field of techniques for estimating a market based return on equity:[59]

> *"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 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*

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57 *FRC v Hope Natural Gas Co*., 320 U.S.591 (1944) at [603] page 5.

58 Although the AER found the Fama French Three Factor model to be relevant, its Guideline proposes to give it no role. See: AER, *Better Regulation, Explanatory Statement, Rate of Return Guideline, Appendix A*; December 2013; page 23.

59 SFG Consulting; *The required return on equity for regulated gas and electricity network businesses, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks*; 6 June 2014, page 3.

> *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."*

Other information such as expert reports prepared in the context of assessing whether corporate takeover offers are "fair", and surveys of practitioners, could also be used provided that the quality is dependable and that consideration is given to the different context for which that other material may have been prepared. To the extent that these other sources are of any use, their value is in terms of illustrating how the above models are implemented and combined in practice to deliver timely estimates of value or return.

Along with a number of other energy network businesses, United Energy 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[60].

Since the publication of the Guideline, SFG Consulting 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 Consulting dated 12 May 2014[61] addresses the issues raised in connection with the equity beta in the

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[60] NERA Economic Consulting; *Review of cost of equity models, A report for the Energy Networks Association*; June 2013.

NERA Economic Consulting; *Estimates of the [Black CAPM] zero beta premium, A report for the Energy Networks Association*; June 2013.

NERA Economic Consulting; *The market, size and value premiums, A report for the Energy Networks Association*; June 2013.

NERA Economic Consulting; *The Fama-French Three-Factor Model, A report for the Energy Networks Association*; October 2013.

NERA Economic Consulting; *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, Competition Economists Group; *Estimating the return on the market*; June 2013.

CEG, Competition Economists Group; *Estimating E[Rm] [expected return on the market] in the context of regulatory debate*; June 2013.

CEG, Competition Economists Group; *Information on equity beta from US companies*; June 2013.

CEG, Competition Economists Group; *AER equity beta issues paper: International comparators*; October 2013.

SFG Consulting; *Dividend discount model estimates of the cost of equity*; 19 June 2013.

SFG Consulting; *Evidence on the required return on equity from independent expert reports, Report for the Energy Networks Association*; 24 June 2013.

SFG Consulting; *Regression-based estimates of risk parameters for the benchmark entity*; 24 June 2013.

SFG Consulting; *The Vasicek adjustment to beta estimates in the Capital Asset Pricing Model*; 17 June 2013.

SFG Consulting and Monash University; *Comparison of OLS and LAD regression techniques for estimating beta*; 26 June 2013.

SFG Consulting and Monash University; *Assessing the reliability of regression-based estimates of risk*; 17 June 2013.

SFG Consulting; *Reconciliation of dividend discount model estimates with those compiled by the AER*; 10 October 2013.

SFG Consulting; *Letter: Water utility beta estimation*; October 2013.

Incenta Economic Consulting; *Report for the Energy Networks Association; Term of the risk free rate for the cost of equity*; June 2013.

[61] SFG Consulting, *Equity beta*, *Report for Jemena Gas Networks, ActewAGL and Networks NSW,* 12 May 2014.

context of the SL-CAPM. Another three reports[62] [63] [64] focus on the issues raised in relation to each of the other financial models, while a fifth report[65], mentioned earlier, addresses how to set a single allowed rate of return figure for equity using the above inputs. In February 2015 SFG Consulting 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.[66]

A further submission prepared by SFG Consulting is the report on the AER's application of the foundation model.[67]

NERA has also prepared a report that gives insights into the empirical performance of the SL-CAPM, the AER's variant of the SL-CAPM and the Black CAPM.[68] A separate report provides an updated assessment of historical estimates of the market risk premium.[69] NERA also reviewed relevant academic publications which provide a critique of the SL-CAPM [70].

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[71] and another in response to those draft decisions.[72]

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62 SFG Consulting; *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.

63 SFG Consulting; *The Fama-French model; Report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA PowerNetworks*; 13 May 2014.

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

65 SFG Consulting; *The required return on equity for regulated gas and electricity network businesses, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks*; 6 June 2014, page 3.

66 SFG Consulting; *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA PowerNetworks and United Energy*; 18 February 2015.

SFG Consulting; *Using the Fama-French model to estimate the required return on equity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy, 13 February 2015.

SFG Consulting; *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.

SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015.

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

68 NERA; *Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy*; February 2015.

69 NERA; *Historical Estimates of the Market Risk Premium*; February 2015.

70 NERA (2015), *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, prepared by NERA Economic Consulting, March 2015.

71 Incenta, Update of evidence on the rate of return on equity from independent expert reports, prepared for Jemena Gas Networks and TransGrid; May 2014.

72 Incenta, Further update on the required rate of return on equity from independent expert reports; February 2015.

Grant Samuel has extensive experience of undertaking valuations in the context of stock market acquisitions, and it has provided its views on the AER's approach, and specifically on the AER's mischaracterisation of the Grant Samuel independent expert report for Envestra[73].

The key characteristics of the return on equity models are described in the sections which follow.

[73] Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12 January 2015.

2.5.1 SL-CAPM

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 (i.e. in this case the benchmark efficient entity), 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 "market risk premium"), and the "beta", which is a measure of the extent to which the investment in question contributes to the systematic risk of the market portfolio.

The SL-CAPM is also commonly used in most other infrastructure revenue regulatory frameworks. SIRCA states that:

> *"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"*[74].

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 in which they wish to engage. Furthermore, empirical studies have consistently found the performance of this model to be poor. As SFG Consulting explains:

> *"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"* [75] [76].

And

> *"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"*[77].

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74 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 page 9.

75 SFG Consulting; *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, page 2.

76 See also SFG Consulting; *Equity Beta*, *Report for Jemena Gas Networks, ActewAGL and Networks NSW;* 12 May 2014, pages 6-7.

77 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, page 9.

NERA Economic Consulting, which investigated this issue in detail, comparing the empirical performance of the SL-CAPM and the Black CAPM models, produced results which concurred with those reported above by SFG Consulting. NERA used two types of tests and in relation to in-sample tests, the findings were[78]:

> *"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.*
>
> *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)*

Similar findings arise from NERA's out-of-sample tests.

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. The AER makes use of an Ibbotson-type measure of the MRP, which means that historical excess returns are measured over an extended time period in the past, while an arithmetic average is taken. The AER then applies a current Commonwealth Government Bond yield to estimate the risk free rate in conjunction with the historical MRP. The AER thus perceives that the expectations of investors move in tandem with the yields on Commonwealth Government Bonds, and there is no solid basis for such an assumption.

There are alternatives available to the Ibbotson inspired approach for establishing the market risk premium for use in the SL-CAPM adopted by the AER. A pragmatic option is to apply the "Wright" approach, which is named after Professor Stephen Wright who examined the return on equity for the Victorian gas distributors in 2012[79]. This method makes use of the same set of historical data that is employed under the Ibbotson approach. However, following Wright, the historical average real return to the market portfolio is evaluated, rather than historical average excess returns. Thus, the Wright approach presumes that the real return required on equity is constant across different market conditions.

Under the SFG implementation of the Wright approach, the real return to the market portfolio was combined with a measure of inflation expectations, to provide a figure for the nominal return on the market (11.64 per cent)[80]. The implied MRP, using the risk-free rate (of 2.64 per cent) from the January 2015 averaging period, was therefore 9.00 per cent. In the current context, the Wright approach is not, of itself, a panacea for the flaws in the SL-CAPM because it does not address the downwardly biased returns for low beta stocks that are recorded as a result of the unrealistic assumption concerning the ability of investors to borrow and lend at the risk free rate.

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78 NERA; *Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy*; February 2015, page 54.

79 Wright (2012), Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER, Professor Stephen Wright, Birkbeck, University of London, October 2012.

80 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015.

2.5.2 The Black CAPM

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:

> *"[T]he Sharpe-Lintner CAPM remains a specific application of the more general model, the Black CAPM."* [81]
>
> *"The Black CAPM does not rely upon the assumption that all investors can borrow at the risk-free rate of interest."* [82]

The Black CAPM has been demonstrated to provide a significantly better empirical fit to the data than the SL-CAPM. For example, in concluding upon the results of its in-sample tests, NERA reported that: [83]

> *"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"*

Similar results were noted by NERA in relation to the results from its out-of-sample tests. Although the AER has accepted that the Black CAPM's theoretical insights are relevant to its determinations, the AER 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.

The AER's approach is not the way in which the Black CAPM is usually used for regulatory purposes. The AER has alleged that an empirical form of the model is unusable because a zero beta premium is hard to estimate. However, the evidence provided in the table shown below, demonstrates that the Black CAPM (also referred to as the "empirical" or the "zero beta" CAPM) has been used extensively in US regulation cases, particularly in circumstances in which an equity beta that is materially less than one has been adopted.

Table 2.1: Use made by regulators of the Black, Zero-Beta and Empirical CAPM[84]

Regulator	Industry	Application	Citation	Date
New York Public Service Commission	Electricity distribution	50/50 weighting. "Traditional" CAPM/zero-beta CAPM paragraph 56.	*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*	2009

81 SFG Consulting; *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, page 15.

82 SFG Consulting; *Cost of Equity in the Black Capital Asset Pricing Model, Report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Network*; 22 May 2014 page 2.

83 NERA; *Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy*; February 2015, page 55.

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

			Ratepayers 2009 N.Y. PUC LEXIS 507[85]	
New York Public Service Commission	Gas distribution	50/50 weighting. Average of traditional CAPM result and zero beta CAPM result paragraph 20.	*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[86]	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. NB; this decision changed the weighting from 75/25 to 50/50, the previously accepted weighting following the approach in the Generic Finance case.	*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.[87]	2006
Oregon Public Utility Commission	Electricity distribution	Zero-beta is used to identify contrast with S-L "*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."* Paragraph 20. *"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."* Paragraph 23. CAPM given no weight, DCF preferred.	*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.[88]	2001

85 *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.

86 *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.

87 *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.

88 *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.

Furthermore, even if the Black CAPM does not perfectly model the relationships in question, SFG Consulting notes that:

> *"because the Black CAPM is more general in that it allows flexibility in a parameter input (r_z versus r_f) it gives some chance of aligning with historical stock returns"* [89].

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

> *"[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 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"* [90].

Importantly, NERA found that the Black CAPM corrects for the low beta bias that is intrinsic to the SL-CAPM. As reported by NERA, one cannot reject the hypothesis that the Black CAPM and the naïve model generate estimates of the return on equity that are unbiased. The naïve model was formed by setting the equity beta equal to one in the SL-CAPM.

A core result from NERA's econometric tests is presented in Table 5.4 of the NERA report, which shows the outcomes from Wald tests.[91] In this case, the tests being conducted were of whether the models under evaluation were capable of producing forecasts of the return on equity (across all portfolios) that matched the actual outcomes for the return on equity that eventuated. The empirical work was clearly done in relation to past periods. Recursive estimates of beta were used for the scenarios being considered in Table 5.4. A Wald statistic uses unrestricted parameter estimates and an estimate of the covariance matrix of the unrestricted parameter estimates to test whether a set of restrictions is true. The variance-covariance matrix takes account of the sizes and dispersion of the forecast errors recorded for each of the portfolios. From Table 5.4:

- High values of the Wald statistic were registered for the SL-CAPM and for the AER implementation of the CAPM. The low p-values of zero or close to zero demonstrate that the null hypotheses of no bias can be rejected at the 1% level of significance.
- In contrast, for the naïve model and for the Black CAPM, the test statistics are lower in magnitude. For the naïve model, a p-value of 0.44, and for the Black CAPM, a p-value of 0.49 indicate that, in either case, the null hypothesis of no bias (or zero forecast error) cannot be rejected at the 5% level of significance.

The Wald test results apply to the full collection of firms across all ten portfolios that were examined. In large samples, the Wald statistic for a test of the null hypothesis that the mean forecast error is zero, based on the sample mean of a time series of forecast errors will be approximately chi-squared distributed with *N* degrees of freedom. In Appendix A of the NERA report, simulation analysis was employed to examine the behaviour of the test statistics and to investigate the power of the tests.[92]

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89 SFG Consulting; 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, page 15.

90 SFG Consulting; *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, page 38.

91 NERA; *Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy*; February 2015, Table 5.4, page 42.

92 Ibid; Appendix A, page 60.

2.5.3 The Fama French Three Factor Model

This model provides separately for additional returns caused by exposure to the value premium and the size premium. The value premium is measured by the difference between the return to a portfolio of high book-to-market stocks and the return to a portfolio of low book-to-market stocks (HML). The size premium is assessed as the difference between the return to a portfolio of small-cap stocks and the return to a portfolio of large-cap stocks (SMB).

Empirical studies in the US and Australia have confirmed that:

> *"The Fama-French model has the advantage of providing an unambiguously better fit to the data than the Sharpe-Lintner CAPM."*[93]

This model in relation to which a Nobel prize[94] has been awarded, is newer than the other two CAPM models. Despite being the newer model, since the turn of the century the Fama French Three Factor model has been part of the evidence in a number of state regulatory proceedings in the United States, including:

1. Before the Massachusetts Department of Telecommunications,[95] Mr Moul (an expert witness) cites the Fama French study as demonstrating the relationship between company size and stock returns.

2. Before the California Public Utilities Commission,[96] Mr Hunt (an expert witness), used the Fama French Three Factor model and calculated a cost of equity of 14.0 percent in September 2005; using the CAPM, Mr Hunt calculated a cost of equity of 12.55 percent. In this proceeding, the Fama French Three Factor model returned a result that was 145 basis points above that from the CAPM.

3. Before the Delaware Public Service Commissioner[97], Artesian Water Company led evidence that included Fama French model results[98]. The Commissioner accepted that evidence without reservation.

4. Mr Ronald Knecht (an expert witness for the Nevada Public Utilities Commission)[99] proposed a return on equity of 10.28 per cent which was calculated as an arithmetic mean of four components. He applied two discounted cash flow (DCF) estimates, a 2CAPM/FF3F model average, and one risk premium estimate. A hearing was held before the Public Utilities Commission of Nevada in April 2006. Mr Knecht stated that

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93 SFG Consulting*; The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks*; 6 June 2014, page 9.

94 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>

95 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, October 17, 2005 page 50.

96 *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.

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

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

99 *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].

this approach was superior to relying only on the average of DCF models, because the CAPM, FF3F, 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/FF3F was reported to be 10.13 per cent. The outcome of 10.13 per cent was comprised of a result from the CAPM with a "Value Line" beta of 10.45 per cent, a result from the CAPM using an Ibbotson beta (with size adjustment) of 8.25 per cent, and a result from the Fama French Three Factor model of 11.63 per cent. The evidence was considered by the Public Utilities Commission of Nevada in April 2006.

5. On a separate occasion, in July 2007, Mr Knecht acted on behalf of the Nevada Public Utilities Commission[100] and again used the Fama French Three Factor Model to assess the rate of return on equity. 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.[101]

6. On another occasion in December 2014, Mt Knecht gave expert evidence (which included results from the Fama French model) before the California Public Utilities Commission. Whilst the Commission observed that the Fama French model had previously been rejected by the California Public Utilities Commission, the Commission recognised that the Fama French model has "gained great currency in investment practice".[102]

7. Mr Hayes an expert from San Diego Gas & Electric used the FFM model in his testimony before the California Public Utilities Commission in May 2007.[103] Hayes calculated a return on equity of 13.89 per cent using the FFM, with a value of 11.73 per cent obtained using the CAPM.

In his testimony before the Californian Public Utilities Commission Gary Hayes notes:

> *"[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."*
>
> *…*
>
> *"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 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*

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100 *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.).

101 See *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 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].

102 *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].

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

> *[the witness] whether FF is more accurate or useful than old standards. Accuracy, when measured as an equation's ability to predict returns (called R^2 by statisticians) is improved by the FF factors…Therein lies the model's usefulness as a cross check on its sibling, the CAPM."*[104]

Clearly then, the question of whether the Fama French model is an appropriate modelling tool is not settled within the United States. Despite a mixed reception of the model, the cases on point seem to suggest that increasingly more companies are using the Fama French model as a source of additional data.

The Guideline, however, takes the approach that although the Fama French model is "relevant", it should play no part whatsoever in the establishment of the allowed rate of return. In United Energy's view, the AER's rejection of the model is unfounded.

If the Fama French Three Factor model is wholly excluded from the analysis, then there will be no other model that specifically addresses the downward bias for value stocks. As SFG Consulting notes:

> *"Our view is that if the Fama-French model is not given any consideration by the AER, then 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."* [105]

In section 2.7.3 below, United Energy discusses in more detail the concerns that the business has about the manner in which the evidence about the Fama-French model has been treated in the Guideline and in the recent draft determinations.

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104 Testimony of Gary G Hayes on behalf of San Diego Gas and Electric before the California Public Utilities Commission 2007, page 12-15.

105 SFG Consulting; *The Fama-French Model; Report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA PowerNetworks*; 13 May 2014, page 3.

2.5.4 The Dividend Discount Model

The Dividend Discount Model (DDM) is also referred to as the Discounted Cash Flow (**DCF**) Model. The Federal Energy Regulatory Commission of the United States of America noted that: [106]

> *"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)"*

and

> *"The DCF method 'has become the most popular technique of estimating the cost of equity, and it is generally accepted by most commissions.* ***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)*

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

> *"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 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"* [107].

A further advantage of the DDM is that it does not require an assumption to be made about whether the Australian economy is integrated or segmented.

This model performs well provided that a robust method is used for forecasting future dividends. SFG Consulting has reviewed a range of ways in which this model can be implemented, and considered the techniques produced by or for the AER during the Guideline consultation process[108]. SFG has also examined methods described in other publications. The principal issues include the length of the period over which dividend growth reverts to an 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 overall economic growth.

The AER has rejected the DDM/DCF approach to estimating the required return on equity for the benchmark entity. Rather, the AER only uses the method to inform the choice of an estimate of the MRP from within a range that has already been constrained to be narrow.[109] The AER's method is therefore wholly inconsistent with the US approach, which is characterised by a reliance on DDM/DCF estimates to directly establish the permitted returns of the firm being regulated.

Additionally, financial analysts rely on the DCF model to assess the value of current ASX listed entities.[110] In this way, the AER is out of step with current practices among investment professionals.

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106 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].

107 SFG Consulting; *The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks*; 6 June 2014, page 9.

108 See, for instance, SFG, Dividend discount model estimates of the cost of equity, prepared by SFG Consulting, 19th June 2013.

109 AER, Draft decision, Jemena Gas Networks (NSW) Ltd, Access arrangement 2015–20, Attachment 3: Rate of return, November 2014; Figure 3-2, page 3-30.

110 JP Morgan: Asia-Pacific; Equity Research; Primary Healthcare Limited, 14 April 2015.

2.6 The approach in the Guideline

The most straight forward approach to the combination of evidence from asset pricing models would have been to estimate all of the relevant models and then determine what weight they should have in contributing to an overall rate of return.[111] A methodology of this type was considered by the AER as part of the Guideline development process, but was then rejected on the following basis:[112]

> *"(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."*

Importantly, the criterion of "predictability" is regarded as being desirable for investors:[113]

> *"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."*

The three reasons provided above for rejecting the straightforward approach of giving all the models an explicit weight when determining the rate of return on equity have been misapplied. Specifically:

- The criterion of "complexity" is irrelevant to the rate of return objective, NEO and revenue and pricing principles. Moreover, the AER's logic is perplexing. An approach of specifying each of the models transparently, and then taking a simple or weighted average of the results, has been characterised as being more complex than the six step foundation model, an abridged version of which is quoted below.
- In practice, the calculation of a weighted average will deliver more predictable outcomes because any 'surprises' or variations that may occur with any one model will have little impact upon the overall weighted average. In contrast, a version of a "primary model" will be highly sensitive to any changes in the parameters used in that model. In any event, the businesses must be in a better position than the AER to assess the views of investors about such matters as the predictability of outcomes from a multi-model approach vis-à-vis the results from the application of the SL-CAPM. UE is in a stronger position to assess the perceptions of investors because the company's own shareholders and potential shareholders are the investors in question. United Energy is not aware of any businesses or potential investors that provided a submission to the AER to support the latter's contention about the problem of predictability that might result from a multi-model method. In fact, regulated network businesses and investors were unanimous in their support for the multi-model approach[114].
- Section 5.3.10 of the Explanatory Statement explains that the third factor noted by the AER, which is about the inappropriate consideration that might be given to relevant material is simply a summary of all the criticisms that the AER makes in relation to the Fama French, Black CAPM and DGM. This third reservation should fall away because the AER's criticisms of these models are incorrect, for reasons that have been provided in this document concerning United Energy's submission.

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111 That particular method would be consistent with the regulatory precedent from the USA, as shown, for example, in the two California PUC cases cited in section 2.5.3 on the Fama-French model.

112 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; page 54.

113 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; page 92.

114 See for instance the submission of the Financial Investor Group; Response to AER Consultation Paper: Rate of return guidelines, The Financial Investor Group, 24th June 2013; page 1.

In place of the multiple model method, the AER's Guideline adopts a "foundation model approach" which is comprised of the following steps:

> ***"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 past practices will be maintained. 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 …*
>
> *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 [sic] 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 2.2: Form of other information (reproduced from AER Guideline)

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, Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; Table 5.3, page 61.

> ***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 [sic]. …"*

The reasons as to why the AER favours the aforementioned "foundation model approach" are set out in the remainder of this section. The foundation model is one of the variants of implementing a "primary model" approach. In relation to primary model approaches, the AER states:

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

Again, the claim that the primary model is capable of providing enhanced predictability is unsubstantiated. Investors have expressed a preference for the multiple model method[115]. The AER's argument that the primary model method delivers a "benefit" in the form of improved certainty and predictability should be rejected.

[115] See for instance the submission of the Financial Investor Group; Response to AER Consultation Paper: Rate of return guidelines, The Financial Investor Group, 24th June 2013; page 1.

In addition to the "key benefit", the AER has also identified the following considerations concerning the foundation approach:

Table 2.3: AER approach to the foundation model

AER comment (pages 79 and 80 of Explanatory Statement)	United Energy's 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. United Energy is unaware of any practitioners who do so and would be most surprised if there were any.
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 of the models are complete in the sense that they provide independent estimates for the return on equity. By comparison with the other three 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 material 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 being exercised in a number of different ways, at every step of the process. That undermines predictability and transparency.
Using a foundation model approach is relatively simple to implement (particularly in comparison to the alternative of combining different estimates from 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).	United Energy simply does not understand how the foundation model can be described as simple to implement when compared with the weighted average approach. For example, the averaging approach can be distilled to a simple mathematical or logical formula, whereas most aspects of the foundation model cannot be expressed in that form. Under the foundation model, the way in which information is evaluated and then distilled is opaque and potentially complex.
Using a foundation model approach may allow stakeholders to make reasonable estimates of the returns expected to be determined in advance of a determination. United Energy considers that its 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.	United Energy does not agree. The AER has made value judgements at each of the six stages of the foundation model process. The judgements are open to extensive debate and may be difficult to rationalise. The subjective aspects of the method 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 only in proportion to the share of each of the component parts.
Using a foundation model, and drawing on other information to determine a final estimate for the expected return on equity, provides an appropriate balance between a comparatively replicable and transparent process, and the need to provide certainty in changing market circumstances.	The foundation model has delivered lower and lower allowed rates of return on equity as the yields on CGS have fallen, while the prevailing cost of equity has either remained stable or else has diminished to a lesser extent. Consequently, a better characterisation of the foundation model is that it makes adjustments in a manner that are inconsistent with the changes in expectations in equity markets. The process is also not easy to replicate due to the significant number of instances in which "regulatory judgement" is exercised without an explanation of how the "judgement" has led to the adoption of a particular value.
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), makes clear that the AER isn't pursuing a high degree of precision.	In fact, the other information (e.g. the Wright approach) strongly suggests that the foundation model is delivering an incorrect range and that a departure should have occurred. The AER's scheme does not specify the circumstances under which a departure would need to occur.
Using the Sharpe–Lintner CAPM as the foundation model reflects the AER's assessment of the model against the AER's criteria. Specifically, the AER considers that the foundation model is superior to alternative models and methods for	United Energy does not agree that the criteria are relevant or (even if they were relevant) that they have been correctly applied. The SL-CAPM cannot be regarded as superior on any relevant metric.

estimating the return on equity for a benchmark efficient entity.	
The AER reports that its approach has been developed in consultation with a range of stakeholders, including service providers and their industry associations, investors, and consumer groups.	Certainly there were opportunities for stakeholders to provide submissions but the AER took very little account of the concerns raised by the businesses as it progressed with the development of the foundation model.

Furthermore, the concept of selecting a primary model implicitly assumes that one of the available models must be superior to all of the other models. The foundation model method introduces a hierarchy of information, with differing levels of importance attached to different kinds of data. However, the classification of information and evidence in this manner is incongruous with the views of AEMC at the time at which the new Rules were promulgated.

2.7 Flaws with the AER's approach to estimating the allowed return on equity

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 2.7.1).
- The AER's extra-legislative criteria distort the evaluation of the merits of the available inputs (see section 2.7.2).
- The Guideline does not give real weight to all the relevant inputs as required (see section 2.7.3).
- 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 of the available models and giving to each one a weight which is proportionate or deserved (see section 2.7.4).
- 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 2.7.5).
- The AER's incorrect selection of a beta of 0.7 (see section 2.7.6).
- The AER's incorrect selection of a market risk premium of 6.5 per cent (see section 2.7.7).
- The AER's flawed use of independent expert reports (see section 2.7.8); and
- The AER's inconsistent treatment of imputation adjustments (see section 2.7.9).

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

United Energy is concerned that the assessment by the AER is not being undertaken on an even handed basis. United Energy has observed that the reasoning employed in the AER's Guideline and in recent draft decisions has been highly asymmetric. For instance:

- The AER does not apply a set of common standards when making assessments of each of the models, and, instead, seems to single out the Black-CAPM and the Fama French model. With respect to the latter two models, the AER has failed to produce any empirical estimates, but has also resisted engaging with the empirical work submitted by the businesses[116] [117].
- There is a failure by the AER to recognise the significant weaknesses of the SL-CAPM from which other models do not suffer; and
- Relatively minor challenges that might arise when implementing the other models (or challenges that are equivalent in nature to those that apply when implementing the SL-CAPM) have been exaggerated and portrayed as major weaknesses. The AER has been reluctant to approach the task with a constructive mindset.

For example, despite the superior empirical performance of the Black CAPM discussed above,[118] the AER relegates this model to a secondary status on the following basis:[119]

> *"the model is not empirically reliable"*

and

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

The AER elaborates on the first criticism, alleging that estimation of the Black CAPM, in particular the return on the zero beta portfolio, is difficult to do in a robust, transparent, or replicable manner because of the complexity of the model.[120] Both the AER and McKenzie and Partington appear to reach that conclusion by observing differences between the reports lodged by the businesses on this question.[121] The AER makes a further apparent criticism that:

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116 Consider for instance:

NERA Economic Consulting; Estimates of the [Black CAPM] zero beta premium, A report for the Energy Networks Association; June 2013.

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

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

118 See section 2.5.2 in this chapter

119 As quoted in: SFG Consulting; *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*; 18 February, 2015, page 18.

120 AER, Draft decision, Jemena Gas Networks (NSW) Ltd, Access arrangement 2015–20, Attachment 3: Rate of return, November 2014; Figure 3-2, page 3-56.

121 McKenzie and Partington, Report to the AER, Part A: Return on Equity, prepared by Michael McKenzie and Graham Partington, October 2014; page 24.

> *"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."*[122]

However, the AER is in effect undermining its own approach. This 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. For example, the AER's own consultants produce beta results that range from 0.3 to 1.03,[123] and results for the MRP that are a full percentage point apart. With the studies for the network service providers included, the ranges may be 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.

Similarly, with respect to the (arguably irrelevant) consideration of whether the model is widely used, SFG notes that:

> *"[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"*[124].

In its letter, Grant Samuel shares its views more broadly concerning the AER's model selection choices:

> *"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"*[125].

Despite conceding that the dividend discount model is useful indirectly to estimate the market risk premium for use in the foundation model, the AER decided not to apply the DDM directly to the task of estimating the allowed return on equity.

One reason put forward is that:

> *"[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.*[126] *Further, the time series for when these estimates are available are both variable and short"*[127].

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.

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122 AER; *Draft decision, Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of return;* November 2014, page 183 (pdf version).

123 Henry, 2014, *Estimating Beta: An update*, a report for the AER prepared by Olan T. Henry, University of Liverpool, April 2014; Table 2, page 17.

124 SFG Consulting; *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*; 18 February, 2015, page 21.

125 Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12th January 2015.

126 The relevant businesses are the APA Group, DUET, Envestra, Spark Infrastructure and SP AusNet. See: AER; Better Regulation, Explanatory Statement, Rate of Return Guideline (Appendices); December 2013 (**Guideline Appendices**); Appendix A.2.

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

Another reason put forward by the AER is that it considers that its results from the DGM are too sensitive to the input assumptions that are used[128]:

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

However, the AER does not give even handed acknowledgement that the same criticisms apply to the CAPM. In Grant Samuel's words[129]:

> *"The DGM, 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.*
>
> *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."*

The Grant Samuel letter adds[130]:

> *"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."*

The AER also suggests that the perpetual time-frame[131] over which the DGM is specified is inappropriate for regulatory purposes but SFG Consulting[132] note:

> *"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*

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128 Guideline Appendices, page 15 (pdf version).

129 Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12th January 2015 page 3.

130 Ibid**;** page 3.

131 For example, AER, *Draft Determination, Jemena Gas Networks, 2015-20, Attachment 3: Rate of Return,* November 2014, page 3-277 (pdf version).

132 SFG Consulting; Alternative versions of the dividend discount model and the implied cost of equity *Report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, Transend and TransGrid;* 15 May 2014, paragraph 74 on page 17.

> *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."*

And Grant Samuel points out:[133]

> *"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…..*
>
> *…*
>
> *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)."*

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

> *"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."*[134]

The AER's treatment of the Fama French Three Factor model provides the most concrete illustration of the double-standards that have been applied because the AER has excluded the results from that model from consideration altogether. SFG Consulting's repudiation of the AER's criticisms also illustrates that criticisms (a) and (b) shown below, apply equally to the SL-CAPM, while criticisms (c) and (d) are incorrect. Nonetheless, the AER has relied upon these considerations to exlude the Fama French Three Factor model, rather than the SL-CAPM:[135]

> *"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.*

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133 Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12th January 2015, page 5.

134 Ibid; page 2.

135 SFG Consulting; *Using the Fama-French model to estimate the required return on equity, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy*, 13th February 2015, page 2.

(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."

In summary, United Energy is concerned about the manner in which the AER has undertaken its model evaluation exercise. The AER has approached the task in such a way that the results are pre-disposed to favouring the SL-CAPM, and either rejecting the other models or else relegating them to a subordinate role. Specifically, United Energy endorses the opinion expressed by SFG Consulting which was that: [136]

"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."

[136] SFG Consulting; *The foundation model approach of the Australian Energy Regulator to estimating the cost of equity Report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy*; 27 March 2015, pages 22 – 23.

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

Instead of directly applying the rate of return objective, the National Electricity Objective (**NEO**) and the Revenue and Pricing Principles (**RPP**), the Guideline applies a set of extra-legislative criteria[137] that do not appear in the NER or the NEL.

Although the criteria appear on their face to constitute a reasonably common sense or at least innocuous set of considerations, the criteria have been instrumental in contributing to several of the significant errors in the formation and implementation of the foundation model approach. Since each of these criteria is initially introduced in abstract terms, one cannot immediately discern how or why the application of the criteria will lead to error when the relevant evidence is being evaluated.

Indeed as is 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 to promote "simple over complex approaches"[138].

When the AEMC adopted the current, common rate of return Rules to apply to United Energy's business and equally to gas network businesses, the words "well accepted" financial model were expressly and purposively repealed from the former Gas Rules because the AEMC considered that these terms led to excessive conservatism. To explain this point further, recall that the current Rules are common to both electricity and gas, and are the result of the repeal of three former sets of Rules, none of which the AEMC considered to be performing adequately. In contrast to the situation with the former electricity Rules, the former gas Rules, at sections 87(1) and 87 (2) permitted the AER to adopt a financial model other than the SL-CAPM, although the model selected had to be a "well accepted" model "such as the CAPM". The AEMC's adoption of a common set of Rules for electricity and gas represented a deliberate and purposeful withdrawal of the "well accepted" criterion because the criterion had led inappropriately to a narrowing of the matters considered in regulatory decisions:

> *"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)"* [139].
>
> *"[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"* [140].
>
> *"The rate of return estimation should not be formulaic and be driven by a single financial model or estimation method"* [141].

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137 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; page 24.

138 Ibid; pages 24 - 28.

139 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, page 42 (**AEMC Draft Rule Determination**).

140 AEMC; *Draft Rule Determination;* page 42.

141 AEMC; *Draft Rule Determination;* page 47.

> *"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."*[142]

The way in which the AER uses the "well accepted" criterion in its Guideline is representative of the form of conservatism that the AEMC sought to avoid through an explicit decision to expunge the phrase "well accepted" from the gas Rules, and by exercising a choice not to incorporate the phrase in the electricity Rules.

There are a number of other ways in which this excessive conservatism manifests itself and causes decision making error. For example, a key report upon which the AER relies in support of the foundation model framework was prepared by Associate Professor Handley of the University of Melbourne.[143] He was not asked what the best way of achieving the rate of return objective might be. Rather he was asked whether the AER's approach was capable of meeting the objective and, importantly:

> *"[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)*[144]

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 reluctance to move away from the Guideline is directly contrary to the AEMC's Rule determination which repealed the Rules that required there to be "persuasive evidence" before the AER would be permitted to depart from its Statement of Regulatory Intent. The AEMC's reasoning was as follows:

> *"[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"*[145].
>
> *"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"*[146].

Consider again the intransigence that surrounds the AER's use of the SL-CAPM. The consultants for the AER, McKenzie and Partington, lend support for the CAPM on the grounds that it is the model with the earliest birthday and because of a misplaced belief that the model is a "standard workhorse". In their report on behalf of the Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited, McKenzie and Partington assert that:

> *"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"*[147].

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142 AEMC; *Draft Rule Determination;* page 47.

143 Handley J.; *Advice on the Return on Equity, Report prepared for the Australian Energy Regulator*; 16 October 2014, pages 3 and 6.

144 Handley J.; *Advice on the Return on Equity, Report prepared for the Australian Energy Regulator*; 16 October 2014, page 6.

145 AEMC, *Economic Regulation of Network Service Providers Rule Change Final Determination*, November 2012 (**AEMC Final Rule Determination**), page 41.

146 AEMC; Final *Rule Determination;* page 46.

147 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, page 9.

The conservatism expressed by McKenzie and Partington has been a significant contributor to the decision by the AER to adopt the SL-CAPM as the foundation model. The advice from McKenzie and Partington has also served to buttress the AER's decision to give only secondary weight to the DGM and the Black CAPM, and to give no weight at all to the Fama-French Three Factor model, despite the Fama French model being of a significantly younger vintage than the SL-CAPM. The DGM and Black CAPM are only used to inform the values of certain parameter estimates within the SL-CAPM. The entrenched conservatism of the AER and its advisers runs directly counter to the intention of the AEMC[148] that the Rules should do away with the incumbency of the SL-CAPM, and should open the decision making to the inclusion of all of the relevant models and other inputs:

> *"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."*

The AEMC also referred to the decision of the Tribunal[149] in which the latter concluded that the use of well-accepted financial models would, *ipso facto*, contribute to an estimate of the required return on equity that was reasonable and commensurate with the prevailing conditions in the market for funds. The AEMC stated:

> *"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…."*[150]
>
> and
>
> *The Commission believes that no one method can be relied upon in isolation to estimate an allowed return on capital that best reflects benchmark efficient financing costs.*[151]

Models chosen on the basis of being simple can easily fall into error because of their inability to give proper consideration to the full range of factors affecting the prevailing return on equity.

There is overwhelming evidence that the SL-CAPM's dominant role should cease. The model fares poorly in empirical tests of predictability, while its application is producing results that are demonstrably downwardly biased, particularly for firms such as the benchmark efficient entity, and in the market conditions that are currently being experienced. The Black CAPM avoids the low-beta bias but further empirical improvements can be achieved by using the Fama French Three Factor model which allows for the possibility that firms with exposure to the high minus low factor may achieve returns on equity that differ from the market average. The DGM has been used for many years in the USA and it provides an independent, alternative basis for setting a rate of return that is also free of the flaws in the SL-CAPM. However, the AER dismisses the possibility that all of these other models should play a material role in the AER's estimation process.

If an existing model is shown to be flawed in ways that newer models are not, then collective inertia and a claim of simplicity should not serve to constrain a decision-maker from giving real weight to a newer model (or models). The weight should be apportioned according to the substantive contributions that the new model (or models) can make. There is no sense in suggesting that the AEMC intended, through its removal of a reference in the Rules to the incumbency of the SL-CAPM, that a "chicken and egg" situation would eventuate.

148 AEMC; *Draft Rule Determination;* page 46.

149 Application by WA Gas Networks Pty Ltd (No 3) [2012] ACompT 12, [61] – [63]; Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14, [81]-[83].

150 AEMC; *Final Rule Determination*; page 48.

151 AEMC; *Final Rule Determination*; page 49.

The AER appears to have convinced itself that it cannot be the first mover, in terms of adopting new models, and that it must wait for another, similar regulator to implement a change.

The criterion that the choice of inputs should "*promote the simple over the complex where appropriate*"[152] 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.

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 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. Fama French Three Factor model).

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 DGM taken individually and the aggregate result is clearly more complex than simply estimating the Fama French Three Factor model. The foundation model approach is also a good deal more complicated than simply estimating all the models and taking a (weighted) average of the results.

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".[153] 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).

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

> *"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."*[154]

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 criterion as one significant basis for "ruling out" the Fama French Three Factor model. 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."*[155]

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152 AER, Better Regulation, Rate of Return Guideline, December 2013, (pdf version); page 6.

153 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013 (pdf version); page 24.

154 Ibid; page 27.

155 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, (Appendices), December 2013, (pdf version); page 21.

In fact, the model's theoretical underpinning is strong[156] [157]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.

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 extensively for approximately 500 years from about 1100 before a theory was developed in 1600 to explain why it worked. The theory was that the earth itself was magnetic and that a magnetic needle will align with the earth's magnetic field.

[156] NERA (2013), *The Fama-French Three-Factor Model, A report for the Energy Networks Association*, prepared by NERA Economic Consulting, October 2013; pages 8 to 10.

[157] NERA (2015), *Review of the Literature in Support of the Sharpe-Lintner CAPM, the Black CAPM and the Fama-French Three-Factor Model*, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy; prepared by NERA Economic Consulting, March 2015, pages 17 - 21.

2.7.3 The Guideline does not give real weight to all the relevant inputs as required

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 on equity that progresses the NEO. In particular, the Guideline does not meet the requirements of Rule 6.5.2(e) that regard must be had to "relevant estimation methods, financial models, market data and other evidence". There is recognition that an expression such as "have regard to" is capable of conveying different meanings depending on its statutory context.[158] [159] And in the absence of a definition of "relevant", then the word "relevant" is to be given its ordinary meaning in the context.[160] In this regard, the AEMC noted in its draft rule determination[161] and in its final rule determination that:

> *"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****"[162]. (Emphasis added)*

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 the other models are unsuitable for contributing directly to the return on equity. Alternatively, there must be a firm underpinning for the view that the return on equity cannot lie outside certain bounds and that the "right answer" falls within the range of outputs that the foundation model will deliver.

Furthermore, there is merit in considering the context of the overall regulatory structure into which the new Rule 6.5.2(e) 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 NGR and should be similarly applied:

National Electricity Rules:

> *"In determining the allowed rate of return, regard must be had to:*
>
> *(1) relevant estimation methods, financial models, market data and other evidence; …"[163]*

National Gas Rules:

> *"In determining the allowed rate of return, regard must be had to:*
>
> *(a) relevant estimation methods, financial models, market data and other evidence …"[164]*

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 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

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158 *Re Dr Ken Michael Am; Ex Parte Epic Energy (WA) Nominees Pty Ltd & Anor* [2002] WASCA 231, paragraph 55.

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

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

161 AEMC; *Draft Rule Determination*, pages 9 -10.

162 AEMC; *Rule Determination*, page 8.

163 National Electricity Rules, Rule 6.5.2(e).

164 Australian Energy Markets Commission; *National Gas Rules, Version 25, Part 9 Price and Revenue Regulations*; Rule 87(5) page 61.

or else had consigned to a secondary role as a "cross check". The AEMC recognised that a reform to the Rules was needed so as to alleviate the constraints on the consideration of a broader range of inputs that concepts such as "well accepted" had apparently imposed upon the AER. The AEMC considered that the new Rules would achieve their stated aim; and

- 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"[165] to the material, and that for a regulator to simply consider and give no weight to relevant information would be inadequate. In view of the prominence of that litigation in the history of the development of the current NGR, it stretches credulity to think that the AEMC envisaged that the AER would be performing its role satisfactorily and completely by simply considering all of the relevant inputs and then giving certain of those inputs no probative weight, or else only a constrained or secondary form of weighting.

The Guideline does not adhere to the requirement to give real weight to the Fama French Three Factor model. The Fama French model is not used at all, and is allowed to play no role in the establishment of the return on equity.[166] In addition, although some limited role[167] is assigned to each of the two other relevant models (the Black CAPM and DDM), these other models are only employed to inform a single parameter of the SL-CAPM. Even when they are used to inform a parameter of the SL-CAPM, the models are deployed as secondary evidence which is disregarded if there's an inconsistency with the primary range that was established, in the first instance, using a different subset of the available evidence. If the use of the Black CAPM and the DDM is limited in this way, then the ability of these models to improve the quality of the return on equity estimate is severely impaired. The application of the Black CAPM and DDM in the manner thus described is entirely incompatible with the more conventional application. The standard way is to properly parameterise the models and to then apply them to work out the required return on equity for a benchmark efficient entity. Regulators in other jurisdictions, including in the United States, allow the models to be expressed in full (refer to section 2.5.4 above).

The Guideline Explanatory Statement describes the foundation model as follows:[168]

> *"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)*

In any event, even if it were correct to harbour reservations about the models other than the SL-CAPM, the deficiencies with the SL-CAPM discussed in section 2.5.1 are sufficiently pronounced that there is no choice but to reconsider the other models and then give them significant weight so as to offset the flaws that could result from using the SL-CAPM in isolation.

The AER's draft decisions for NSW[169] provide further insight into the manner in which the foundation model approach is to be applied. The draft decisions contain examples of "cross checks" and "regulatory judgement"

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165 *Re: Dr Ken Michael AM; ExParte Epic Energy (WA) Nominees Pty Ltd & Anor* [2002] WASCA 231 at [54 – 6].

166 AER, Better Regulation, *Rate of Return Guideline,* December 2013; (pdf version) page 13.

167 Ibid; page 13..

168 AER; Better Regulation, *Explanatory Statement*; Rate of Return Guideline, December 2013; (pdf version) page 54.

169 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).

– both of which have been problematic concepts in energy regulation. On the subject of "cross-checking", a decision about the appropriate outcome is easily made when all of the evidence is mutually corroborative. However, difficulties invariably arise when the secondary "cross check" material contradicts the primary material, and regulators seldom offer a coherent explanation as to what the appropriate course of action should be in such circumstances. Where there is a conflict, either the initial estimate is preferred regardless of what the "cross check" suggests, or else the secondary material is used to displace the initial estimate. In either case, one piece of information is, in effect, being given determinative weight while the other information is being given no weight.

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 "regulatory judgement" 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. When these scenarios arise, a person reading the regulatory decision cannot infer whether real weight was given to all of the relevant material. The opacity which surrounds the AER's decision is not consistent with the Rules, which require reasons to be given at both the draft determination stage[170] and the final determination stage.[171]

By way of example, the AER uses "regulatory judgement" when 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 United Energy contends, the range is incorrect, then one cannot discern whether the 0.7 number is 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.

The draft determinations identify a number of matters that have not been the basis of selecting the value of 0.7, but the closest that the regulator comes to an articulation of why the 0.7 number has been chosen is a comment that the AER makes about having achieved a "balanced outcome", after applying "regulatory judgement". The AER reports that it has read all of the material that was submitted to it and that the regulator is "satisfied" as to the furtherance of the rate of return objective:[172]

> *"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."*

And: [173]

> *"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*

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).

170 National Electricity Rules, Rule 6.10.2(3), the Rules, page 711.

171 National Electricity Rules, Rule 6.11.2(3), the Rules, page 714.

172 For example, AER; *Draft decision, Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of return;* November 2014, (pdf version) page 3-82.

173 For example, AER; *Draft decision, Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of return;* November 2014, (pdf version) page 3-83.

> *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 consistent with the NEO and RPP. We provide a detailed analysis of technical issues and responses to JGN's proposal in appendix D." (Emphasis added).*

And finally: [174]

> *"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).*

While the decision discloses a series of matters that were not the reason for the 0.7 figure, from what has been written, there is no means of comprehending in any positive way how the value of 0.7 was reached. In the absence of a rational explanation, there is no scope 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 of the AER to explain why the equity beta has been brought down significantly since the AER's 2009 determination when essentially the same set of factors and data were considered. The new information that has since become available points to a higher value for beta. SFG Consulting discusses the reasoning that was applied by the AER during the 2009 WACC review in paragraphs 89 to 92 of its February 2015 report on "The required return on equity for the benchmark efficient entity".[175]

The absence of a transparent, quantitative process to determine the equity beta, and the disregard for information that was considered during the 2009 WACC review are both problems that have been manifested in the AER's draft decisions for NSW. For example, when selecting a beta range of 0.4 to 0.7, the AER relies on a small (and potentially unrepresentative) set of partially dated data for domestic firms. There has been a diminution in the number of members of the ASX 200 Utilities Index. The AER purports to apply a "cross-check" comparison, using international data from the UK and USA, but, in the process, the AER misinterprets the beta results from overseas jurisdictions. SFG (2015, Beta) has reported that the international evidence does not span the AER's 0.7 estimate. Rather, the international evidence is uniformly consistent with a re-geared beta that is materially above 0.7. An average of the international and Australian equity beta results

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174 For example, AER; *Draft decision, Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of return;* November 2014, (pdf version) page 3-172.

175 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015, pages 19 -20.

also delivers values that are greater than 0.7.[176] To resolve the inconsistency, the AER adheres to the initial range, thereby rendering the international material used for "cross checks" as being of nugatory value.

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. The Wright approach, as previously mentioned, is a method for determining the historical average, real return to the market portfolio, from which an MRP estimate can also be derived. The AER claims to apply the Wright method as a technique for verifying the results from the AER's application of the SL-CAPM. SFG Consulting reports as follows:[177]

> *"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."*

The AER considered the Wright approach as part of the fourth step of a convoluted process for assessing the rate of return on equity[178]. In practice, as reported by SFG, the Wright method was rendered worthless by the process of obfuscation employed by the AER. Conversely, if the Wright approach had been used quantitatively from the outset, rather than referentially at step four, then the method would have had a chance of exerting its effect on the allowed rate of return on equity. Undoubtedly, on this occasion, the Wright approach would have contributed to a higher final result for the rate of return on equity.

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176 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*; 13th February 2015. In paragraphs 40 to 56, pages 10 – 16, SFG responds to the claims made by the AER that the results from international comparators support an estimate of the equity beta below 0.7. SFG Consulting shows that these pieces of evidence, when properly considered on a like-for-like basis, support estimates above 0.7.

177 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015, paragraph 151, page 32.

178 Ibid; paragraph 149, page 31.

2.7.4 The improper search for a preeminent model and improper constraints inherent in using a "foundation" model

An assumption underpinning the Guideline is that it is possible to identify a single superior model and to accord that model "single foundation" status[179] which, in practice, means setting outer limits on the range of possible values for the return on equity by using the upper and lower bounds from the results that the model delivers.

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 to believe otherwise is simply wrong. The concept of a foundation model does not appear in the NER or the NEL. Indeed, when promulgating the new Rules, the AEMC noted disapprovingly that:

> *"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"[180].*

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:

> *"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;*
> - *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*

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179 AER; Better Regulation, *Explanatory Statement*; Rate of Return Guideline, December 2013; (pdf version), section 5.3.2 page 56.

180 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, **(AEMC Draft Rule Determination)**; page 47.

> *all these financial models are based on certain theoretical assumptions and* ***no one model can be said to provide the right answer****."*[181] *(Emphasis added)*

SFG states:

> *"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"*[182].

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. Even the reports of the AER's consultants 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:

> *"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"*[183].
>
> *"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"*[184].

As is discussed in the next section, there are strong reasons as to why the SL-CAPM is not the best of the available models. However, even if it were the best of the available models, applying it in the way that the AER has done limits, and in some cases impedes, the use being made of insights from the other models. Furthermore, adopting a single foundation model is inconsistent with the practices of other regulators, which draw upon a number of models to inform their decisions[185].

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181 AEMC; *Draft Rule Determination*; pages 47 - 48.

182 SFG Consulting; *The required return on equity for regulated gas and electricity network businesses, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks*; 6th June 2014, paragraph 370 page 89.

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

184 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 page 9.

185 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 page 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 page 4.

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 page 7.

Network businesses in other countries have found that sole reliance on the SL-CAPM for regulatory purposes exposes them to unacceptable risks and distortions in their return on capital resulting from the weaknesses in the model. For instance, in September 2006, the Ontario Energy Board hosted an industry conference.[186] At that conference, the Ontario equivalent of the ENA, the Coalition of Large Distributors (**CLD**)[187] proposed a regulatory reform that would involve a range of available equity models being used by the regulator. Amongst other things the CLD's regulatory specialists stated that:

> *"Capital market participants have pointed out serious shortcomings with [the Ontario Energy Board's] intention to use only the CAPM methodology."* [188]
>
> *"[The] CLD believes that limiting the determination of ROE to* ***a single methodology is inappropriate****. As has been shown in previous cost of capital hearings, and as discussed in some of the current expert submissions,* ***reliance on a single methodology fails to recognize the strengths and weaknesses inherent in all estimation methodologies."*** *[emphasis added].* [189]

In September 2009, the CLD made a submission to a consultation process[190] facilitated by the Ontario Energy Board. This submission attached a report from Concentric Energy Advisors[191] which recommended to the Ontario Energy Board that it embrace a number of different return on equity methodologies[192] rather than rely solely on a single return on equity measure. Specifically, the submission noted that:

> *"Estimation methods commonly employed by financial analysts in regulatory proceedings include the ERP Method, the Discounted Cash Flow ("DCF") Method, the Capital Asset Pricing Model ("CAPM"), Comparable Earnings of like-risk companies, and Comparable Authorized Returns.* ***As there is no single, widely-adopted and precise method for determining the ROE, more than one of these methods should be utilized in order to bracket the appropriate ROE for a given utility."*** *[emphasis added].*[193]
>
> ***"Multiple approaches for determining ROE provide greater assurance that the end result will be just and reasonable, as conditions that may bias results could be detected or mitigated by considering alternative results."*** *[emphasis added].*[194]

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186 Ontario Energy Board, Review of Cost Capital (EB-2006-0088) and Development of 2nd Generation Incentive Regulation (EB-2006-0089), September 18-22 2006.

187 The members are Enersource Hydro Mississauga Inc., Horizon Utilities Corporation, Hydro Ottawa Limited, PowerStream Inc., Toronto Hydro-Electric System Limited and Veridian Connections Inc.

188 Coalition of Large Distributors, 'Cost of Capital: Business Considerations' page 2, <http://www.ontarioenergyboard.ca/documents/cases/EB-2006-0088/presentations/cld_150906.pdf>

189 Coalition of Large Distributors, 'Cost of Capital: Business Considerations' page 2, <http://www.ontarioenergyboard.ca/documents/cases/EB-2006-0088/presentations/cld_150906.pdf>

190 Ontario Energy Board, Consultation on the Cost of Capital in Current Economic and Financial Market Conditions (EB-2009-0084).

191 Coalition of Large Distributors and Hydro One Networks Inc., 'Consultation on the Cost of Capital in Current Economic and Financial market Conditions, Board File No: EB-2009-0084', 8 September 2009, <http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/148685/view/CLD_Hydro%20One_Comments_CoC_20090908.PDF>

192 The submission encourages the Ontario Energy Board to embrace the CAPM, DCF, Equity Risk Premium methodologies 'and their variations', to properly determine return on equity. See page 2, <http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/148685/view/CLD_Hydro%20One_Comments_CoC_20090908.PDF>

193 Coalition of Large Distributors and Hydro One Networks Inc., 'Consultation on the Cost of Capital', page 43-44, <http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/148685/view/CLD_Hydro%20One_Comments_CoC_20090908.PDF>

194 Coalition of Large Distributors and Hydro One Networks Inc., 'Consultation on the Cost of Capital', page 45, <http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/148685/view/CLD_Hydro%20One_Comments_CoC_20090908.PDF>

Elevating any one model to the "foundation model" status necessarily gives that model primary weight and all of the other models less weight. In view of the significant downward bias of the SL-CAPM for low beta stocks, and the overall empirical shortcomings of the SL-CAPM, the AER's approach gives undue primary weight to the foundation model. The AER's framework contravenes the requirement to take all of the available information into account, because the method limits the extent to which the AER can have regard for those other models.

There is substantial evidence[195] that the SL-CAPM produces a downwardly biased estimate of the return on equity for low beta stocks and for value stocks – with both of these characteristics applying to the benchmark efficient entity. Recent NERA work, for example, concludes as follows with respect to its in-sample tests of the SL-CAPM[196]:

> *"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."*

Furthermore, using current data, SFG calculates returns using the various models. The results of the exercise demonstrate that the SL-CAPM delivers a lower result than any other model, particularly when the SL-CAPM is estimated in the manner proposed by the AER, which involves placing primary reliance on a subset of the relevant evidence.

An important basis for the AER's exclusion of the Fama-French Model 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 some merit in the argument for giving primacy to empirical performance over *a priori* theoretical beliefs, because hypotheses may simply be one idea as to reality until such time as the hypothesis is subjected to practical testing.

There is no reason to suppose that selecting from the upper range of possible outcomes for SL-CAPM parameters will correct for the model's known biases. Indeed by selecting from ranges that have been set using a downwardly biased model, there is logically a significant risk that the true or unbiased return on equity will fall outside that range.

The AER has acknowledged that the DDM and the "theoretical" Black-CAPM 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 the narrow straitjacket of a range for estimates of the equity beta. The estimates for the equity beta were derived using linear regression techniques that are designed to produce values for the equity beta that can be employed in the SL-CAPM, but not necessarily in other models.[197] The AER imposed further curbs on the range, narrowing it to "0.4 to 0.7" from Henry's result of "0.3 to 0.8"[198]. Thus, the range for the equity beta was selected using a method that does not aim to correct for the downward biases that are inherent in the SL-CAPM. Accordingly, the notion that the DDM and the Black CAPM should be used to select an upper bound from such a range is flawed. There is every reason to believe that the process of selecting an equity beta from the upper end of a confined

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195 SFG Consulting refers to the extensive empirical work on this topic, including research by Black, Jensen and Scholes (1972), Friend and Blume (1970) and Fama and Macbeth (1973) in: SFG Consulting, *Cost of equity in the Black Capital Asset Pricing Model*, *Report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks,* 22nd May 2014; pages 6 -10.

196 NERA, *Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report prepared for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy*, February 2015 page 54. Similar results are reported from out-of-sample tests.

197 Henry, 2014, *Estimating Beta: An update*, a report for the AER prepared by Olan T. Henry, University of Liverpool, April 2014; section 4.5, page 63.

198 AER; *Draft decision, Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20, Attachment 3: Rate of return;* November 2014, (pdf version), section D.5.1, page 3-267.

range will not ultimately produce results from the SL-CAPM that accord with prevailing (unbiased) equity returns. Moreover, the AER's method does not conform to the regulator's own "fit for purpose" criterion[199] 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.

[199] As noted above, United Energy considers 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 if it were a relevant criterion, there is a failure to apply the criterion properly.

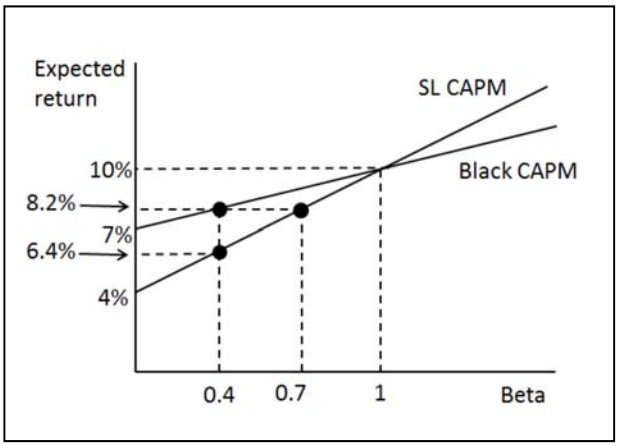
2.7.5 Flawed selection of the Ibbotson inspired AER approach to implementing the SL-CAPM as the foundation model

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 the Ibbotson inspired SL-CAPM is the optimal model. "*We consider it superior to other models we have considered. We therefore employ the SLCAPM as our foundation model*".[200]

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 that the AER does.

The SL-CAPM is flawed because it has very weak explanatory power (i.e. there is, at best, a very weak association between observed returns and betas). A related consideration is that the SL-CAPM produces downwardly biased estimates of the rate of return on stocks with an equity beta of less than 1.0, largely because the model assumes that there is a risk free asset, and that investors can borrow or lend freely at the risk free rate. The Black CAPM does not suffer from such a flaw. The point about borrowing or lending at the risk-free rate can be illustrated graphically as follows[201]:

Figure 2.2: Comparison of the SL-CAPM and the Black CAPM



The size of the bias is substantial when it is considered in the context of the magnitude of errors that have been corrected during previous cases brought before the Australian Competition Tribunal. For example, in the ActewAGL matter, the Tribunal corrected a decision resulting from the incorrect selection by the AER of the data source used to estimate the cost of debt. The measure of the cost of debt chosen by ActewAGL produced a debt risk premium which was 53 basis points higher than the AER's estimate.[202] The impact on the nominal vanilla WACC of an increase in the DRP by that amount would be expected to be approximately 32 basis points, because of the assumed benchmark gearing ratio of 60 per cent. In contrast, the empirical estimates obtained by NERA suggest that the downward bias associated with the application of the SL-CAPM, using an equity beta of 0.7, would be in the order of 449 basis points per annum, with the result drawn from tests that had employed data over a significant time period.[203]

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200 For example, AER, *Draft decision, Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of return;* November 2014, (pdf version),page 3-27.

201 SFG Consulting, *The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks*, 6 June 2014, page 93.

202 Application by ActewAGL Distribution [2010] ACompT4, 17th September 2010; paragraph 16, page 4.

203 NERA, Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report prepared for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy; Table 5.2, page 40.

More specifically, the outcome of 4.49 per cent per annum was obtained as the mean forecast error for portfolio 3, as derived when out-of-sample tests were performed on the SL-CAPM. Under the particular scenario being considered, realised excess returns to the market portfolio were employed in the formulation of model predictions. The equity beta was presumed to have been assessed on a rolling basis, using data drawn from overlapping, 60-month time intervals. The mean forecast error of 4.49 per cent was statistically significant at the 5 per cent level of significance. The equity beta for portfolio 3 was reported by NERA to be 0.67, which is close to the beta that has been set by the AER for a regulated energy utility. Thus, the magnitude of the forecast error from the SL-CAPM was such that it under-estimated the returns from portfolio 3 by 449 basis points per annum, on average. Clearly, that degree of under-statement represents a considerable margin of error. The empirical work was in respect of time intervals from January 1979 to December 2013.

If the return on equity allowance for a business was, on average over time, under-stated by this amount, then the business would be compelled to postpone investment. The business would recognise that it was not earning a fair rate of return on equity, and would therefore formulate plans which resulted in less investment, or delayed investment. Consumers would ultimately suffer a serious detriment.

As is described in the discussion below, the AER does not explain clearly what it has done to address the bias in the SL-CAPM. However, the regulator's comments suggest that the selection of a beta value from the upper end of the 0.4 to 0.7 range has been motivated by a knowledge of the prevalence of the bias. The problem with this approach is that there is no reason to suppose that the adjustment is sufficient to address the low-beta bias. A much safer way to proceed would have been to avoid selecting the SL-CAPM as the foundation model or, indeed, to have refrained from elevating any model to foundation status.

The low beta bias is not the only flaw of the SL-CAPM. There are other deficiencies that, considered separately and in conjunction with each other, are sufficient to disqualify the SL-CAPM from contention as the foundation model. SFG Consulting is of the view that there is a need to relax – as the Black CAPM does - the assumption that investors can borrow or lend freely at the risk free rate, so as to overcome the biases of the SL-CAPM. SFG further believes that in order to improve the overall fit of the data to the model, there is merit in taking account of the insights from the work of Fama and French[204].

> *"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."*

The aforementioned models are varieties of capital asset pricing models which, in the USA, are generally regarded as flawed when compared with the DDM. For example, the Maine Public Utilities Commission states that:[205]

> *"The theoretical weaknesses of the CAPM spelled out in the Bench Analysis cause 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."*

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204 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015, paragraph 42, page 10.

205 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 [41]). Note: These cases predate decisions in which an equal weighting between the Black CAPM and the SL-CAPM models has been adopted.

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).

There can be little surprise therefore that, at present, all of 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 per cent to 10.32 per cent, while the SL-CAPM falls well below that cluster, delivering a return on equity of 9.3 per cent when estimated by SFG Consulting.[206] The AER's rendition of the SL-CAPM, which draws upon the AER's MRP estimate of 6.5 per cent, produces a result for the return on equity which, at 7.19 per cent, is several orders of magnitude lower. Recall that the risk-free rate over January 2015 was 2.64 per cent, for a 10-year Commonwealth Government bond. In the draft decision for Jemena Gas Networks, the application of the AER's Ibbotson inspired SL-CAPM produced a result for the return on equity of 8.1 per cent.[207] The January 2015 averaging period was the market time interval that was used by SFG for most of its computations.

These figures also highlight the significance of choosing between different approaches to implementing the SL-CAPM when using it as a foundation model.

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 the MRP: The Ibbotson and Wright methods. The AER elects to continue with 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 deliberately chosen to restrict 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, (in section 2.7.3), that gives the secondary material nugatory weight.

In the current economic conditions, the AER's approach of combining a contemporaneous measure of the risk free rate with an essentially constant market risk premium delivers values for the return on equity of a benchmark efficient entity that are necessarily materially lower than prevailing market returns.

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 market risk premium tends to fluctuate in the reverse direction from risk free rates. Incenta Economic Consulting recently updated its analysis of the work of valuation practitioners, and has again found evidence of a negative relationship between the risk premium for equity applied for regulated energy networks and the risk-free rate.[208]

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 apparent 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 significantly reducing wholesale interest rates to try and stimulate the economy. This is a stark example of the phenomenon that is generally borne out by expert evidence: That the market risk premium and the risk free rates tend to move in opposite direction. Note, however, that UE is not suggesting that there is a deterministic relationship between the risk-free rate and the MRP.

The implication is that adding a long run average (essentially constant) market risk premium to a contemporaneous risk free rate will deliver downwardly biased results when risk free rates are low and

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206 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015, page 35.

207 AER, *Draft decision, Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of return;* November 2014, (pdf version) Table 3-1, page 3-11.

208 Incenta Economic Consulting; Further update on the required return on equity from Independent expert reports, prepared 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, page 6.

upwardly biased results when risk free rates are high. In the current environment of record low risk free rates, the simple addition of a very long term market risk premium and a current risk free rate will almost invariably under-compensate equity investors by a significant margin.

Indeed, the approach in the draft determinations delivers a nominal, post tax return on equity of just 8.10 per cent, which is substantially lower than the result for five years previously. By way of example, the final decision for Jemena Gas Networks that was handed down in June 2010 produced a nominal return on equity of 11.05 per cent.[209] The results for other networks at that time were comparable. Since 2010, more than 200 basis points of the reduction in the return on equity 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 to substantiate the case that equity investors' required rates of return have diminished in exact proportion to the fall in the risk free rate.

Precisely the same question confronted the AER's counterpart in the United States when a decision was made about the New York Independent System Operator on 28th January 2014. In that case, FERC decided as follows:[210]

> *"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.****"*

A recent bulletin from NERA reports that in Continental Europe, there is a misalignment between regulatory settings for the risk-free rate, which is measured over relatively short time periods, and regulatory settings for the market risk premium, which is recorded over more extended time frames. NERA refers to preliminary evidence of declines in investment in energy networks which NERA ascribes to reductions in the allowed rates of return on equity in Europe. From an Australian perspective, the point that is remarkable is that the "short time" intervals for typical measurement periods for the risk-free rate in Europe are actually quite long by Australian standards. Specifically:[211]

- In Austria a *five year* averaging period for the risk-free rate is used in conjunction with a market risk premium that is assessed using data from than 110 years.
- In the Netherlands, a *three year* averaging period for the risk-free rate is used in conjunction with a market risk premium that is assessed using data from than 110 years.
- In France, a *one to two year* averaging period for the risk-free rate is used in conjunction with a market risk premium that is assessed using data from than 110 years.

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209 AER (2010), Jemena Gas Networks, Access arrangement proposal for the NSW gas networks, 1 July 2010 – 30 June 2015; June 2010, Table 3, page 13.

210 Federal Energy Regulatory Commission (28 January 2014): "*Order accepting tariff filing subject to condition and denying waiver",* Docket No. ER14-500-000, pages 35 to 36.

211 NERA; *European Regulators' WACC Decisions Risk Undermining Investment Decisions*; 2015, page 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.

- In Norway a *long term* risk free rate is combined with long term market risk premium.
- In Germany, a risk-free rate, measured over an unspecified period, is applied in combination with a market risk premium that is assessed using data from than 110 years.
- In Denmark, the risk-free rate assessment period is 6 months, while the MRP is also assessed using data from, at least, the past 100 years.

On this issue, the AER is clearly out of step with all of its major peers.

A regulator may perceive that to under-compensate investors at this time will be of little consequence if, once the economic cycle turns, the current under-compensation ends up being offset by future over-compensation. However, no decision maker should take comfort from such a scenario. If regulatory allowances for the return on equity are not synchronised with actual rates of return, then inefficiencies will result. Firstly, there are costs for the businesses of absorbing inter-temporal fluctuations in returns because of a likely requirement to either explicitly or implicitly carry a balance sheet provision for such a mismatch. Secondly, at times of under-compensation, timely investments are discouraged or delayed whereas at times of over-compensation the opposite effect applies, and there is an incentive to invest earlier than required. Neither outcome is efficient, and nor are such outcomes in the interests of customers. 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.

The Rules should therefore require - as indeed they do - that each determination must provide for a regulatory allowance that is commensurate with the prevailing efficient costs for a benchmark entity at the time the decision is made. The AEMC reported that:[212]

> *"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."*

Consequently, the AER should not – as, in effect, it does – place sole reliance on the Ibbotson inspired implementation of the SL-CAPM, unless the AER has a proper basis to conclude that the expectations of investors move in parallel with the risk free rate. The AER's current methods serve to impede adjustments to the MRP that are needed to produce an allowed rate of return that can accommodate the prevailing expectations of equity investors.

[212] AEMC, Economic Regulation of Network Service Providers Rule Change Final Determination, November 2012 (AEMC Final Rule Determination), page 44.

2.7.6 Errors in the AER's selection of the beta

The equity beta is a key input parameter for the SL-CAPM and represents the AER's view as to the risks associated with the operation of an energy network business relative to a benchmark efficient business. The AER has signalled that it intends to bring down the "equity beta" to the lowest level ever applied in Australian regulatory decision making. The equity beta has been reduced to progressively lower levels, having first been set at 1.0 when the NEM came into being[213], followed by a shift to 0.8, and, now, with a further proposed downward adjustment to 0.7. The AER is expecting to also use the lower equity beta in NSW.

The AER's decision to significantly downgrade the beta value is based on a general review of risk by Frontier Economics[214] and on domestic empirical estimates. The Frontier Report sets the scene in a broad qualitative sense, suggesting that electricity businesses are comparatively safe – even with high levels of leverage. In United Energy's view, that report fails to properly assess the operational and financial risks facing network businesses. 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 1.0. SFG reported that the AER had misinterpreted the Frontier report by attempting to conceptualise equity beta as a trade-off between business risk (asset beta) and the five types of financial risk that were identified in the report[215]. United Energy submits that the AER has misrepresented the findings of that report.

In section 2.2 of this report, evidence was presented that the risks in the market environment in which electricity network businesses operate are increasing over time. There is scope for debate as to whether the systematic component of the risk is best incorporated in the equity beta or in some other variable, but to-date, the heightened levels of risk have been accommodated neither in the equity beta nor in any other part of the regulatory framework.

When faced with the task of preparing a quantitative estimate, one would expect the AER and other relevant stakeholders to concur with the following proposition:[216]

> *"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."*

Unfortunately, the current situation could not be further from the ideal world because the number of domestic firms has dwindled, leaving an unworkably small sample of relevant domestic comparator firms. Recent data is only available for four comparable firms. When the US Federal Energy Regulatory Commission was examining interstate gas pipeline businesses, and was confronted with the same problem (in other words, a comparator set comprised of about 10 firms, or possibly less), the FERC responded by broadening the sample:[217]

> *"[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*

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213 Note that in *South Australia* the figure was 0.9.

214 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.

215 SFG Consulting; *Equity beta, Report for Jemena Gas Networks, ActewAGL and Networks NSW*; 12th May 2014, page 22.

216 SFG Consulting; *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*; 13th February 2015, paragraph 38, page 12.

217 Federal Energy Regulatory Commission of the United States of America, Statement of Chairman Joseph T. Kelliher, on Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity, 17 April 2008..

> *natural gas industry, fewer and fewer interstate natural gas companies have satisfied our prior requirements for proxy group composition.*
>
> *Our policy change is born out of a practical recognition that the size of the proxy group used under our prior approach had shrunk dramatically."*

In contrast, the AER continues to rely on a steadily decreasing sample size for data, in terms of the number of domestic utility firms available for analysis. The AER supplements the observations for firms in the current comparator set with observations for discontinued entities that are becoming increasingly out-of-date. The results for the de-listed or not otherwise available firms are unlikely to give rise to estimates which properly represent the prevailing cost of equity funds, consistent with the requirement set out in Rule 6.5.2(g). As was explained by SFG Consulting:[218]

> *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.*

In the Guideline process,[219] the AER made use of pre-existing results from the diminishing dataset. The results appeared to be mutually corroborative but were in fact averages drawn from substantially overlapping samples of the data that had been reworked using two different statistical techniques. The AER claimed that the re-examination of past results had delivered a range for the equity beta of 0.4 to 0.7. The principal analysis that was intended to inform the AER's estimate was a report by Henry which was not delivered until five months after the Guideline was issued.

In the report from Professor Henry of the University of Liverpool Management School,[220] the AER's brief has been revealed and it shows that the data requirements were tightly specified. Henry was instructed to use "nine specified Australian gas/electricity firms", "short term Australian Government debt" and the "ASX 300 Accumulation Index". The brief also set forth the work was to be done. Henry was instructed to use only Australian data, to measure weekly returns, and to apply value weights when constructing portfolios. There was to be no Blume adjustment or Vasicek adjustment, although Henry was to apply the Dimson thin trading adjustment. The methods of estimation were ordinary least squares (OLS) and least absolute deviations (LAD), and Henry was to report his results at the 95% confidence interval. Indeed, Henry was given explicit permission to exercise his judgement in relation to only two issues: On the choice of stability and robustness tests, and on whether to use raw returns or excess returns (though Henry was told not to apply both)[221]. Accordingly, Professor Henry's work does not set out his expert opinion as to the level of beta at large. Instead, Henry participated in an exercise that was circumscribed by the AER in a fundamental way. Henry employed inputs that were, for all extents and purposes, provided by the AER, and he used the inputs in a manner that was specified by the AER. The results obtained by Henry were a product of the AER's views concerning each of the relevant inputs.

While operating within the confines of the AER's framework, Henry stated that[222]:

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218 SFG Consulting; *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; 13th February 2015, paragraphs 28- 29 page 10.

219 AER, *Guideline Appendices*, December 2013, Appendix C, pages 53 to 55.

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

221 Henry O, University of Liverpool Management School; *Estimating β: An update*; April 2014, page 4.

222 Henry O, University of Liverpool Management School; *Estimating β: An update*; April 2014, page 63.

> *"The consultant is of the opinion that the most reliable evidence about the magnitude of β 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 β lies in the range **0.3 to 0.8**." (Emphasis added).*

Indeed, in Henry's Table 2, the beta estimates for two out of nine firms significantly exceed 0.8. The particular estimates are for Alinta (at 0.8795) and for Hastings (at 1.0305). The Henry report states that [223]:

> *"[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".*

The range of values that is ultimately reported by Henry is narrower than the lower and upper bounds of 0.21 and 1.04 would suggest, because of the instructions that were given to Henry by the AER. The instructions set out how Henry was to establish a range.

In other words, even in the context of a highly circumscribed exercise, the AER's own consultant stated that the range for the equity beta was 0.3 to 0.8, and not 0.4 to 0.7 as published in the AER's Guideline. If the beta estimation exercise were relieved of the strictures imposed by the AER, then the analysis would deliver beta estimates that varied further in an upward and downward direction.

Although the evidence from Henry's equity beta report, (April 2014), demonstrated that the 0.4 to 0.7 range published in the 2013 Guideline was in error, the AER has failed to retract and correct the document. Instead, in the draft decisions released in November 2014, the approach taken by the AER was to delve into the beta report and to then assert that the majority of the beta figures fell within the AER's narrower range. The AER continues to assert that the 0.4 to 0.7 range is appropriate, even though it is inconsistent with the 0.3 to 0.8 range that Henry reported. In providing the values at each end of the interval (0.4 and 0.8), Henry was himself merely following instructions that had been provided by the AER.

The AER sought to bolster the domestic data with one set of international comparisons undertaken for the Guideline and another set undertaken for use in the NSW draft determinations. SFG Consulting examined the international evidence that was adduced by the AER, and concluded that in relation to the first set of data upon which reliance was placed, all of the contemporaneous estimates were above 0.7. SFG stated that the international evidence used by the AER supported an equity beta estimate that was above the top end of the 0.4 to 0.7 range that had been proposed in the Guideline[224].

In relation to the international evidence that was compiled by the AER for the purpose of preparing the NSW draft decisions, the analysis appears to have been undertaken in a cursory fashion. For example, the AER has relied upon the following material:

> *"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"[225].*

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223 Henry O, University of Liverpool Management School; *Estimating β: An update*; April 2014, page 18.

224 SFG Consulting; *Equity beta, Report for Jemena Gas Networks, ActewAGL and Networks NSW*; 12th May 2014, paragraph 149, page 32.

225 SFG Consulting; *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*; 13th February 2015, paragraph 50(c) page 15.

An important factor to take into account is that the equity beta used in Alberta represents the starting point for an analysis, after which an assessment is made of whether "adders" are required so as to boost returns and thereby achieve a required return on equity.

SFG Consulting has identified significant flaws in the use of the following report:

> *"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 2.4: PwC beta estimates for the NZCC

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

> *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"*[226]*.*

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

Although Appendix C of the Rate of Return 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:

> *"[O]ur proposed point estimate of 0.7 is not inconsistent with our consultants' advice"*[227]*.*
>
> *"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 [sic], financial models, market data and other evidence when determining the allowed rate of return. When this*

[226] SFG Consulting; *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; 13th February 2015, paragraph 50(d), page 16.

[227] SFG Consulting; *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; 13th February 2015, page 76.

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"[228].

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 (which were discussed above in section 2.5.1, section 2.7.4, and section 2.7.5).

The AER's chosen range for the equity beta of 0.4 to 0.7 is demonstrably incorrect because it is incompatible with the lower and upper bounds that are suggested from the results of the Henry analysis. The AER's chosen interval for the equity beta is also unsustainable as soon as any reasonable assessment of international evidence is brought to bear. However, even if the AER's range were correct, a further shortcoming is that the AER has not demonstrated that taking the upper end of that range provides an adequate correction for the downward biases. Appendix C of the Guideline[229] provides a discussion of this issue but in such heavily qualified terms as to insinuate that the AER cannot be satisfied of the adequacy of the correction factor. In reality, there is no basis to support the conclusion that selecting the upper bound from the AER's assessment of the range will be exactly sufficient to redress all of the known biases of the SL-CAPM. The range itself has been constrained artificially and is underpinned by a limited sample of four current and five former domestic comparators. A better approach would be to simply estimate the models that have been developed so as to redress the well-documented problems with the SL-CAPM.

[228] AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, (Appendices), December 2013, (pdf version); Appendix C.5.2, pages 76 to 77.

[229] Ibid, page 76.

2.7.7 The flaws in the AER's implementation of the Ibbotson approach to measuring the historical MRP for use in the SL-CAPM

In this section, United Energy examines the approach taken by the AER to establish a range and a point estimate for the market risk premium (MRP) that is used in the regulator's "foundation model".

To implement its approach, the AER establishes a range for the MRP (which is currently 5.1% to 7.8%), and then selects a point estimate from within the range (6.5%). The AER has described its method in the draft decision for Jemena Gas Networks (JGN)[230], and in the draft decisions for other businesses that are currently subject to review. In addition to the historical means and DDM analysis, the AER considers certain other information as set out below.

The AER has been opaque in its explanation of how the estimate of 6.5 per cent is drawn from the range.

> *"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"[231].*

The numbers that fit within the AER's band for estimates of the MRP are derived from a consideration of the following components[232]:

- An arithmetic mean of the MRP, calculated over the historical period from 1883 to 2013.
- Estimates of the historical MRP that have been derived by applying inappropriate re-sampling over shorter, and more recent time periods[233].
- Estimates derived from using the dividend growth model.
- Reported results of surveys.
- The determinations of other Australian infrastructure regulators.
- Conditioning variables.

United Energy, (UE), has significant concerns in relation to the AER's application of each of the above methods. Below, UE discusses each of the approaches in turn.

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

231 AER; Better Regulation, Explanatory Statement; Rate of Return Guideline, December 2013; (pdf version), section 6.3.2 page 90.

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

233 This issue was discussed in the NERA report, *The Market, Size and Value Premiums*, prepared for the ENA by NERA Economic Consulting, June 2013. As was explained by NERA in that chapter 5 report (with a reference to a draft decision for Multinet Gas):

It is important to note that data from the 24-year period 1988 to 2011 contributes to all five pairs of MRP estimates that the AER uses while data from the 22-year period 1958 to 1979 contributes to three pairs of estimates and data from the 54-year period 1883 to 1936 contributes to only one pair. So by displaying estimates of the MRP from the five sample periods that the AER uses, the regulator is inviting the reader to weight recent returns to the market portfolio in excess of the yield on a government bond more heavily than earlier observations. While this may sound an attractive strategy, placing a larger weight on more recent observations than on earlier observations can substantially lower the precision of the estimates that one produces.

The AER has, to-date, completely disregarded the NERA analysis and has not responded to it.

2.7.7.1 Historical long run average MRPs

The historical estimates are the source of information that make the most significant contribution to the AER's MRP estimate. The lower bound of the AER's range (being 5.1 per cent) is informed (incorrectly within the context) by a geometric average of the historical data. The historical averages also provide the first stage in an assessment process which gives rise to the point estimate upon which the AER ultimately settles. The AER appears to evaluate the evidence qualitatively and has suggested that it gives more weight to data from 1958 onwards. This sub-section provides evidence to support United Energy's concerns about the use of historical data in the AER's MRP analysis.

The AER has stated that it places the greatest weight upon the historical, long run average MRP. Specifically, the AER posited in its Guideline Explanatory Statement that[234]:

> *"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****."*

The low point of the range is established as follows. In the Explanatory Statement to the Rate of Return Guideline, the AER remarked that[235]:

> *"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."*

In other words, the low end of the range was established from the high end of the geometric mean estimates (that is, 4.8 per cent) by adding 20 basis points to give 5.0 per cent.

For the development of the Rate of Return Guideline, the AER used historical data up to the end of 2012 in order to conduct its analysis. In the NSW draft decisions,[236] the figure mentioned above of 4.8 per cent has been updated and is now 4.9 per cent using the additional data available for 2013. The data that was current as at the time of the NSW draft decisions[237] is as follows:

Table 2.5: Data in the NSW draft decisions – historical excess returns (with theta equal to 0.6)

Sampling period	Arithmetic mean (per cent)	Geometric mean (per cent)
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%

234 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, (Appendices), December 2013, (pdf version); page 83.

235 AER; Better Regulation, Explanatory Statement; Rate of Return Guideline, December 2013; (pdf version), section 6.3.4, page 93.

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

237 AER; *Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return*; November 2014 page 3-195.

Source: AER, Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return; November 2014, Table 3-39, page 3-195.

The material presented in Table 2.5 above is erroneous in the following respects:

- Geometric means would only have a role to play if compound interest was calculated and used in the AER's post-tax revenue model. However, compounding is not performed in any significant way, and so geometric means are irrelevant.
- The data for earlier time periods that was used to produce the results shown in Table 2.5 depends in part on an incorrect adjustment to the Lamberton/SSE dividend yield series. The AER has, in effect, applied an adjustment factor of 0.75 instead of NERA's adjustment factor, which exhibits variation through time.
- The calculated results presented in the table take no account of the Wright approach which makes use of the historical average, real return to the market portfolio.
- Furthermore, in deriving the MRP estimates for more recent time periods, the AER has applied a theta estimate of 0.6 which is itself in error because it has not been sourced from a market valuation study.

There is considerable variability in stock market returns, and so the longest possible time series should be used, that being the full data set commencing in 1883. The use of a large number of historical observations is the best way of ensuring that the calculated standard errors will remain relatively low.

The annual observations for the MRP should be based on the best available data, which means using the most representative series of dividend yields, and the most accurate information on price indices. In particular, UE believes that the AER has fallen into significant error by relying upon estimates of the MRP that were provided by Brailsford, Handley and Maheswaran, (Brailsford et al.), (2008 and 2012).[238] Brailsford et al. (2008) indicate that an analysis of the data suggests that the yields provided by Lamberton and the SSE were lowered between 1882 and 1964 by multiplying them by 0.75. However, there is no evidence to substantiate the adjustment that was made by Brailsford et al. and the authors appear to have chosen the factor through a process of guesswork and hearsay. When that particular error is rectified, and an alternative set of adjustments is put in place, then the correct estimate of the historical MRP, over the 1883 to 2013 period, is 6.56 per cent.

The AER continues to use geometric means when measuring the historical MRP as a result of erroneous advice provided by McKenzie and Partington, in 2012, which was that an unbiased estimator of the MRP should lie between the arithmetic average and the geometric average.[239] However, McKenzie and Partington did not demonstrate that they have any knowledge of the AER's post-tax revenue model (PTRM). Their terms of reference did not provide for a review of those models, and there is no mention of the models in the list of documents that the authors described as having been reviewed.[240] There is no compounding of the weighted average cost of capital (WACC) in the PTRM and so there is no prospect that an arithmetic average of the MRP will give rise to an upwardly biased estimate of the cost of capital. These are simple matters of mathematics and statistics and are therefore beyond contention.

[238] Brailsford, T., J Handley and K. Maheswaren; Re-examination of the historical equity risk premium in Australia; Accounting and Finance 48 (2008) 73-97.

Brailsford, T., J Handley and K. Maheswaren; The historical equity risk premium in Australia: post-GFC and 128 years of data; Accounting and Finance 52 (2012) 237-247.

[239] McKenzie, M. and G. Partington, *Report to the AER: Supplementary report on the equity market risk premium*, SIRCA Limited, 22 February 2012, pages 5-7.

[240] McKenzie, M. and G. Partington, *Report to the AER: Supplementary report on the equity market risk premium*, SIRCA Limited, 22 February 2012, page 3.

The AER's own consultant, Lally[241], and NERA have pointed out that the regulatory arrangements do not provide for compounding[242]. Since there is no compounding in the PTRM (and only a minor instance of compounding in the roll-forward model), then the use of a geometric mean for the MRP will give rise to a downwardly biased result for the return on equity, and therefore also for the WACC.

The Maine Public Utilities Commission has acknowledged that the geometric mean has no role to play when working out the return on equity for regulatory purposes:

"….[W]e agree with the Company that it is improper to use a geometric mean in the CAPM model…"[243]

The post-tax revenue model that is used by the AER does not apply compounding to the estimates of the weighted average cost of capital, (WACC), in any significant way. Thus, there is no likelihood that an estimate of the WACC, which is based, in part, on a sample of annual excess returns to the market portfolio, will be biased. UE supports a recommendation by NERA, that for long-run estimates of the MRP, the AER should rely solely on estimates that use arithmetic means[244]. The AER should place no weight on MRP estimates that use geometric means.

These arguments are already well substantiated in materials that the businesses have already lodged with the AER, most notably a series of reports by NERA (with the most recent being the February 2015 report titled "Historical Estimates of the Market Risk Premium").

NERA has reiterated its concern that the AER continues to apply historical estimates of the MRP from Brailsford et al[245] [246]. Handley has provided updates of the MRP to the AER, and the regulator continues to draw upon the Brailsford et al series, notwithstanding that the reliability of the data underlying the articles has been called into question on multiple occasions.

Available data series

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.

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.[247] 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[248]. Professor Officer provided the Lamberton series to Dimson,

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241 Lally, M., *The cost of equity and the market risk premium*, Victoria University of Wellington, 25 July 2012.

242 NERA Economic Consulting; *The market, size and value premiums*, A report for the Energy Networks Association; June 2013; chapter 4.

243 *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 [41].

244 NERA, *Historical Estimates of the Market Risk Premium*, NERA Economic Consulting, February 2015.

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

246 AER, *Guideline Appendices*; December 2013, (pdf version) pages 84 and 103.

247 NERA Economic Consulting; *The market, size and value premiums*, A report for the Energy Networks Association; June 2013; chapter 2, page 7.

248 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, page 25.

Marsh and Staunton who are the publishers of a number of widely used studies and updates of the MRP covering approximately 30 countries[249].

For the period from 1882 to 1957, the data put together by Lamberton[250] and used by Officer (1989)[251], and Dimson, Marsh and Staunton comprises:

(a) a price index series; and

(b) a dividend yield series.

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[252]:

- 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.

Dimson, Marsh and Staunton (2002) provide summary statistics for the return to the market portfolio of equities and for bond yields and use [253]:

- 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 ASX All Ordinaries Index from January 1980 to December 2000.

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.

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249 Dimson, E., P. Marsh and M. Staunton, *Credit Suisse Global investment returns sourcebook 2015*, Credit Suisse, February 2015 page 61.

250 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, page 14.

251 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.

252 Ibid.

253 Dimson, E., P. R. Marsh, and M. Staunton, Triumph of the Optimists: 101 Years of Global Investment Returns, 2002, Princeton University Press, Princeton, New Jersey, United States.

In a number of reports for the Australian Energy Regulator, Handley has updated the results of Brailsford et al.

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)[254].

And for the yield data:

Officer (1989) uses[255]:

- 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.

Dimson, Marsh and Staunton (2002) use [256:]

- the Lamberton 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.

Finally, Brailsford, Handley and Maheswaran (2008) use[257]:

- a series that is 0.75 times the Lamberton 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.

The Lamberton 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[258]. First, the series omits stocks that pay no dividends. Second,

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254 Lamberton, D. McLean, *Share Price Indices in Australia*, 1958, Law Book Company of Australasia, Sydney, NSW.

Sydney Stock Exchange Official Gazette, 1958, 22, 7, July, Sydney, NSW..

255 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.

256 Dimson, E., P. R. Marsh, and M. Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns,* 2002, Princeton University Press, Princeton, New Jersey.

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

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

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.

The authors of the Brailsford et al. papers state that they exchanged several emails with an employee of the Australian Stock Exchange (**ASX**) and that the employee provided them with a dividend yield series which was based, to a significant extent, on a series created by Lamberton, although a reducing multiple of 0.75 has been applied to the relevant underlying data[259].

Brailsford et al. (2008)

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

> *"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"[261].*

The paper by Brailsford et al. accepts the 0.75 multiplier having considered the following four matters[262]:

- 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."
- That there are several studies that suggest that US dividend yields, *"to the extent that the US observations are relevant to the Australian market"* would be consistent with the 0.75 multiplier.
- That there is a UK study that would deliver an even lower multiplier.
- 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.

Dimson and his colleagues 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 the Credit Suisse Global Investment Returns Sourcebook, 2015, Dimson notes[263]:

> *"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."*

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

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

260 Ibid; pages 79 and 80.

261 Ibid; page 80.

262 Ibid; pages 80 and 81.

263 Dimson, E., P. Marsh and M. Staunton, *Credit Suisse Global investment returns sourcebook 2015*, Credit Suisse, February 2015, page 61.

throughout the period, adjustment factors should vary over time by interpolating between the figures derived from NERA's seven data points[264].

The Explanatory Statement accompanying the AER's Rate of Return Guideline[265] 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 et al. adjustment, rather than the NERA adjustment[266].

The AER's basis for preferring the Brailsford et al. material appears to stem from three aspects:

1. The apparent robustness of the testing and analysis undertaken by Brailsford et al.

2. That the material has been sourced from the Australian Stock Exchange (**ASX**).

3. The publication of the material in a peer reviewed journal.

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[267]. These characteristics are presented as:

1. Perceived, unacceptable, differences in approach to the data and its preparation

2. Differences in the frequency of data collection

3. Unachievable accuracy requirements pursued by NERA through seven data points (contrasted with the one data point of Brailsford et al.).

United Energy has investigated these issues further and has made the following findings.

Published in a peer reviewed academic journal

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"*[268]. 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.

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.

United Energy approached[269] the Accounting and Finance Journal to understand the Journal's peer review process, but a positive response was not forthcoming[270]. The Accounting and Finance Journal's website

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264 NERA, *The Market, Size and Value Premiums*, prepared for the Energy Networks Association, June 2013.

265 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; (pdf version), section 6.3.4, page 83.

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

267 Ibid.

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

269 Letter from Nick Taylor, Jones Day, addressed to Professor Steven Cahan, Editor-in-Chief, dated 2nd January 2015.

270 Email from Professor Steven Cahan to Prudence Smith, Jones Day; 10th February 2015.

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 which is also subsequent to the article which describes the 'comprehensive study' that was undertaken[271]. 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.

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[272].

By contrast, NERA was briefed to follow the strict obligations set forth in *Practice Noted 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'

As noted above, Brailsford et al. state:

> *"stock exchange itself, whose staff carefully considered the issue and ultimately decided on an adjustment factor of 0.75." (Emphasis added)*

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", the degree of care was not sufficient to prompt the staff member to express a great deal of confidence in the robustness of the 0.75 multiplier. In fact, the staff member wrote:

> *"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." [273] (Emphasis added)*

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.

Associate Professor Lally states that[274]:

> *"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."*

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

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271 *Accounting and Finance Journal, Instructions to Authors*, accessed 1 April 2015.

272 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.

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

274 Lally, M; *Review of Submissions to the QCA on the MRP, Risk-Free Rate and Gamma*; 12 March 2014, page 6.

> *"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"*[275].

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

Despite the claims made by 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. The AER appears to have taken the Handley assertion at face value when it describes the data as having been sourced from:

> *"[t]he ASX, which we consider to be a credible source, provided and adjusted the earlier data"*[276].

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[277].

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

> *"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".***[278] *(Emphasis added)*

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

As part of the interaction, Mr Goodman of the ASX noted[279] that much information from the period after 2000 relating to index management and methodology was transferred from the ASX to Standard and Poor's. Standard and Poor's have advised United Energy that they are unable to endorse any indices or adjustments which were instigated or made prior to 2000[280].

For completeness, Jones Day (retained by United Energy) has also approached Standard and Poor's **(S&P)** which took custody of the ASX data. S&P has also stated[281] in response to the question as to S&P's views as to whether an adjustment to the series is warranted, that:

> *"S&P has no view on the issue"*

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275 Handley, J.C. Report prepared for the Australian Energy Regulator: Advice on the return on equity, University of Melbourne, 16 October 2014, page 79.

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

277 Letter to Jeremy Rothfield of United Energy from Brian Goodman, Product Development Manager, Australian Securities Exchange 18th March 2015.

278 Letter to Jeremy Rothfield of United Energy from Brian Goodman, Product Development Manager, Australian Securities Exchange 18th March 2015.

279 Letter to Jeremy Rothfield of United Energy from Brian Goodman, Product Development Manager, Australian Securities Exchange 18th March 2015.

280 Email from Douglas Been, S&P Dow Jones Indices to Prudence Smith, Jones Day, dated 26th February 2015.

281 Email from Douglas Been, S&P Dow Jones Indices, to Prudence Smith, Jones Day, dated 26th February 2015.

The letter from Mr Goodman 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[282]. 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.

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.

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[283]. 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.

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[284]:

> *"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.'*

The Product Development Manager for the Australian Securities Exchange (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.

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 Economic Consulting) 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.

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.

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.

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282 Letter to Jeremy Rothfield of United Energy from Brian Goodman, Product Development Manager, Australian Securities Exchange 18th March 2015; page 3.

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

284 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, page 30.

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[285]; or
- To apply the NERA adjustment when calculating the arithmetic mean.

In United Energy's 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 per cent. The upper bound for the MRP of 8.29 per cent would still be drawn from the AER's version of the dividend growth model. SFG has performed some calculations on the assumption that the overall return to the market portfolio remained constant from the level that was implied by the AER's analysis undertaken for the draft decisions in November 2014[286]. Specifically, the AER reported an MRP result of 7.4 per cent from its three-stage DDM, in the draft decision for Jemena Gas Networks.[287] The risk-free rate used in the AER's analysis was 3.55 per cent, consistent with a reference period in September/October 2014. The implied return to the market portfolio was therefore 10.95 per cent over the particular reference period. If the return on the market was maintained at that level in January 2015, then the implied MRP would be 8.29 per cent over the month.

Note that with respect to the historical MRP, the AER can also gain comfort from Lally's preference for the NERA adjustment over the Brailsford et al. adjustment.

2.7.7.2 Dividend Growth Models

Although the AER gives the most weight to data on the historical MRP, it also pays some attention to the output from its own dividend growth model (DGM). Table 2.6 presents the results from the AER's DGM, as reported in Appendix B.2 of the draft decision for Jemena Gas Networks.

Table 2.6: MRP estimates from the AER's dividend growth model, (with theta equal to 0.6)

Growth rate (per cent)[288]	2-stage model (per cent)	3-stage model (per cent)
4.0%	6.6%	7.0%
4.6%	7.2%	7.4%
5.1%	7.7%	7.8%

Source: AER, Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return; November 2014, Table 3-41, page 3-200.

285 Dimson, E., P. Marsh and M. Staunton, *Credit Suisse Global investment returns sourcebook 2015*, Credit Suisse, February 2015 page 61.

286 SFG Consulting; *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network,* Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 18th February 2015, paragraph 23, page 5.

In this DDM report, SFG has used an estimate of the risk-free rate over the January 2015 averaging period of 2.66 per cent. This value was sourced from RBA Table 2. In its final calculations for the return on equity, SFG used a value for the risk-free rate which was obtained using the data from RBA Table F16. The AER's interpolation method, when applied to the data from Table F16, delivers a risk-free rate value of 2.64 per cent.

287 AER; *Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return*; November 2014, Table 3-41 page 3-200.

288 AER; *Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return*; November 2014 page 3-200.

SFG Consulting has advised that the 7.8 per cent figure in Table 2.6 above should now be 8.71 per cent using current data on the risk-free rate.[289] An explanation is provided below.

SFG examined results from the AER's DGM as between the Rate of Return Guideline (Explanatory Statement) and the draft decision for Jemena Gas, and noted that there had been an increase in the required return on the market portfolio, across all scenarios, from the evaluations undertaken for the Guideline to the evaluations undertaken for the NSW draft decisions[290]. The increase in the required return on equity had been recorded notwithstanding the fall in the risk-free rate from the period when the analysis was conducted for the Guideline (October and November 2013) to the reference period used for the JGN draft decision (which was 17th September 2014 to 15th October 2014). The risk-free rate had declined from 4.20 per cent to 3.55 per cent over an interval of approximately 12 months. However, under one of the scenarios for the AER's DGM, the required return on the market had risen from 11.02 per cent to 11.35 per cent. As has been mentioned in the penultimate paragraph of section 2.7.7.1, SFG then postulated what would happen if the return to the market portfolio had been at the same level in January 2015 as in September and October 2014. Under the AER's high growth scenario, the AER's DGM would still be predicting a return to the market of 11.35 per cent, however with a lower risk-free rate of 2.64 per cent applicable in January 2015 (as assessed using the data from RBA Table F16), then the implied MRP would now be 8.71 per cent.

SFG prepared a graphical representation of the implications for the MRP of the AER's DGM, and the graph is reproduced below as Figure 2.3.

In commenting upon the findings of the AER's dividend growth model, SFG has exhorted the AER to take heed of the results of its own model:

> *"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"*[291].

In an earlier paragraph which remarked upon the same analysis of the AER's DGM results, SFG drew further attention to the problems inherent in the AER's mechanistic application of the SL-CAPM. The AER relegates the DGM to a very secondary role, and, in effect, actually ignores the output from its own model.

> *"Moreover, government bond yields have continued to fall since the recent draft decisions and averaged 2.64% over January 2015. If the AER were to maintain a market risk premium of 6.5%, there would be a further material fall in the allowed return on equity to 2.64%+6.5%=9.14%. This would represent a 14% fall in the allowed return on equity since the Guideline, when the only new evidence considered by the AER indicates that the required return on equity has increased. In our view, such an outcome would be devoid of all logic and is simply untenable. Indeed this highlights the fundamental problems with the mechanistic approach of adding a constant premium for risk to the contemporaneous risk-free rate that the AEMC sought to address with its rule changes."*[292]

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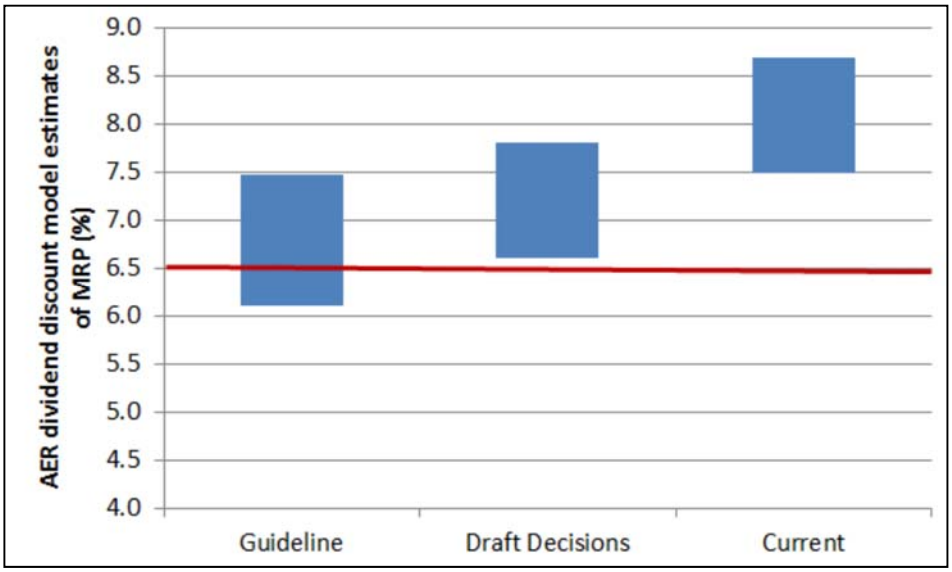
289 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015, Table 4 at paragraph 115. Note that Table 4 has been inadvertently mislabelled and should read "AER dividend discount model estimates of the MRP".

290 Ibid, Table 3 at paragraph 111.

291 Ibid, paragraph 116, page 25.

292 Ibid, paragraph 114, page 24.

Figure 2.3: Range of AER dividend discount model estimates of MRP



2.7.7.3 Survey evidence

In the Explanatory Statement for the Rate of Return Guideline[293], and in the NSW draft decisions, the AER has presented the results of surveys of the MRP, and has indicated that it intends to place some reliance on the survey information as part of its overall assessment of the MRP.[294] Table 2.7 below shows the survey evidence that the AER presented in the draft decision document for Jemena Gas Networks. There are fewer separate survey results mentioned in the table below than in a comparable table presented in the Explanatory Statement, Rate of Return Guideline, and so the AER has signalled that it intends to focus on a smaller pool of survey findings.

Table 2.7: Key findings from recent MRP surveys, as presented by the AER

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: AER, Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return; November 2014, Table 3-42, page 3-201.

Nevertheless, there are a number of significant problems with the data presented in Table 2.7. Surveys can be extremely unreliable and the surveys that the AER has been considering do not appear to have been conducted with the appropriate protections in place, such as those set out in the Federal Court guidelines for conducting surveys[295]. Certainly, United Energy's business was not consulted on the questions, and on

[293] AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, (Appendices), December 2013, (pdf version); Table D.5 page 92.

[294] AER; *Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return*; November 2014, Table 3-42 page 3-201.

[295] Federal Court of Australia, Practice Note CM13, Survey Evidence, 1st August 2011.

aspects of the survey's design, before the survey was administered to the participants. The Federal Court protocol stipulates that there should be appropriate consultation and agreement about the form of a survey. Since there was no consultation, and no agreement was reached, then the survey results should not be accorded any weight – particularly when there is an extensive range of more reliable evidence available.

United Energy, Multinet Gas and other businesses have drawn attention to the deficiencies of survey data in no less than five submissions prepared by NERA Economic Consulting however the AER has persistently failed to engage with the arguments.[296] A particular problem noted by NERA in a report on the MRP prepared in October 2013, is that survey respondents may be providing estimates of the MRP that are based on the geometric mean of a sample of annual returns to the market portfolio. There is a sound basis for this argument because Dimson, Marsh and Staunton (2013) place as much emphasis on geometric means as on arithmetic means and so it is quite possible that some survey respondents will supply what they know to be geometric means computed from past data.[297] However, the AER has been treating the numbers from surveys as though the values were representative of an arithmetic average. The use of such numbers is therefore in error.

2.7.7.4 Other Regulators

The AER has considered the values for the MRP that have been used by other economic regulators in Australia. The results of the AER's assessment are presented below in Table 2.8.

Table 2.8: Recent regulatory decisions on the MRP by jurisdictional regulators in Australia

Regulator	Decision date	Sector	MRP (per cent)
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 12th May 2014)
ERA	Jul 2013	Rail	6.0%
ESC	Jun 2013	Water	6.0%
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%

296 NERA, The Market Risk Premium, A report for Multinet Gas and SP AusNet, 29th April 2011, chapter 3, page 11.

NERA, The Market Risk Premium, A report for CitiPower, Jemena Electricity Networks, Powercor, SP AusNet and United Energy Distribution, 26th August 2011, chapter 4, page 19.

NERA, Prevailing Conditions and the Market Risk Premium, A report for APA Group, Envestra, Multinet & SP AusNet, March 2012; chapter 6, page 43.

NERA, *The Market, Size and Value Premiums*, a report prepared for the Energy Networks Association, June 2013; chapter 8, page 60.

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, section 3.3, page 33.

297 Dimson, E., P. Marsh and M. Staunton, *Credit Suisse Global investment returns sourcebook 2013*, Credit Suisse, February 2013.

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%

Source: AER, Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return; November 2014, Table 3-43, page 3-205.

With a few possible exceptions, the opinions expressed by other regulators about the MRP are generally of limited value when assessed against the evidence upon which United Energy and the other Victorian electricity distributors have relied. The analysis of primary information and data sources is of greater value, because the methods and results have been set out more clearly. The expert reports commissioned by United Energy have provided detail about the techniques that were employed, and have also provided justifications for the choices of methods. The reports have covered both the MRP and asset pricing models.

In contrast, the decisions of other regulators are generally less transparent, and may have been made using methods that are less robust, and data sources that are less comprehensive. In some instances, the judgements exercised by other economic regulators in Australia may have also have been subject to error. A further consideration is that other regulators may not take into account the impact on the MRP of the value of imputation credits. The AER has also referenced decisions made by other regulators at different times over the past three years, and those regulators would not have had access to the material that UE has prepared for the current electricity distribution price review (EDPR, 2016 to 2020).

Accordingly, a crude and unadjusted comparison between estimates of the MRP applied by the AER, and the values for the MRP determined by other regulators is of limited assistance to the current regulatory proceedings. United Energy cautions against the use of the results in Table 2.8.

2.7.8 The AER's flawed use of the reports from independent experts

NERA Economic Consulting has previously reported that the use of independent expert reports circumvents a number of the problems associated with survey evidence. In particular:

- Independent expert reports are typically made public and so it is not necessary to seek a response from each expert.
- Many transactions require that an independent expert report be produced.
- Independent experts face strong incentives to provide accurate responses.
- It is clear from independent expert reports how returns are measured, that is, whether returns are continuously compounded or not continuously compounded.
- Independent experts generally state whether they place a value on imputation credits.
- Independent experts generally state how they choose a value for the risk-free rate; and
- A time series of independent expert reports can be collected so that one can test propositions about the behaviour of expert assessments of the MRP through time.

The AER has reported that it makes use of return on equity estimates from valuation reports, broker reports and other regulators' decisions within the context of its overall assessment. Specifically, the AER has noted that the information from these sources plays a "directional role to inform movements in the overall return on equity".[298] In the draft decisions for NSW, the AER made use of a limited sub-sample of the available independent expert reports, and extracted information about the equity risk premium. The AER chose only a small number of valuation practitioner reports because of a misplaced belief that it should focus on reports that included a return on equity for companies that provided the closest proxy for the benchmark efficient entity.[299] The AER's position cannot be justified because, of course, WACC parameters such as the MRP and the risk-free rate are estimated on an economy-wide basis. The dividend growth model also captures all of the sectors of the economy. To add to the list of market-wide parameters, United Energy would include the zero beta premium used in the Black CAPM, and the Fama French premiums.

The AER concluded from its confined analysis that:

> *"The total risk premium from expert reports appears to have increased following the GFC, but also appears to be recently declining towards a level more in line with the total risk premium from this draft decision. However, caution should be exercised in drawing inferences from a small number of valuation reports"* [300].

Unsurprisingly, the AER urged that care be taken when interpreting the results from a small number of reports, though the AER did not note that the small number of reports was a direct consequence of the AER's own filtering criteria.

Incenta has examined the reasoning applied by the AER and has found it to be significantly wanting. The first issue concerns whether the Ibbotson inspired approach reflects current equity market expectations. In this regard Incenta reports the following:[301]

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298 AER; *Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return*; November 2014, Table 3-57 page 3-283.

299 Ibid, page 3-89.

300 Ibid, page 3-90.

301 Incenta Economic Consulting; *Further update on the required return on equity from Independent expert reports*, prepared 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, page 1.

> *"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."*

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 the manner in which its report has been interpreted and used by the AER, both in relation to the market risk premium and the equity beta used in the SL-CAPM, and in respect of broader issues such as whether in fact experts use the SL-CAPM.

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[302]:

> *"[O]ur approach … is to form an overall judgement as to a reasonable discount rate rather than mechanistically 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 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 to 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%)."*

The AER expressed concern about the transparency of Grant Samuel's methodology but Grant Samuel responded as follows[303]:

> *"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."*

The AER asserted that[304]:

> *"[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."*

However, Grant Samuel repudiated the AER's claim, commenting that[305]:

> *"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."*

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302 Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12 January 2015 page 4-5.

303 Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12 January 2015 page 6.

304 AER; *Draft decision Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20, Attachment 3: Rate of Return*; November 2014 page 93.

305 Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12 January 2015 pages 6-7.

And in a similar vein:[306]

> *"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."*

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

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

[306] Letter from Grant Samuel & Associates Pty Limited (Grant Samuel) to the Directors of Transgrid; 12 January 2015 page 7.

2.7.9 Inconsistent treatment of the imputation adjustment

In an accompanying document, United Energy discusses its approach to the gamma parameter, which represents the valuation of imputation credits.[307] An important consideration is the inter-relationship between the regulatory estimates of the required return on equity and gamma.[308] This relationship is most apparent in the AER's post-tax revenue model (**PTRM**). The PTRM requires the regulator's estimate of the with-imputation required return on equity. The model then removes the regulator's assumed value of imputation credits, leaving an estimate of the ex-imputation required return on equity. Thereafter, allowed revenues are 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 deliver the total required return on equity.

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 the MRP so that the AER's assumed value of imputation credits has been incorporated. For example, when implementing its DGM approach for estimating the 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 cash dividends.

Accordingly, 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.

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, United Energy 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.

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, then there is an internal inconsistency problem to be resolved.

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[307] United Energy, Assessment of the value of imputation credits: Proposal for 2016 to 2020, prepared by United Energy, April 2015.

[308] The AER has received submissions on this matter previously. Consider, for instance: The required return on equity: Response to AER Victorian Gas Draft Decisions, Report for APA GasNet, Envestra, Multinet and SP AusNet, prepared by SFG Consulting, 7th November 2012; Appendix 1: Consistency between cash flow and discount rate adjustments for gamma.

2.7.10 Summary

The AER's approach to establishing an allowed return on equity is ill conceived in almost every conceivable respect. Consequently United Energy departs from the Rate of Return Guideline in all respects other than the identification of the relevant models. United Energy's approach is described in the next section.

2.8 Rate of Return Allowance Proposed in Place of the AER Guideline

For all the above reasons, United Energy considers that the approach in the Guideline cannot appropriately be remedied through adjustments that correct isolated errors, and instead a new ground-up assessment of each of the inputs and the manner in which they are combined needs to be undertaken. SFG has conducted such an evaluation, in conjunction with a number of other expert advisers appointed by the regulated businesses. United Energy's proposal, described in the next section, is based on that work.

Instead of the approach adopted in the Guideline, United Energy proposes to establish a rate of return giving real weight to all of 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, and mentioned by the AEMC).
- Identifying the relevant evidence which can be used to estimate the parameters within each of the relevant return on equity models.
- Estimating model parameters for the return on equity models, drawing upon relevant market data and other evidence.
- Separately estimating the required return on equity using each of the relevant models.
- Synthesising the modelling results as a weighted average of the individual estimates with weights that will help to avoid over-apportioning or over-stating any of the key conceptual elements of the models.

2.8.1 Estimate the parameters for use within each of the four models

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 rate of return (for the Black-CAPM), or zero-beta risk premium.
- The market risk premium, together with premiums for high minus low (HML) and small minus big (SMB).
- An equity beta, an HML beta, and an SMB beta.
- An equity risk premium for comparable firms (as evaluated using the dividend discount model applied to utility stocks).

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

2.8.1.1 Risk Free Rate Averaging Period

When assessing the risk-free rate that is used to determine the cost of equity, United Energy accepts the approach proposed in the Rate of Return Guideline which is for the AER to select an averaging period of approximately 20 days, with the period itself falling as close as is practically possible to the commencement of the regulatory period. For illustrative purposes, the figures presented in this proposal have been calculated using a 20 business day period ending on 30th January 2015.

2.8.1.2 Required return on the market portfolio (or its corollary, the market risk premium)

The SL-CAPM, the Black CAPM, and the Fama French Three Factor model all make use of an estimate of the market risk premium (MRP). The return to the market portfolio minus the risk-free rate gives the MRP.

In the past, the AER has used the Ibbotson approach to the analysis of historical stock return data so as to derive an estimate of a long term average, unconditional MRP. Under the Ibbotson approach, the MRP is assumed to be constant over varying market conditions, and the required return on equity varies one-for-one with changes in the risk-free rate.

The Wright approach is an alternative method for using historical information on the return to the market portfolio. The method has been named after Professor Stephen Wright who examined the return on equity for the Victorian gas distributors in 2012[309]. To apply the technique, the expected real market return on equity is set equal to the historical average real market return, with the value then converted into nominal terms using prevailing expected inflation. The prevailing nominal risk-free rate is then deducted. It should be noted that Wright did not develop an alternative implementation of the SL-CAPM.

In advice prepared for the Queensland Competition Authority (QCA), Martin Lally has stated, with reference to the Wright method, that: [310]

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[309] Wright (2012), Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER, Professor Stephen Wright, Birkbeck, University of London, October 2012.

[310] Lally, M. (2013), Response to Submissions on the Risk-Free Rate and the MRP, prepared by Martin Lally, School of Economics and Finance, Victoria University of Wellington, 22nd October 2013.

> *"Relative to the Ibbotson methodology, this approach assumes that the expected real market cost of equity rather than the MRP is constant over time, and therefore will be superior to the Ibbotson approach if the expected real market cost of equity is more stable over time than the MRP."*

The dividend discount model (DDM), when applied on an economy-wide basis can be used to obtain an MRP estimate which is forward-looking. A further method for obtaining a contemporaneous value for the MRP is to make use of the results of an analysis of independent expert reports.

SFG has noted 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[311].

> *"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)."*

To suggest that the required return on equity would be lower during financial crises than during periods of economic expansion is counter-intuitive. The AER should take account of this finding when it considers how to best employ historical stock return data to inform estimates of MRP. In the Rate of Return Guideline, the AER used an historical average MRP figure which had been calculated using the Ibbotson approach, but placed no weight on MRP estimates that had been derived using the Wright approach[312]. In contrast, SFG has recommended that both methods should be applied because both provide relevant evidence.

The Guideline proposed that the AER would consider all of this material and determine an MRP using 'regulatory judgement'. The Guideline attempted to provide a worked example of MRP calculations as at December 2013, however, when assessing United Energy's proposal, the AER will not necessarily exercise judgment in the same way as it did in the Guideline. In summing up its assessment of the AER's use of MRP data, SFG Consulting reported as follows:

> *"[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)" [313].*

United Energy has, in broad terms, endorsed the method for assessing the MRP, which has been set forth by SFG in its two principal reports authored in 2014 and 2015[314]. The results for the MRP are presented below in Table 2.9. SFG makes use of four separate measures that have been evaluated as follows:

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311 SFG Consulting, The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks, 6 June 2014, paragraph 224 page 56.

312 The AER stated that it would employ the Wright approach to inform the selection of a point estimate of the expected return on equity from within the foundation model range. See:

AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, (Appendices), December 2013, (pdf version); page 26. Table D.5 page 92.

313 SFG Consulting, *The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks*, 6 June 2014, paragraph 157, page 44.

314 SFG Consulting, The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks, 6 June 2014.

SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015.

- An historical MRP which has been calculated as an arithmetic average of excess returns to the market portfolio, assessed over the period from 1883 to 2013. SFG (2015) has made use of the figures from NERA (2015) [315]. The MRP estimate obtained, of 6.56 per cent, is an unconditional mean.

- The Wright approach, which, as discussed earlier, presumes that the real return required on equity is constant across different market conditions. The real return to the market portfolio was combined with a measure of inflation expectations, to provide a figure for the nominal return on the market (11.64 per cent). The implied MRP, using the risk-free rate from the January 2015 averaging period, was therefore 9.00 per cent.

- The DDM estimates of the MRP were drawn from a current application of the SFG (2015) endogenous growth model[316]. SFG (2015) used a market-wide variant of their model to estimate the expected return over a two month period from November to December 2014. The result obtained from the model was 11.37 per cent, after grossing up the return by the value of imputation credits (with gamma equal to 0.25). The implied MRP was worked out to be 8.73 per cent, with a risk-free rate of 2.64 per cent; and

- In relation to the results from independent expert (valuation practitioner) reports, SFG (2014) set the estimate of the MRP conservatively at 6 per cent. This figure has to be transformed into an estimate of the nominal return on the market (8.64 per cent), which can then be grossed up for the value of imputation credits by applying the level perpetuity method. The result for the nominal return on the market, inclusive of the value of imputation credits, is then 9.57 per cent, which implies a transformed value for the MRP of 6.93 per cent. An important point to note is that in determining the result for the grossed up MRP, SFG did not make any adjustments to the return on the market to take account of the uplift factors that are often applied by valuation practitioners. In contrast, NERA Economic Consulting, which examined 142 independent expert reports in 2013, sought to fully incorporate the impact of the alterations that were often made by valuation practitioners[317]. NERA (2013) found that valuation practitioners sometimes made upward adjustments to the risk-free rate so as to lift the WACC that they were computing. In other instances, the final cost of capital was revised by practitioners, but information was not provided as to how the revisions had been made, although there was no evidence that changes had been made to the cost of debt.

For the different estimates of the MRP, SFG (2014) devised a weighting method to be applied, the basis of which can be explained as follows:

- A 50 per cent weight was allocated to the forward-looking DDM estimate, with the remaining 50 per cent weight given to the three approaches that are based on historical averages.

- Equal weights were assigned to the Ibbotson and Wright approaches for processing the historical market return data, because the two approaches represent two ends of a spectrum in relation to the processing of that data; and

- A share was also given over to the results from independent expert valuation reports, noting that the MRP estimate (of 6.93 per cent) was conservative because it had not been influenced by any uplift factors or adjustments to the historically low risk-free rate.

The weighted average result for the MRP was determined to be 8.17 per cent, and this value was used by SFG (2015) in a number of asset pricing models, although not in the DDM.

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315 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.

316 SFG Consulting; *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network,* Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 18th February 2015; section 2.3, page 8.

317 NERA (2013), *The Market, Size and Value Premiums*, a report for the Energy Networks Association, prepared by NERA Economic Consulting, June 2013; section 8, page 65.

Table 2.9: Estimates of the required return on the market and the MRP (per cent)

Method	MRP (per cent)	Required return on the market (per cent)	Weighting (per cent)
Historical excess returns (Ibbotson approach)	6.56%	9.20%	20%
Historical market returns (Wright)	9.00%	11.64%	20%
Dividend discount model	8.73%	11.37%	50%
Independent expert valuation reports	6.93%	9.57%	10%
Weighted average	8.17%	10.82%	100%

Source: SFG, The required return on equity for the benchmark efficient entity, prepared by SFG Consulting, 25th February 2015. See Table 5.

Note: Risk-free rate of 2.64 per cent for January 2015. Gamma set to 0.25, theta to 0.35. The calculation methods and justification for the weighting scheme are set out in SFG, The required return on equity for regulated gas and electricity network businesses, prepared by SFG Consulting, 6th June 2014.

The other inputs suggested in the Guideline were not used because there are no reliable surveys upon which to rely and the recycling of past regulatory decisions does not provide any additional insight into prevailing market conditions.

2.8.1.3 Equity beta

United Energy considers that the reduction in the equity beta from 0.8 to 0.7, as proposed by the Rate of Return Guideline is incorrect. SFG consulting has stated that if a beta estimate of 0.7 is inserted into the SL-CAPM, then the particular model will not produce an estimate of the required return on equity that is commensurate with the efficient financing costs and degree of risk of a benchmark efficient entity. The reasons set out by SFG have been presented here[318]:

> *"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:*

[318] SFG Consulting, *Equity beta*, *Report for Jemena Gas Networks, ActewAGL and Networks NSW,* 12 May 2014, paragraph 10, pages 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 …"

In addition, the AER's modelling of the equity beta is flawed because the sample of domestic comparator firms is too small, while the AER has been reluctant to impose the Vasicek correction method, notwithstanding that Vasicek beta estimates have been shown to have superior empirical performance to raw OLS beta estimates.[319] Furthermore, the use of results from water utilities introduces circularity because the regulatory estimates of beta for water utilities are themselves based on regulatory estimates of beta for energy networks. The AER has also not made a genuine attempt to incorporate the equity betas from international comparators so as to improve the reliability and precision of its overall result. There is a large sample of international energy networks for which data is available.

SFG compiled beta estimates (re-levered to 60 per cent) for nine domestic firms (five of which are currently listed), and 56 international energy network businesses, and thereafter ascertained that the best available estimate for the equity beta is 0.82[320] United Energy submits that the most appropriate estimate for the equity beta is 0.82, drawing on the following reasoning provided by SFG Consulting[321]:

"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."

The AER's consultant concludes that:

"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"[322].

The AER's selection of a point estimate for the equity beta of 0.7 is not underpinned by firm empirical evidence.

2.8.1.4 Return on a zero beta asset

An asset with a zero beta has no systematic risk. SFG has derived an empirical estimate of the zero beta premium by running a regression of portfolio returns on two independent variables, namely (1 – portfolio beta) and (portfolio beta × the market return)[323]. The estimation technique therefore relied on the following core variables: Stock returns, government bond yields, market capitalisation, book-to-market ratio and industry classification. The value of the zero beta premium obtained was 0.239 per cent over four weeks, or 3.34 per cent per annum. SFG used 20 years of returns information from 1994 to 2013, with data sourced from the

319 SFG Consulting, *Equity beta*, *Report for Jemena Gas Networks, ActewAGL and Networks NSW,* 12 May 2014, paragraph 49, page 12.

320 SFG, 2013, *Regression-based estimates of risk parameters for the benchmark firm*, 24th June 2013.

321 SFG Consulting, *Equity beta*, *Report for Jemena Gas Networks, ActewAGL and Networks NSW,* 12 May 2014, paragraph 195, page 42.

322 Henry O, University of Liverpool Management School; *Estimating β: An update*; April 2014, page 63.

323 SFG Consulting; *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, paragraph 100, page 27.

World Scope database which is provided by Datastream (Thomson Reuters). A large sample of listed and formerly listed stocks was brought to bear in the analysis.

An important aspect of the method employed by SFG is that the authors formed portfolios of stocks that had approximately the same industry composition, market capitalisation and book-to-market ratio. In other words, portfolios of stocks were formed by sorting firms according to size (market capitalisation), as well as book-to-market characteristics (book-to-market refers to the ratio of the book value of the stock to its market value). SFG also sought to maintain an even industry composition across portfolios.

Therefore, the authors were able to isolate the relationship between stock returns and beta estimates in a way that was largely independent of other characteristics of stocks that might affect stock returns.

SFG made pragmatic choices, and so the zero beta premium that was produced is suitable for regulatory purposes. The total return to a zero beta stock can be formed by adding the estimated zero beta premium (of 3.34 per cent) to the risk-free rate (of 2.64 per cent, over the January 2015 averaging period). Thus, the overall return on a zero beta asset is 5.98 per cent over the relevant reference period.

A detailed treatment of this matter is not warranted in this document because of the comprehensive coverage provided by SFG Consulting[324].

2.8.1.5 Fama-French Model market exposure, SMB and HML factors

The Rate of Return Guideline does not apply the Fama-French Model, and so there is no relevant departure from the Guideline in relation to the Fama French premiums and the Fama French betas.

SFG evaluated Fama French premiums for Australia and also for the USA. The Fama French betas (or risk coefficients) for Australia were calculated for 9 comparable firms, while the Fama French betas (or risk coefficients) for the USA were estimated for the 56 comparable firms.

When amalgamating the results for Australia and the USA, SFG took care to ensure that the results which were combined were the product of the individual betas and the premiums. In other words, the Australian and USA results were combined at the level of (s × SMB) and for (h × HML) rather than at a more disaggregated level. In addition, the weight given to each Australian result was twice the weight given to each result from the USA.

The empirical work undertaken by SFG Consulting has produced the following estimates for the three relevant Fama-French Model factors:

- A market exposure of 6.33 per cent. This variable is worked out as the product of the market beta estimate in the Fama-French model (which is 0.78) and the best estimate of the Australian market risk premium, which is 8.17 per cent.
- The exposure to the size factor, meaning the product of (s × SMB), is -0.19 per cent; and
- The exposure to the book to market factor which is the product of (h × HML) is equal to 1.15 per cent.

The report by SFG Consulting fully substantiates these figures[325]. In addition, from the values presented above, the sum of the risk premiums from the Fama French Three Factor model is 7.29 per cent. To this amount, the risk-free rate is added, giving a cost of equity of 9.93 per cent. The latter value, being the cost of

[324] SFG Consulting; *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.

[325] SFG Consulting; *The Fama-French Model*; Report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA Power Networks; 13 May 2014.

equity from the Fama French model, when the best estimate of the MRP is used, is reported in Table 6 of the SFG (2015) report on the overall cost of equity[326].

2.8.1.6 Risk premium for use in the DDM

The SFG dividend discount model was used to obtain specific information about the required return on the market for listed energy stocks. As has been reported in SFG (2015, DDM), the sample of firms used was the same as that employed by the AER for the purpose of evaluating the equity beta[327]. However, the DDM is not as susceptible to some of the shortcomings which afflict the estimation, using historical data, of equity betas. The empirical work made use of analyst projections for the two months ending in December 2014.

SFG (2015, DDM) compared the forecast return on equity for the nine listed energy networks with the broader, market-wide return, and found that the implied risk premium ratio was 0.94. The risk premium ratio is the listed network risk premium estimate, relative to the market risk premium estimate[328]. The value of 0.94 gives the same cost of equity as would the use of a beta estimate of 0.94 in the SL-CAPM.

Consequently, SFG Consulting has estimated the risk premium for relevant comparable firms at 94% of the overall market return.

Note that in Table 2.10 below, the ratio of 0.94 is the only result that was taken from the DDM. The value of 0.94 was actually used in conjunction with the weighted average market risk premium of 8.17 per cent from Table 2.9, thereby giving an equity risk premium, inclusive of a value assigned to imputation credits, of 7.68 per cent.

326 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015; paragraph 49, page 8.

327 SFG Consulting; *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network,* Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 18th February 2015; section 5.4, page 30.

328 Ibid; section 2.3, page 8.

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

The parameter estimates from the individual models can be put together to produce return on equity estimates. SFG Consulting obtained estimates for the four models using the indicative averaging period which spanned the 20 days to 30th January 2015[329]:

- SL-CAPM: 9.32 per cent.
- Black-CAPM: 9.93 per cent.
- Fama French Three Factor model: 9.93 per cent.
- DDM: 10.32 per cent.

On the basis of the figures presented above, the return on equity for United Energy is 9.95 per cent.

329 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015, page 35.

2.8.3 Weighted average of all four models

United Energy is steadfast in its belief that the approach to establishing the return on equity that is set out in the Rate of Return Guideline is not consistent with the NER, and is not capable of delivering the best possible estimate of the required rate of return for equity. In particular, United Energy is concerned that the over-arching framework for the return on equity that is described in the Guideline does not meet the requirement of the new Rules that regard must be had to "relevant estimation methods, financial models, market data and other evidence".

Accordingly, United Energy does not agree with the approach in the Guideline that an estimate for the return on equity that is in compliance with the NER can be generated using the SL-CAPM as a "foundation model" (or indeed any foundation model). United Energy submits that there are three methods that are preferable to the AER's "foundation model" approach, and are consistent with the NER. These methods include:

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.

2.8.3.1 Weighting the four relevant equity return models

Specific weighting for each model

United Energy considers that the use of the SL-CAPM to constrain estimates of equity returns undermines the capacity of the Black-CAPM and DDM models to exert an impact on the return on equity. In other words, the AER's foundation model method does not permit proper regard to be had to the output from those models. UE believes that the Fama French Three Factor model provides an insight into equity returns, and so the results from that model should be brought into overall calculation.

The outcomes of the empirical assessments performed by NERA would justify a policy of giving no weight to the return on equity results from the SL-CAPM when determining the overall rate of return on equity for regulatory purposes.[330] However, following advice from SFG about the capacity of a certain group of asset-pricing models to contribute to the overall rate of return objective, UE has decided that the SL-CAPM should not be eliminated from consideration altogether. UE has adopted a weighting scheme for model results which was devised by SFG Consulting, and which is described further below. The weight ultimately accorded to the outputs from the SL-CAPM is low but is non-zero.

SFG (2014, ROE) has explained the rationale for its return on equity weighting scheme in the following broad terms[331]:

- A 25 per cent weight is applied to the dividend discount model, with 75 per cent then remaining for the three asset pricing models.
- Of the 75 per cent weight that has been made available for asset pricing models, approximately half (37.5 per cent) has been earmarked for the Fama French model, and half to the CAPM (37.5 per cent). Thus, an equal weight has been assigned to the possibilities that either a reliable estimate of

330 NERA; *Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy*; February 2015, Table 5.4, page 42.

331 SFG Consulting, *The required return on equity for regulated gas and electricity network business,* Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks, 6 June 2014, paragraph 26, page 9.

required returns for exposure to the HML factor is available, or that the estimate of required returns for exposure to the HML factor is over-stated[332].

- The total weight that can be applied to the CAPM is 37.5 per cent. In the context of practical application, the essential difference between the two forms of CAPM is in respect of the value of the intercept term on the y-axis. The same values of beta and of the required return on the market are used for both models. The Black CAPM uses an empirical estimate of the intercept, which has been selected to provide the best possible fit to the observed data. The S-L CAPM uses a theoretical lower bound for the intercept, which is that the intercept cannot possibly be lower than the risk-free rate. SFG (2014, ROE) applied twice as much weight to the Black CAPM as to the S-L CAPM precisely because, in the case of the former model, the intercept term is empirically determined.

SFG (2014, ROE) has reported that the final estimate of the required return on equity is relatively insensitive to the proposed weighting scheme.

United Energy believes that the SFG weighting scheme represents the best of the currently available approaches for combining the results from different models. On that basis, and drawing upon the SFG results for the individual models, the single point estimate for the required return on equity is 9.95 per cent[333]. The return on equity is in respect of the January 2015 averaging period because the asset pricing models were, to the extent possible, calibrated and "operated" so as to give estimates which were current for that month.

Equal weighting to each model

An alternative, but less satisfactory approach from the perspective of United Energy would be to give all of the models an equal weight. Indeed, to rank the SL-CAPM equally with other models would suggest that no consideration was being given to the results from asset pricing model tests. The poor performance of the SL-CAPM when it has been subjected to empirical testing has been discussed in sections 2.5.2 and 2.7.5 of this submission document.

If an equal weight were given to each of the four models, then the resulting estimate for the return on equity would be 9.87 per cent[334].

Use of parameters within the SL-CAPM

As has been mentioned in section 2.7.5, the SL-CAPM is flawed because it has very weak explanatory power (i.e. there is, at best, a very weak association between observed returns and betas). A related consideration is that the SL-CAPM produces downwardly biased estimates of the rate of return on stocks with an equity beta of less than 1.0, largely because the model assumes that there is a risk free asset, and that investors can borrow or lend freely at the risk free rate.

NERA has reported that the SL-CAPM tends to underestimate the mean returns to low beta assets, value stocks, and, in the USA and some other countries, low-cap stocks[335].

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332 In the Fama-French three factor model, the HML factor is measured as the difference in returns to a portfolio of stocks with a high book-to-market ratio for equity, compared to a portfolio of stocks with a low book-to-market ratio for equity.

333 SFG Consulting; *The required return on equity for the benchmark efficient entity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy; 25th February 2015, table 6, page 35.

334 Ibid; table 7, page 35.

335 NERA (2015), *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, prepared by NERA Economic Consulting, March 2015; page 9.

The Black-CAPM in particular addresses the issue of the bias for low beta assets, whereas the Fama French Three Factor model addresses the matter of the bias for value assets. The DGM draws upon contemporaneous information and forecasts of stock prices to produce forward looking estimates of the return on equity. SFG has estimated betas and premiums for the Fama French three factor model, for both Australia and the USA[336].

United Energy thereby submits that if the SL-CAPM is to be used to the exclusion of the other models, then the appropriate parameter estimates to factor in to the model are:

- the weighted average of the betas is 0.895; and
- the required return on the market to be 10.81 per cent.

Accordingly, if the risk-free rate is 2.64 per cent, the equity beta for the stock is 0.89, and the overall required return to the market portfolio of 10.81 per cent, then the result for the required return on equity for the benchmark efficient entity will be 9.95 per cent. The SL-CAPM will deliver this result using the parameter estimates as shown.

[336] SFG Consulting; *Using the Fama-French model to estimate the required return on equity*, Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy, 13th February 2015, Table 1, page 27.

2.9 Establishing a real allowed rate of return

2.9.1 The evolution of the AER's method for forecasting inflation

Clause 6.4.1 of the National Electricity Rules specifies that the AER should prepare and publish a post-tax revenue model (**PTRM**), which is used to establish the revenue allowance for each year of the regulatory period. Under clause 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"*

The Rate of Return Guideline does not explain how the AER proposes to determine the rate of inflation, and instead leaves that issue to be resolved in each individual revenue determination.

Up until 2008, the AER had been using the "break-even" method for preparing inflation forecasts, which meant that it was comparing the yields on nominal Commonwealth Government Securities (CGS) with the yields on Treasury indexed bonds, and applying a Fisher equation transformation. However, in its final decision for SP AusNet transmission, in January 2008, the AER chose to adopt a different method, which was ostensibly based on forecasts of inflation from independent providers. The AER noted in the determination that[337]:

> *"In the absence of a robust market based estimate, the AER agrees with SP AusNet's emphasis on independent forecasts in its revised proposal. However, the AER considers that more regard should be given to inflation forecasts from the RBA than those available from the various forecasters cited by SP AusNet and NERA, as the RBA is responsible for monetary policy in Australia, and its control of official interest rates and commentary has a significant impact on both outturn inflation and inflation expectations. In its latest Statement on Monetary Policy the RBA forecast inflation to be 3% in the 12 months to December 2008, and 2.75-3% in the 12 months to December 2009. The AER considers the RBA's forecasts represent the best estimates of forecast inflation for these two years. The RBA does not release inflation forecasts beyond a two year period."*

And:

> *"In the absence of a reliable market based estimate, and acknowledging the difficulty of forecasting inflation beyond the short term, the AER considers 2.5% to be a reasonable estimate of inflation beyond the RBA's forecast period. Averaging the RBA's forecasts for 2008 and 2009 with 2.5% for the remaining 8 years produces a 10 year inflation forecast of 2.59%....."*

In almost every regulatory decision since 2008, the AER has adopted a projection for inflation which is at or close to 2.5 per cent.

The AER's approach to preparing inflation forecasts makes use of the following steps[338]:

- Draw upon the near term projections for inflation from the latest available version of the RBA Statement on Monetary Policy. Use the results from the Statement for underlying inflation to produce inflation forecasts for the next two years.
- For year 3 to year 10, insert a value of 2.5 per cent in the corresponding cells of the AER's inflation forecasting template. The value of 2.5 per cent is the mid-point of the range for inflation targeting that is used by the RBA.

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337 AER (2008), Final Decision, SP AusNet transmission determination, 2008-09 to 2013-14, January 2008; pages 103 to 104.

338 See, for instance: AER, Final Distribution Determination, Aurora Energy Pty Ltd, 2012–13 to 2016–17, April 2012.

- The values of the inflation forecasts for the individual years are transformed into an index, with a value of 100 being assigned to the year preceding the current year.
- A geometric mean is then fitted to the entire series, making use of the ultimate value of the index in the final year out of ten years (or 11 years, if the immediately preceding year is also counted).

The forecast rate of inflation is an important variable in the AER's post-tax revenue model (PTRM). Other things being equal, the higher is the forecast of inflation that is used in the PTRM, the lower will be the real return on capital that is modelled, and for which compensation is provided. The lower real return is manifested as higher positive X-factors that are produced as an output from the PTRM (a positive X-factor implies a real decrease in prices).

The AER has, in effect, adopted a ten year tenor for its inflation forecasts. The ten year horizon is not appropriate in circumstances in which there are significant differences between expected inflation at the 5 and 10 year tenors.

The escalators that underpin the cost components which enter the PTRM are generally prepared with respect to a medium term horizon of five years. The relevant cost escalators are those used for labour and materials costs. The escalators underpin the projections, in nominal terms, of the components of operating expenditure and/or capital spending. Forecasts of the cost escalators, and of the operating and capital expenditure components themselves, are generally only provided for the next five years. The relevant cost build-ups are not available for a more extended time horizon.

CEG (2015c) has reported that an estimate of expected inflation that is used as an input into the PTRM should be calculated as a weighted average of expected inflation measured at five and ten year tenors, where the weights given to the five and ten year tenors should match the shares given to debt and equity finance respectively[339]. The use of the results, at different tenors, for expected inflation would be appropriate in the PTRM, in its current form.

According to CEG (2015c), the trailing average rate of return on debt, as measured under the rate of return guideline, represents the payments made on a series of contracts that have been entered into through time for fixed nominal amounts. The values of the nominal payments will vary from year to year, and can be estimated by considering the outstanding value of debt contracts at different terms to maturity. However, the historical nominal payment schedules do not change with forward-looking inflation expectations. The expected real cost of the payments in any year of the regulatory period is given by the nominal value of payments in that year deflated by the value of accrued inflation up until that time. Thus, the relevant term over which to estimate inflation is the five year regulatory period.

Ordinarily, the promised yield on debt, or the nominal cost of debt that is issued at any time will be representative of forward-looking inflation expectations. However, the payments on a staggered portfolio of debt issued historically do not vary with changes in the prevailing expected inflation rate.

In contrast, the return on equity is evaluated as forward-looking variable, as has been acknowledged by the AER in its rate of return guideline. An extended horizon is adopted for measurement, with the relevant time frame generally being ten years[340]. Consequently, at a point in time, the nominal cost of equity estimated by the AER represents the real cost of equity at a 10 year horizon plus expected inflation over that 10 year horizon. In order to produce a correct and internally consistent real cost of equity, the nominal cost of equity should be deflated by using a forecast inflation rate that has been measured over the same time horizon (that is, ten years). Equity investors are interested in earning a real return after inflation, and a business must offer equity investors an appropriate real rate of return.

The nominal cost of equity that has been estimated by the AER in respect of a particular averaging period represents the real cost of equity over a ten year horizon, plus expected inflation over that ten year horizon. In order to produce a correct and internally consistent real cost of equity, the nominal cost of equity should be

339 CEG (2015c), Measuring risk free rates and expected inflation, a report for United Energy, prepared by Dr Tom Hird, Competition Economists Group, April 2015.

340 AER, Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; section 6.3.5, page 97.

deflated by using a forecast inflation rate that has been measured over the same time horizon (that is, ten years).

United Energy does not believe that the AER's method is producing an optimal and reliable forecast for inflation at the present time. The allowed rate of return (which is the subject of this regulatory proposal, and, ultimately, of the regulatory determination) is an input into the post-tax revenue model (PTRM), which, itself is the subject of a separate regulatory decision-making process under clause 6.4.1 of the NER. The outputs of the PTRM are used for the determination of prices in accordance with the regulatory requirements. If the inflation rate assumptions in the PTRM are flawed, then a rate of return allowance, which is otherwise correct, will result in the business being over or under-compensated for the capital that it has invested, by comparison with the outcomes that would be recorded for a benchmark efficient firm earning market returns. In current circumstances, the application of the PTRM with an inflation forecast of 2.5 per cent, which is the value typically used by the AER, has the effect of depressing the returns of the regulated firm relative to fair market returns. There are two reasons for such an outcome:

- As has already been discussed, there is ample evidence that market participants currently anticipate lower rates of inflation. A further consideration of inflation expectations is provided in CEG (2015c).
- The PTRM is not currently structured to allow separate tenors for the inflation forecasts used respectively for the cost of debt and the cost of equity.

An appropriate way to address these matters would be to make amendments to the PTRM pursuant to clause 6.4.1(b) of the NER[341]. Pending an amendment to the PTRM, United Energy's proposal adopts the AER's approach to inflation consistent with the current version of the PTRM. In doing so, United Energy does not concede that the current version of the PTRM is correct in this respect. If these issues are not adequately addressed in the context of an amendment to the post tax revenue model, then United Energy reserves its position to potentially make compensatory adjustments as part of its revised rate of return proposal. The revised proposal will be lodged in the context of the revocation and substitution process which will take place subsequent to the preliminary determination.

2.9.2 Further perspectives on inflation

Recent developments in financial markets suggest that a re-appraisal of the AER's approach to developing inflation forecasts is now warranted.

In principle, the most direct and accurate way to set a rate of return allowance that is commensurate with the prevailing costs of a benchmark entity is to use market prices that are either directly observed from financial markets, or else can be inferred from financial markets. Prior to 2008, the inflation figure used to adjust the regulatory asset base (and, thereby, indirectly to apply a real rate of return in place of a nominal rate of return) was indeed drawn from financial markets. As was mentioned in section 2.9.1, the Fisher equation was used to compare the yields on Treasury fixed rate bonds with the yields on Treasury indexed bonds, and to thereby infer an inflation rate which was consistent with market expectations.

However, between 1995 and 2008, there was a marked reduction in the volume of all CGS on issue. There are some investor classes for which adequate substitutes for CGS were not available, and there was a belief in the market that observed yields on CGS might have been affected by that scarcity. However, since 2008, the volumes of CGS on issue have increased significantly, both in dollar terms and as a proportion of GDP.[342] Figure 2.4 and Figure 2.5 provide a perspective on Australian Commonwealth Government debt, with the figures, and, indeed, the charts, having been sourced from the Australian Office of Financial Management.

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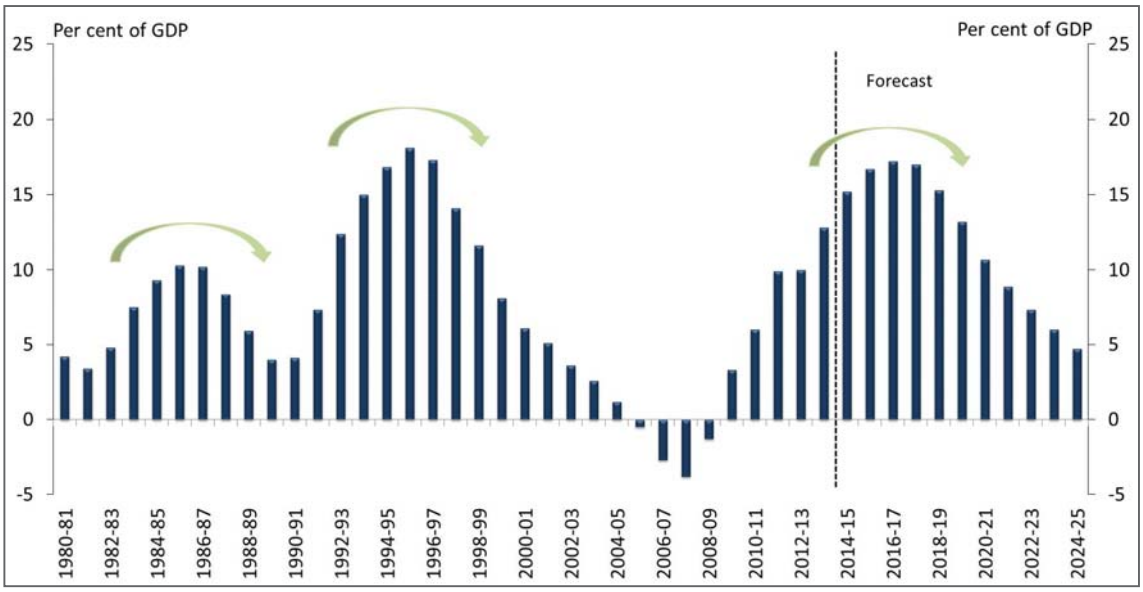
[341] United Energy has previously written to the AER about a deficiency with the PTRM insofar as it presumes that imputation credits can be paid out even in circumstances in which there are no cash dividends available for distribution. Email correspondence from Jeremy Rothfield, United Energy, to Kenny Yap, Australian Energy Regulator, 2nd February 2015. See also section 14.4 of the main regulatory proposal from United Energy.

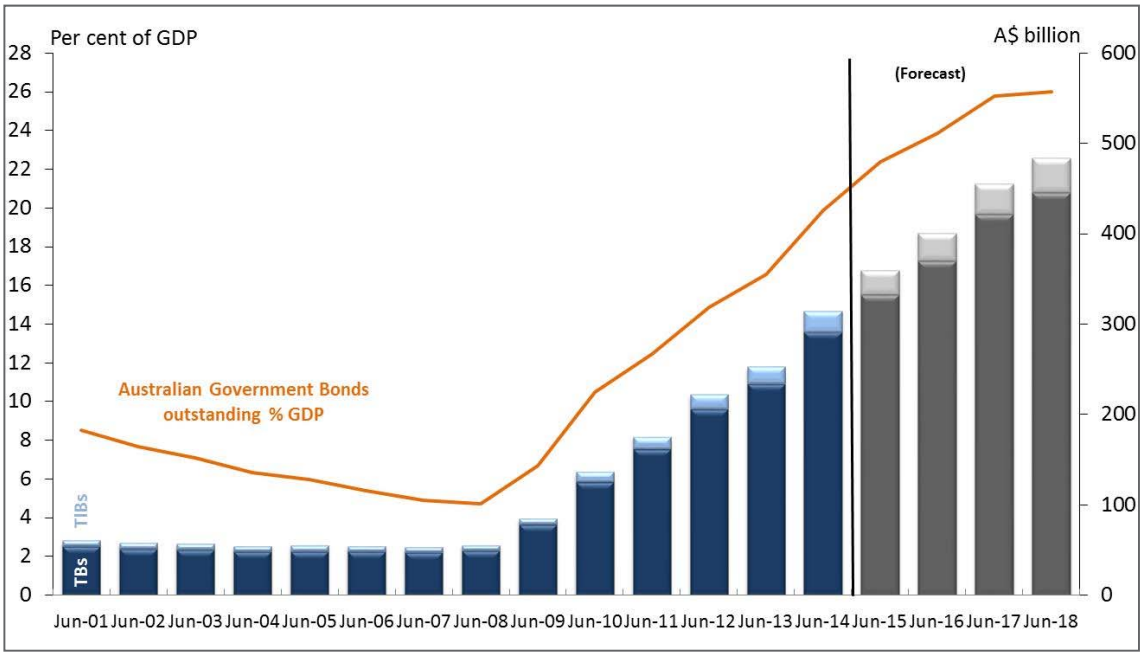
[342] Australian Office of Financial Management; Investor Handout; December 2014, page 14.

Figure 2.4: Australia's net debt position



The value of indexed CGS on issue has increased from approximately $6 billion in 2009 to $18 billion in 2013[343]. Furthermore, the outstanding stock of CGS is not expected to diminish at all over the regulatory period[344].

Figure 2.5: Australian Government Bonds on issue



Consequently, there is no longer a presumption in favour of the use of third party forecasts of inflation in place of the implied inflation measure that is provided by financial markets.

343 Australian Office of Financial Management; *Investor Handout*; December 2014; page 14.

344 Australian Office of Financial Management; *Investor Handout*; December 2014; page 16.

The April 2015 issue of the World Economic Outlook publication from the International Monetary Fund incorporates a discussion of Australia in the commentary on the Asia-Pacific region. The IMF reports that its forecast for economic growth in Australia of 2.8 per cent in 2015 is broadly unchanged from the predictions that the IMF made in October 2014. The IMF reports that lower commodity prices and resource-related investment will be offset by supportive monetary policy and a somewhat weaker exchange rate[345]. In addition:

> *Exporters of commodities (Australia, Indonesia, Malaysia, New Zealand) will see a drop in foreign earnings and a drag on growth, although currency depreciation will offer some cushion. Headline inflation — already on a downward trend on cooling growth and stronger trade-weighted exchange rates — is expected to moderate further as the recent oil price decline is felt at the pump, although core inflation has eased only modestly.*

In further comments about the outlook for consumer prices, the IMF warned of the possibility of a structural change in inflation expectations in Australia:

> *Monetary policy should not respond to the decline in headline inflation from the drop in oil prices. However, loosening is called for if the effect of lower oil prices is transmitted to core inflation or inflation expectations. To date, moderating prices are apparent only in narrow categories of the consumer basket. However, in economies in which output gaps are currently negative (Australia, Japan, Korea, Thailand), policymakers may need*
>
> *to act to prevent a persistent decline in inflation expectations.*

The comments from the IMF are corroborated by the trends in the market indicators in Australia that are normally used as a gauge for perceived inflation. In particular, the yields on nominal Commonwealth Government Securities (CGS) have fallen faster than the real yields on index-linked bonds over the latter part of 2014, and early in calendar year 2015. Hence, the estimated rates for break-even inflation have also diminished, over the same time interval. The data on inflation swaps seems to be exhibiting similar trends. The five year tenor, 5-year forward real yields that are implied by inflation swaps have generally followed the trajectory of nominal yields, but diminished by less over 2014.

A market update paper from the Reserve Bank of Australia has confirmed the view that expectations for inflation have fallen considerably across the Australian economy[346]. The RBA has further reported that:

> *The sharp decline in oil prices has certainly reduced near-term inflation expectations as most advanced economies are net oil importers. But this would only account for a decline in inflation expectations in the short term. A substantial decline in medium-term inflation expectations is more difficult to explain. Survey-based inflation expectations from market economists and consumers do not appear to have declined substantially over the same period. It is also worth noting that the decline in longer-run inflation expectations over the past six months is not a universal phenomenon – Australian breakeven rates were broadly flat over the second half of 2014 (and consistent with the RBA's inflation target).*

For January 2015, United Energy can report that the implied break-even inflation rate over a five-year horizon was 1.778 per cent. This figure has been calculated as an average across 20 business days. The implied break-even inflation over a ten year forecast horizon was 2.207 per cent. These values have been determined by comparing the yields, at tenors of 5 and 10 years, between treasury bonds and treasury indexed bonds. The comparison was undertaken using the Fisher equation.

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345 IMF, World Economic Outlook, Uneven Growth, Short and Long-Term Factors, International Monetary Fund, Washington, April 2015; page 14.

346 RBA (2015), Global and Domestic Influences on the Australian Bond Market, a speech delivered by Guy Debelle, Assistant Governor (Financial Markets). Presented at the Kanga News Debt Capital Markets Summit 2015, Sydney; 16th March 2015.

The report from CEG (2015c) on measuring risk-free rates and expected inflation recommends that the break-even method be applied:[347]

> *In [the current] context, the assumption implicit in the AER methodology that investors believe that inflation will be 2.5% beyond 2 years is not reasonable. The best assumption is that investors perceive a greater risk of underperforming relative to the RBA's midpoint than over-performing. In this context I regard break even inflation from the CGS market provides the best estimate of expected inflation.*

CEG has also advised that inflation swaps do not provide a satisfactory option at this time. This is because a premium is paid for the additional hedging activity in which swap dealers must engage. The premium is, in effect, payable on top of the break-even inflation rate[348]:

> *In my view, implied inflation from swap markets at long maturities should be treated with caution. This is because the inflation swap market is one-sided in the sense that there is more demand for the fixed leg of an inflation swap than the floating leg. That is, there are more investors wanting to hedge long-term inflation than who want to be exposed to long term inflation (by taking on floating rate exposure).*

In any event, a relevant consideration is that breakeven inflation and CPI swaps are both predicting that inflation will be at or below 2.5 per cent for the next 5 years – such that average inflation over the next 5 years is well below 2.5 per cent.

[347] CEG (2015c), Measuring risk free rates and expected inflation, a report for United Energy, prepared by Dr Tom Hird, Competition Economists Group, April 2015; paragraph 82.

[348] Ibid; paragraph 79.

2.10 Conclusion

The models and model outputs that are used to formulate United Energy's proposed return on equity for each regulatory year are shown below in Table 2.10. The values that are used to establish the market risk premium were presented earlier in Table 2.9.

Table 2.10: Estimates of the required return on equity for a benchmark efficient entity

	Risk free component (per cent)	Equity risk premium (per cent)	Cost of equity (per cent)	Weight (per cent)	Implied SL beta
S-L Capital Asset Pricing Model	2.64%	6.68%	9.32%	12.50%	0.82
Black Capital Asset Pricing Model	2.64%	7.29%	9.93%	25.00%	0.89
Fama and French Model	2.64%	7.29%	9.93%	37.50%	0.89
Dividend discount model	2.64%	7.68%	10.32%	25.00%	0.94
Overall cost of equity	2.64%	7.31%	9.95%	100.00%	0.89

Source: SFG, The required return on equity for the benchmark efficient entity, prepared by SFG Consulting, 25th February 2015. See Table 6. The additional calculations of the equity risk premium, and of the implied beta in the SL-CAPM were performed separately.

A summary of the results for United Energy's proposed return on equity is shown below in Table 2.11.

Table 2.11: Key return on equity parameters

Risk-free rate over the averaging period (January 2015)	2.64%
S-L CAPM beta estimate	0.82
MRP	8.17%
Value of a dollar of imputation credits (gamma)	0.25
Distribution rate	0.70
Value of a distributed imputation credit (theta)	0.35
Ratio of return from dividends and capital gains to total returns in the AER's post-tax revenue model	0.90
Gearing	60%

Source: Rate of Return on Equity: Proposal for 2016 to 2020, United Energy. Assessment of Gamma: Proposal for 2016 to 2020, United Energy. SFG, Beta and the Black Capital Asset Pricing Model, prepared by SFG Consulting, 13th February 2015. SFG, The required return on equity for the benchmark efficient entity, prepared by SFG Consulting, 25th February 2015. SFG, Estimating gamma for regulatory purposes, prepared by SFG Consulting, 6th February 2015.

For completeness, the results of the overall cost of capital assessment for each regulatory year of the regulatory control period are shown below in Table 2.12.

Table 2.12: Overall cost of capital

	Value
Return on equity	9.95%
Return on debt	5.67%
Gearing	60%

	Value
Gamma	0.25
Nominal vanilla Weighted Average Cost of Capital (WACC)	7.38%
Inflation	1.78% to 2.50%

Source: Post-tax revenue model submitted with United Energy's Regulatory Proposal.