



Western Power

Weighted Average Cost of Capital

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Inherent Limitations

This report has been prepared as outlined in Section 1 of this report. The procedures outlined in Section 1 constitute neither an audit nor a comprehensive review of operations.

The findings in this report are based on a qualitative study.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by Western Power consulted as part of the process.

KPMG have indicated within this report the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

KPMG is under no obligation in any circumstance to update this report, in either oral or written form, for events occurring after the report has been issued in final form.

The findings in this report have been formed on the above basis.

Third Party Reliance

This report is solely for the purpose set out in Section 1 of this report and for Western Power's information, and is not to be used for any other purpose or distributed to any other party without KPMG's prior written consent.

This report has been prepared at the request of Western Power in accordance with the terms of KPMG's engagement letter dated 26 March 2008. Other than our responsibility to Western Power, neither KPMG nor any member or employee of KPMG undertakes responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

1 Executive summary

1.1 Overview

Western Power owns and operates an electricity network, the South West Interconnected System ("SWIS") that serves the south west of Western Australia.

The SWIS is covered for the purposes of the Electricity Networks Access Code ("the Code"). Under the Code, Western Power is required to submit a proposed access arrangement that establishes, amongst other things, revenues and prices for third party access to the network. The price controls for the access arrangement reference services are required to be set in accordance with target revenue established taking into account the total costs of the service provider as approved by the Economic Regulation Authority ("ERA"). This process includes applying a weighted average cost of capital ("WACC") to a capital base set for the network.

The Code also provides a framework in which the ERA is obliged to consider the proposed access arrangement and the various components that make up the arrangement. The Code requires Western Power to propose an access arrangement and the ERA to assess whether it complies with the Code. The ERA is obliged to accept the proposed access arrangement unless it is demonstrably inconsistent with the requirements in the Code.

Western Power has appointed KPMG to assist it in estimating the WACC for its SWIS.

The determination of the WACC is the subject of this report.

It provides KPMG's recommendations on the values or value ranges for Western Power to adopt on each of the underlying parameters that make up the WACC, and explains the basis for those recommendations. Western Power can then use these values or value ranges to make a reasonable point estimate of the WACC for the SWIS.

KPMG is of the view that the approach it has taken to estimating the WACC parameters is consistent with the ERA's preferred methodology to estimating the WACC, except in relation to:

- the approach to estimating the real risk free rate - In this case, new information has come to light which is widely accepted, including by the ERA in its recent final decision on the WACC for freight and urban railway networks. This new information suggests that a different approach to estimating the real risk free rate would be more consistent with the meeting the Code objective and thus warrants departing from the ERA's methodology, as the Code allows; and
- the sampling period for measuring the risk free rate – Western Power's preference is to adopt a sampling period of 60 trading days for the purpose of measuring the risk free rate. This approach is sought to facilitate the management of interest rate risk by Western Power.

1.2 Key findings and analysis

Results

KPMG considers that the cost of capital for the SWIS should be estimated by reference to the values and value ranges for the relevant underlying parameters as set out in Table 1 below.

Table 1: WACC – parameter estimates

Parameter	Section Reference	Feasible range	
		Low	High
Nominal risk free rate*	Section 5	6.45%	6.45%
Real risk free rate*	Section 5	3.62%	3.62%
Expected Inflation	Section 5	2.73%	2.73%
Gearing ratio	Section 6	60%	60%
Debt margin*	Section 6.2	3.37%	3.66%
Market risk premium	Section 7	6.0%	7.0%
Equity beta	Section 8	0.90	1.10
Imputation credits	Section 9	50%	0%
CAPM cost of equity		11.85%	14.15%
Pre-tax real WACC		8.50%	11.12%

* Will vary with market movements until the final decision is made.

Except for the real risk free rate of return, the methodology we have applied in estimating the WACC for the SWIS is consistent with the ERA's preferred methodology.

Risk free rate of return and expected inflation

The nominal risk free rate of return has been estimated by reference to the prevailing yield (expressed as an effective annual rate) on the 10 year Commonwealth Government bond. It is recognised that the nominal risk free rate adopted for the purpose of the ERA's decision-making will reflect the rates prevailing at the time(s) of those decision(s).

The expected inflation rate has been estimated from short-term inflation forecasts and the long term inflation target of the Reserve Bank of Australia ("RBA"). The expected inflation rate is then used to de-escalate the nominal risk free rate of return to estimate the real risk free rate of return. This approach departs from the ERA's preferred methodology but addresses the recent concerns on the existence of bias in the yields on index-linked Commonwealth Government bonds.

For the purpose of this report, a 60 day sampling period to 23 June 2008 has been adopted in measuring the risk free rate. A longer sampling period has been adopted by Western Power in order to better manage interest rate risk within the current market environment. In addition,

Western Power proposes that the sampling period dates be kept confidential between itself and the ERA and in order to preserve this confidentiality, the sampling period should not be linked to date of the ERA's final determination.

Gearing

KPMG considers that a 60% gearing ratio is a reasonable benchmark assumption to adopt for the purpose of establishing the cost of capital for the SWIS. This ratio is consistent with regulatory decisions around Australia. Prevailing market evidence does not provide a compelling case to justify a departure from this benchmark.

Debt margin

We have estimated a benchmark debt margin for the SWIS based on a BBB to BBB+ credit rating assumption. Our estimate is based on data on 10 year corporate bonds sourced from CBA Spectrum and reflects a 60 day trading average to 23 June 2008. It also includes an allowance of 12.5 basis points per annum ("bppa") for debt establishment costs.

We acknowledge that there has been some debate around the integrity of information sourced from CBA Spectrum. However, it is no longer feasible to demonstrate the systematic bias that is claimed to exist in the data. We also note that the ERA has relied upon data from CBA Spectrum in its recent final decision on the WACC for freight and urban railway networks.

Market risk premium

For the purpose of establishing a WACC for the SWIS, we consider that 6% to 7% is a reasonable and conservative range to adopt. This range of values is supported by empirical data on long term historical averages of the MRP in Australia. In particular, it takes into account recent academic research showing that MRP estimates based on pre-1958 data may be unreliable. We also note that the lower bound value of the range - 6% - is the value most commonly used by independent experts in valuations of companies subject to takeovers.

Beta

For the purpose of estimating a WACC for the SWIS, we consider that is reasonable to adopt a range of 0.90 to 1.10 for the equity beta. Our choice of values reflects the view that a reasonable range for the equity beta would have to include a value of 1.0, preferably as a central estimate.

In forming our views, we note that empirical measurement of the equity beta is an inherently difficult exercise due to the small sample size and data limitations. We are cognisant that there is considerable pressure from regulators to reduce the value of the equity beta, however, we question whether it is possible for regulators to conclude with a sufficient degree of confidence that current observations reflect a 'true' estimate of company betas. Comprehensive analysis undertaken for the Victorian gas distribution businesses by SFG Consulting suggests that there are strong reasons not to depart from an equity beta of 1.0, and it also recommends using 0.90 to 1.10 as a reasonable range.

Imputation credits

We consider that a reasonable range to adopt for imputation credits is 0% to 50%. Recent developments on this parameter suggest that:

- There is no basis for regulators to argue for an increase in the value of gamma above the existing upper bound of 50%. Furthermore, a value of 50% is likely to overstate the appropriate value for gamma;
- There is good reason to question the appropriateness of a value of gamma of 50% since it relies upon evidence from studies that suffer from methodological flaws; and
- A value for gamma of zero is consistent with the market evidence and would appear to be consistent with a value for the MRP of 6%.

2 Introduction

Western Power owns and operates the SWIS that serves the south west of Western Australia. The SWIS is covered for the purposes of the Code. More specifically, under:

- Section 4.1 of the Code, the service provider of a covered electricity network is required to submit a proposed access arrangement that establishes policies for third-party access to the network, and establishes reference services and price controls for those reference services;
- Section 6.2 and 6.3 of the Code, the price controls for the access arrangement reference services may set target revenue by reference to the total costs of the service provider as approved by the ERA; and
- Section 6.43 of the Code, the total costs of the service provider include a return on the capital base of the covered network calculated by applying a WACC to a capital base set for the network.

Western Power has appointed KPMG to assist it in estimating the WACC for its SWIS.

The determination of the WACC is the subject of this report.

It provides KPMG's recommendations on the values or value ranges for Western Power to adopt on each of the underlying parameters that make up the WACC, and explains the basis for those recommendations. Western Power can then use these values or value ranges to make a reasonable point estimate of the WACC for the SWIS.

2.1 Structure of this report

The remainder of this report is structured as follows:

- Section 3 contains a general discussion and overview of WACC concepts and identifies the WACC formulation that we have adopted in this report;
- Section 4 summarises the relevant sections of the Code and outlines the key considerations relevant to assessing the cost of capital, including the principles arising from recent regulatory developments;
- Section 5 examines the nominal and real risk free rates and the expected inflation rate;
- Section 6 examines gearing and the debt margin;
- Section 7 examines the market risk premium;
- Section 8 examines the equity beta; and
- Section 9 examines the value of imputation credits.

3 The Weighted Average Cost of Capital

The cost of capital (also known as WACC) is the rate of return that an investor requires from an investment. It is conventionally measured using the Capital Asset Pricing Model (“CAPM”) which assumes that investors in risky assets require compensation for bearing risk that cannot be diversified away. In the context of regulated revenue determination, the cost of capital is applied to the value of the regulatory asset base to derive a return on capital which is one of the major building blocks of required revenue.

The WACC formula that has been applied in this report is expressed as a pre-tax real WACC. This formula, which is adjusted for imputation credits, is consistent with the ERA’s preferred methodology for calculating the WACC for covered electricity networks, as outlined in its February 2005 determination¹, which is discussed further in Section 4 of this report.

3.1 Introduction

The cost of capital is the rate of return required by the marginal investor in a firm (i.e. the last investor willing to contribute funds). Equivalently, it represents the minimum return on capital that a firm must expect to earn on its investments to attract new capital and to maintain its current value.

The cost of capital of a firm is typically estimated by reference to the current cost of raising funds via the various classes of its capital (e.g. equity, debt, etc.), each weighted by the target proportion of each class of capital to the total market value of capital of the firm. Hence, the cost of capital of a firm is often referred to as a WACC.

In estimating WACC, the Capital Asset Pricing Model (CAPM) is widely applied to estimate the cost of equity². The CAPM is based on the assumption that an investor in a risky asset requires additional return to compensate for bearing additional risk. In simple terms, the CAPM asserts that the required rate of return on a risky asset is a function of the risk free rate of return (R_f) plus a risk premium that reflects the return on a well-diversified portfolio of risky assets over the risk free rate ($R_m - R_f$), scaled by the “beta” of the risky asset. Therefore, the required rate of return for equity securities (K_e) is determined as follows:

$$K_e = \text{Risk free rate} + \text{Risk premium}$$

$$K_e = R_f + \beta_e * \{R_m - R_f\}$$

Beta (denoted by β_e) is a measure of the risk of the risky asset relative to the market index. In theory, the only risks that are captured by beta are those risks that cannot be eliminated by the investor through diversification. Such risks are referred to as systematic, undiversifiable or uninsurable risks – they affect all assets since they derive from underlying economy-wide influences. Portfolio diversification is assumed to eliminate all other risks. In practice,

¹ Economic Regulatory Authority, Determination of the Preferred Weighted Average Cost of Capital Methodology to Apply to Covered Electricity Networks, 25 February 2005.

² There are a number of other theories that can be applied to estimate the cost of equity. However, the CAPM remains the most popular theory.

however, diversification to the extent that the CAPM assumes is uncommon³. For this reason, some investors are likely to require compensation for risks that are considered to be diversifiable under the CAPM.

The risk-return concepts underlying the CAPM are applicable to any risky asset. Therefore, the required rate of return for risky debt securities can be similarly estimated:

$K_d = \text{Risk free rate} + \text{debt risk premium}$

$$K_d = R_f + \beta_d * (R_m - R_f)$$

In practice, rather than estimating the individual components underlying the debt risk premium (i.e. β_d , R_m and R_f), the observed yields on issued debt securities provide an indication of the debt risk premium as a whole.

In addition to the CAPM, capital structure theory is also applied to estimate the target weights that are applied to the cost of equity and the cost of debt in estimating WACC. Capital structure theory focuses on the factors which influence the mix of capital employed by the firm.

In the context of revenue setting by regulators, the cost of capital is effectively converted into a cash flow item. That is, it is applied to a measure of the value of the regulatory asset base, and the result is then added to other revenue building blocks to derive a measure of the required revenue of the regulated entity. In order to ensure that the revenue derivation formula is internally consistent, it is clear that the cost of capital cannot be considered in isolation of the definition of other components of overall revenue determination in regulatory decisions. Care must be taken to ensure this mutual dependency is observed. This also applies to the treatment of inflation, risk and tax. It is in this context that capital structure theory and the CAPM also intersect. For example, the variance of possible future costs influences capital structure choice, the cost of debt and possible cash flows under conditions of distress. Consequently both the cost of capital and the expected operating costs are influenced by variance however the CAPM focuses only on the non-diversifiable element of variance.

3.2 WACC formula

WACC can be expressed in a variety of ways. For each definition, there is a corresponding cash flow definition. Consistent with the ERA's methodology, we have estimated a pre-tax real

³ For example, Goeztman, W. and A. Kumar, *Diversification Decisions of Individual Investors and Asset Prices*, January 2004, unpublished working paper Yale School of Management, conducted an empirical study of 60,000 individual investors during a six year period (1991-1996) and found that the vast majority of investors in their sample were under-diversified. The authors suggest that if investors systematically hold less than fully diversified portfolios, they are likely to demand compensation for the idiosyncratic risk in their equity portfolios. Further analysis suggested that the diversification decisions of these investors will also be reflected in asset prices. In addition, we are also aware of research which has found that the unsystematic risk related to the risk of the firm has increased in recent times, and due to this, elimination of unsystematic risk is no longer possible by holding a portfolio of 20 to 30 stocks. (refer Campbell, Lettau, Malkiel and Xu, *Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk*, Journal of Finance, Vol. LVI, No. 1, February 2001). Finally, Malkiel and Xu (2002) also postulate that if there are investors who cannot hold the market portfolio for exogenous reasons (i.e. they are not diversified to the extent the CAPM presumes), other remaining investors will also be unable to hold the market portfolio (since the sum of the two make up the whole market). Under such a scenario, investors will care about total risk, not just market risk. (refer Malkiel, B and Y. Xu, *Idiosyncratic risk and security returns*, December 2002, unpublished working paper).

WACC for Western Power. The pre-tax real WACC that we have estimated for Western Power is based upon the “Officer” expression of WACC adjusted for imputation credits, as set out in paragraph 46 of the ERA’s February 2005 determination of its preferred methodology:

$$\text{WACC} = K_e * (1-t) / \{1-t*(1-\gamma)\} * E/V + K_d*(1-t)*D/V$$

grossed up by 1 minus the statutory corporate tax rate to obtain the pre-tax nominal WACC:

$$\text{Pre-tax nominal WACC \%} = K_e * 1 / \{1-t*(1-\gamma)\} * E/V + K_d*D/V$$

and then adjusted for inflation:

$$\text{Pre-tax real WACC}^4 = \{(1+\text{Pre-tax nominal WACC \%}) / (1+\text{CPI})\} - 1$$

⁴ A number of regulators adopt a “post tax” WACC. This is often referred to as the “Vanilla” WACC, which is estimated using the following formula: Vanilla WACC = $K_e * E/V + K_d * D/V$

4 The Regulatory Framework applying to the SWIS

4.1 Overview

The regulatory framework which governs third party access to the SWIS is set out in the Code. It is based on the “propose/respond” model. Under this model, Western Power is required to develop and submit an access arrangement to the regulator for approval, and the regulator must accept the access arrangement if it has met the Code objective and other detailed requirements relating to the content of the access arrangement.

The price control applied under the access arrangement is to be determined so as to achieve the price control objectives which are set out at sections 6.4(a) – (c) of the Code. In assessing the required revenue amount which achieves these objectives, the regulator must treat this as a target rather than a ceiling or a floor.

Assessing an appropriate WACC is a key element of the price control approval process. Section 6.65 of the Code allows the ERA to make and publish a determination of the preferred WACC methodology. Pursuant to this provision, the ERA has set out its views on its preferred WACC methodology in its February 2005 determination. Amongst other things, the ERA’s preferred methodology is based on:

- Application of the CAPM methodology, using a cost of capital defined as a pre-tax real WACC; and
- Estimating WACC in accordance with, amongst other things, the following benchmark assumptions:
 - A debt margin consistent with a BBB to BBB+ credit rated business;
 - Nominal and real risk free rates derived from prevailing yields on Commonwealth 10 year bonds and index-linked bonds, respectively, calculated as a 20 day trading average; and
 - Gearing levels consistent with the objective of encouraging efficient financing decisions.

The WACC that we have estimated in this report is consistent with the ERA’s published methodology except in relation to:

- The approach to estimating the real risk free rate. We have departed from the ERA’s published methodology to reflect recent evidence on the existence of bias in index-linked Commonwealth government bond yields; and
- The length of the sampling window for measuring the risk free rate. To facilitate better interest rate risk management, Western Power is proposing to adopt a sampling window of 60 trading days.

These issues are discussed further in later sections of this report.

4.2 The Electricity Networks Access Code 2004

The Code provides the regulatory framework to facilitate third party access to the SWIS.

4.2.1 The Code Objective

The Code requires the Minister, the ERA and the Arbitrator to have regard to the Code objective when performing a function under it. The objective, as stated at s.2.1 is:

to promote the economically efficient:

- *investment in; and*
- *operation of and use of,*

*networks and services of networks in Western Australia to promote competition in markets upstream and downstream of the networks.*⁵

Recent judicial and regulatory precedent suggests that significant weight should be given to ensuring the provision of appropriate incentives for investment. Section 4.3.2 of this report contains further discussion of relevant precedents.

Given the long-term nature of the assets involved in the provision of electricity, it is appropriate for long-term matters to be given primacy in the development of the access arrangements. It is in this context where potential for conflict between the twin objectives of economically efficient investment and operation might arise.

Issues of conflict are addressed in the Code at s.2.3 and 2.4, such that if the Code objective is specified in a provision of the Code as a specific criterion, and it then conflicts with one or more other specific criterion, the Code objective prevails. However, if the Code objective is not listed as a specific criterion, any conflict that arises requires the specific criterion to prevail over the Code objective.

In addition, were a situation to arise such that more than one specific criterion is to be applied, and a conflict arises between them, s.2.3(b)(ii) requires the Code objective to be applied to reconcile which specific criterion will prevail.

4.2.2 The Propose/Respond model

The Code establishes a form of regulation that requires Western Power to develop an access arrangement to submit to the ERA for approval (i.e. whether it meets the Code). Section 4.28(b) of the Code removes the ability for the ERA not to accept Western Power's access arrangement if it has met the Code objective and the detailed requirements in chapter five of the Code. Moreover, it does not allow the ERA to refuse to approve an access arrangement on the grounds that another form of access arrangement might better or more effectively satisfy the Code objective and the chapter five requirements.

⁵ Government Gazette, The Electricity Networks Access Code, 2004

The implication is that in relation to the WACC, the ERA's role is restricted to reviewing the justifications presented in estimating the WACC parameters and determining whether it is consistent with the Code.

4.2.3 Price Control and the WACC

The price control applied under the access arrangement is to be determined so as to achieve the price control objectives. In determining revenue amounts which achieve these objectives, the ERA is required to treat this as a target rather than a ceiling or a floor.⁶ In addition, any determination is required to apply the "Propose/Respond" model of regulation, with s.6.39 noting that each element of the price control is to be proposed by the service provider (including the WACC).

The key elements of the price control objective are detailed at sections 6.4(a), (b) and (c) of the Code. The price control in an access arrangement must have the objectives of:

- Giving the service provider an opportunity to earn an amount of revenue that meets the forward-looking and efficient costs of providing covered services, including a return on investment commensurate with the commercial risks involved;
- Enabling a user to predict the likely annual changes in target revenue during the access arrangement period; and
- Avoiding price shocks.

The implication of these sections of the Code is that when determining an appropriate estimate of the WACC to be applied under Western Power's access arrangement, the ERA is to consider a target outcome, rather than a floor or ceiling, and in making its determination ensure the outcomes are consistent with the Code objective and the price control objectives. Where there is any conflict between these objectives the Code objective is to have primacy.

4.3 The Code requirements on setting the WACC

Setting the appropriate value for the WACC is a key element of the price control process. In setting the appropriate WACC for this access arrangement, the following provisions of the Code are relevant:

- Section 6.65 of the Code allows the ERA to make and publish a determination of the preferred WACC methodology. This methodology must represent an effective means of achieving the Code objective and the objectives in Section 6.4 of the Code, and must be based on an accepted financial model such as the CAPM; and
- Where the ERA has published a determination, Section 6.64(a)(ii) of the Code provides that Western Power must use the methodology in the determination unless it can demonstrate that an alternative methodology would better achieve the objectives of the Code (which may be formulated without reference to the ERA's determination), provided that regard is given

⁶ Section 6.5 of the Code.

to the ERA's determination in assessing whether Western Power's methodology is consistent with Chapter 6 of the Code and the code objective.

4.3.1 The ERA's preferred WACC methodology

In 2005, the ERA outlined its views on the appropriate methodology to employ in estimating the WACC.⁷ The ERA preferred WACC methodology proposes, amongst other things, the use of:

- The CAPM methodology for calculating the return on assets;
- The use of a real, pre-tax formulation of the cost of capital;
- A debt premium based on market evidence for businesses with a credit profile consistent with a BBB or BBB+ rating;
- Nominal risk free rates, derived from the prevailing yields on Commonwealth 10 year bonds, calculated on the basis of a 20 trading day average;
- Real risk free rates derived from the prevailing yields on Commonwealth index-linked bonds with a term of 10 years, calculated on the basis of a 20 trading day average;
- An inflation forecast derived consistent with the above market information and estimated using the Fisher equation; and
- An appropriate benchmark gearing assumption to encourage efficient financing decisions.

KPMG is of the view that the approach it has taken to estimating the WACC parameters is consistent with the ERA's preferred methodology, except in relation to:

- The approach to estimating the real risk free rate and therefore the inflation forecast. We have departed from the ERA's published methodology to reflect recent evidence on the existence of bias in index-linked Commonwealth government bond yields. Further information on our approach and how it differs from the ERA's preferred methodology is outlined in Section 5 of this report. We consider that the approach we have taken is more consistent with the meeting the Code objective and thus warrants departing from the methodology articulated in the ERA's February 2005 determination, as the Code allows at s6.64(a)(ii).; and
- The length of the sampling window for measuring the risk free rate. To facilitate better interest rate risk management, Western Power is proposing to adopt a sampling window of 60 trading days.

⁷ Economic Regulatory Authority, Determination of the Preferred Weighted Average Cost of Capital Methodology to Apply to Covered Electricity Networks, 25 February 2005.

4.3.2 Guidance from recent regulatory developments

Over the past few years there has been considerable focus on improving economic regulation of the Australian energy sector. This focus has followed from various decisions by Courts^{8 9 10 11} on the interpretation of various aspects of access regulation and views expressed by authoritative and independent opinion.^{12 13 14} These regulatory developments have highlighted the importance of avoiding regulatory error and the risks to regulated infrastructure investment, and thus the long term interests of customers, that might arise from those errors. For this reason, they provide importance guidance for access regulation in Australia and illustrate how prevailing views on various WACC parameters and their values have developed over time.

A national approach to energy access regulation

An important milestone in energy access regulation was the release of the Ministerial Council on Energy's ("MCE") December 2003 report on energy market reform to the Council of Australian Governments.¹⁵ In that report, the MCE noted that there had been progress with reform, and significant benefits were now being delivered. However, it also noted that substantial policy issues remained to be resolved if the full benefits of energy market reform were to be realised, and that a second phase of reform was required to capture those benefits.

The MCE's report set out principles and directions for further reform, and the processes and timelines for resolution of key issues that had to be addressed in finalising the details of the reform program. In particular, Ministers agreed that further reform was required to:

*Streamline and improve the quality of economic regulation across energy markets, to lower the cost and complexity of regulation facing investors, enhance regulatory certainty and lower barriers to competition.*¹⁶

The Productivity Commission in its review of the gas access regime had previously identified the need to enhance regulatory certainty to ensure that energy sector investment would proceed.

The MCE sought to address this need through:

- The creation of two new statutory authorities:
 - The Australian Energy Market Commission ("AEMC"), which be responsible for rule-making and market development; and

⁸ Application by Epic Energy South Australia Pty Ltd [2003] ACompT 5.

⁹ Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT 6.

¹⁰ Application by East Australian Pipeline Limited [2004] ACompT 8.

¹¹ *Re Dr Ken Michael AM; Ex parte Epic Energy (WA) Nominees Pty Ltd* [2002] WASCA 231.

¹² Government Response to the Productivity Commission Review of the National Access Regime, released 17 September 2002.

¹³ Productivity Commission, Review of the Gas Access Regime: Draft Report, Canberra, December 2003.

¹⁴ Council of Australia Governments Energy Market Review Panel, Towards a Truly National and Efficient Energy Market: Final Report [Parer Report], 20 December 2002.

¹⁵ Ministerial Council on Energy, Report to the Council of Australian Governments: Reform of Energy Markets, 11 December 2003.

¹⁶ Ibid. page 4.

- The Australian Energy Regulator (“AER”), which would be responsible for market regulation; and
- Agreement in-principle to the development of a national approach to energy access under the *Trade Practices Act 1974*, covering electricity and gas transmission and distribution.

Since that time, policy makers have developed a national approach to electricity network access through the development of the National Electricity Law (“NEL”) and the National Electricity Rules (“NER”). Policy makers have also implemented a national approach to gas network access through a new National Gas Law (“NGL”) and National Gas Rules (“NGR”).

However, these developments have followed a somewhat different course, with the AEMC developing the NER rules and the MCE developing the NGR.

To advise on a model to achieve a common approach to network access pricing across the energy market, the MCE established the Expert Panel on Energy Access Pricing in December 2005. The Expert Panel reported in April 2006, and its report appears to have been influential in shaping the regulatory scheme of the NGL and the NGR.

In its report, the Expert Panel reiterated the need for regulatory certainty:

A regulatory environment that is conducive to desirable investments being made in a timely way is important. This means not only appropriate returns in the short term but that potential investors can be confident that sound substantial long term investment decisions can be based on a well understood and predictable regulatory regime and not rendered loss-making by subsequent regulatory intervention.

*Equally important is the predictability of those decisions – that is the development of an approach that gives energy users and investors in transmission and distribution infrastructure confidence that access and pricing outcomes will be guided by known principles that are applied in a consistent manner.*¹⁷

Enhancing regulatory certainty through the rate of return

The terms of reference given to the Expert Panel directed it to provide high level policy guidance and recommendations. Nevertheless, in respect of one matter, the Panel gave consideration to the detail of the future energy access regime. The Expert Panel clearly indicated its preference for greater prescription in the setting of the rate of return. This was, in the Panel’s view, necessary to provide greater certainty for investors in regulated assets. This recommendation can be contrasted with the Productivity Commission’s earlier recommendation to allow pipeline service providers greater flexibility in the setting of the rate of return in its review of the national gas access regime.

In May 2006, the MCE effectively rejected the Productivity Commission’s recommendations on the setting of the rate of return, in favour of the approach of the Expert Panel.¹⁸ Amendments to the NER followed this approach, but the draft NGR does not appear to reflect this policy position.

¹⁷ Expert Panel on Energy Access Pricing, Report to the Ministerial Council on Energy, April 2006, page 59.

¹⁸ Ministerial Council on Energy, Review of the National Gas Pipelines Access Regime: Decision, May 2006, Appendix 1.

In particular, Chapter 6A of the NER now specifies the values to be used for certain parameters critical to determination of the rate of return for electricity transmission businesses. These are:

- Market risk premium 6%
- Beta 1.0
- Gearing 60%
- Gamma 0.5

Although currently fixed, these values are subject to periodic review. In accordance with the NER, the AER must initiate a first review on 1 July 2009, and subsequent reviews every five years thereafter. The NER as they relate to electricity distribution require a similar review, although there are currently no values specified for the above parameters and the review may cover wider matters (e.g. including the nominal risk free rate, the maturity periods for the relevant bonds, and credit rating levels).¹⁹

The AER recently commenced the review, which it intends to complete by March 2009.

In discussing the rationale for fixing the values of those parameters critical to determination of the rate of return, the AEMC stated:

*The provision of stability in the short term regarding the determination of the WACC reduces an important source of potential variability in regulatory decision making providing a more certain and predictable environment for investment and financing decision-making.*²⁰

More specifically, in relation to equity beta, the AEMC stated:

The equity beta is the most difficult parameter to estimate, as it cannot be measured accurately from empirical data that is available. The Commission understands that the value of 'one' that was adopted in the SRP represents a compromise between the difficulties of estimation and the consequent need to err on the side of caution. Regulators have applied equity betas above and below 'one', but 'one' has come to represent the most widely accepted practice.

*In the interests of certainty and predictability the Commission has sought to codify elements of the SRP where there is general acceptance.*²¹

The NER states that where the values that are attributable to the above parameters cannot be determined with certainty, the AER must have regard amongst other things to:

- (i) *the need to achieve an outcome that is consistent with the national electricity objective; and*
- (ii) *the need for persuasive evidence before adopting a value for that parameter that differs from the value that has previously been adopted for it.*²²

¹⁹ The requirements in relation to assessing whether to alter credit rating levels are slightly different.

²⁰ AEMC, Draft Rule Determination, 2006, pages 57-61.

²¹ Ibid.

²² National Electricity Rules Version 20, Chapter 6A Economic Regulation of Transmission Services, 6A.6.2(j)(4) and Chapter 6, 6.5.4(4).

The AER has also indicated that, while the determination it will make under the NER is specific to electricity transmission and distribution, it would expect the determination to have broader ramifications for regulated gas assets.²³ Indeed, in its recent decision for GasNet it used the same parameters, although it was under no obligation to do so.²⁴

Therefore despite the slow and convoluted path taken to achieve regulatory reform of electricity and gas network access, policy makers and regulators have recognized the need for greater regulatory certainty in regulatory decision making to facilitate adequate energy sector investment.

²³ <http://www.aer.gov.au/content/index.phtml/itemId/718592>

²⁴ AER, Revised access arrangement by GasNet Australia (Operations) Pty Ltd and GasNet (NSW) Pty Ltd for the Principal Transmission System, 30 April 2008.

5 Risk free rates and expected inflation

The nominal risk free rate of return has been estimated by reference to the prevailing yield on the 10 year Commonwealth Government bond. It is recognised that the nominal risk free rate adopted for the purpose of the ERA's decision-making will reflect the rates prevailing at the time(s) of those decision(s).

The expected inflation rate has been estimated from short-term inflation forecasts and the long term inflation target of the Reserve Bank of Australia ("RBA"). The expected inflation rate is then used to de-escalate the nominal risk free rate of return to estimate the real risk free rate of return. This approach departs from the ERA's preferred methodology but addresses the recent concerns on the existence of bias in the yields on index-linked Commonwealth Government bonds.

For the purpose of this report, a 60 day sampling period to 23 June 2008 has been adopted in measuring the risk free rate. Western Power prefers a longer sampling period in order to better manage interest rate risk within the current market environment. In addition, Western Power proposes that the sampling period dates be kept confidential between itself and the ERA and in order to preserve this confidentiality, the sampling period should not be linked to date of the ERA's final determination.

5.1 Key issues in estimating risk free rates and expected inflation

For the purpose of establishing a cost of capital for input into the revenue setting process, the basis upon which the risk free rate of return is established needs to address the:

- Choice of proxy for the nominal and real risk free security;
- Estimation of expected inflation; and
- Sampling window over which the risk free rate of return is measured.

5.1.1 Choice of proxy

Nominal risk free rate

KPMG considers that for the purpose of establishing a cost of capital for input into the setting of access charges for an energy network, the nominal risk free rate should be estimated by reference to the yield on a nominal Commonwealth Government Bond with a term to maturity corresponding with the nominal 10 year government bond which financial markets regard as the benchmark security. This approach is consistent with the ERA's preferred WACC methodology. The current benchmark 10 year nominal government bond yield can be estimated by interpolating between the February 2017 and February 2019 government bonds.

We have sourced our data from the RBA. As the bond yields quoted by the RBA are semi-annual yields, we have converted the yield into an effective annual rate.

Real risk free rate

The conventional market practice for estimating the real risk free rate of return is by reference to the yield on Commonwealth index-linked bonds with a term to maturity matching that of the proxy for the nominal risk free rate (i.e. 10 years). The expected inflation rate can then be inferred from the nominal and real Commonwealth bond yields by applying the Fisher equation. This practice is also reflected in the ERA's preferred WACC methodology.

We note, however, that this approach differs from the approach recently adopted by the ERA in its final determination for freight and urban railway networks, which is to infer the real risk free rate from the nominal risk free rate and an independent estimate of inflation using the Fisher equation. The approach used by the ERA in its final determination for freight and urban railway networks reflects recent developments in the estimation of the real risk free rate which has been triggered by concerns over the reliability of market observed yields on index-linked bonds. Given that the railways determination is the most recent determination issued by the ERA, it is relevant to examine the basis for the ERA's departure from conventional market practice and its preferred WACC methodology under the Electricity Network Access Code.

Concerns over market observed yields on index-linked government bonds are not new and were highlighted in KPMG's WACC report which accompanied Western Power's previous access arrangements. We summarised our concerns as follows:

"Legitimate questions can therefore be raised about the extent to which current market yields provide a reliable estimate of the expected risk free rate, which again highlights the uncertainties associated with estimating the cost of capital."²⁵

We argued at the time rather than necessarily changing the method of estimating the real risk free rate, it would prudent for regulators to take this into account when estimating a cost of capital from a reasonable range.

Recently, more quantitative evidence has emerged in work undertaken by NERA,²⁶ and jointly by NERA and CECG.²⁷ This work examined the existence and extent of the downward bias in Commonwealth Government Bond yields from two perspectives:

- The bias in relevant indexed yields *relative* to nominal yields; and
- The *absolute* bias in the nominal yields.

In relation to relative bias, NERA found that since late 2004, there has been an observed widening of the spread between the nominal and indexed bond yields. They attribute this to a downward bias in indexed yields relative to nominal yields and estimate the relative bias at around 18 to 20 basis points. NERA also point out that similar observations have been made by the Reserve Bank.²⁸

²⁵ KPMG, Weighted Average Cost of Capital, May 2005, page 29.

²⁶ NERA Economic Consulting, Bias in Indexed CGS Yields as a Proxy for the CAPM Risk Free Rate, March 2007.

²⁷ NERA, Absolute bias in (nominal) Commonwealth Government securities, 7 June 2007; CECG, Estimating relative risk in the market for funds, 26 October 2007; CECG, Choosing a proxy for the nominal risk free rate, 26 October, 2007.

²⁸ May 2006, RBA Statement on Monetary Policy, page 58. Also refer RBA Statement of Monetary Policy, February 2007, pages 48-49

The implication of this finding is that observed yields on index-linked government bonds are not considered to be an effective proxy for the real risk free rate in the WACC formula. In particular, the research suggests that the 'true' real risk free rate of return:

- is higher than that indicated by observed real risk free rates, and
- under this condition, the application of the Fisher equation would imply an expected inflation that is higher than would otherwise be the case, for a given nominal risk free rate.

In relation to absolute bias, NERA infers that given the relative bias between real and nominal government bonds is around 20 basis points, the absolute bias in real government bond yields can be expected to exceed 20 basis points if there is also an absolute bias in nominal government bond yields. By comparing the yields on credit default swaps ("CDS") at a particular credit rating with spreads to nominal government bond yields for the same credit rating, NERA observed that the latter overstated the former. This result provided support for the existence of an absolute bias in nominal government bond yields. They also observe that the bias in nominal yields was – at the time of writing - at historic highs, measuring around 42 to 44 basis points. NERA attributes this to the reduction in supply of Commonwealth Government Bonds.

A number of regulators have accepted the arguments in relation to the relative bias in indexed linked bonds, but rejected the arguments in respect of the absolute bias in nominal bonds. This includes the AER and the ESC. The ERA has also formed a similar view recently, concluding that there is "sound evidence" of relative bias in indexed linked Commonwealth Government Bonds.²⁹ The evidence in relation to the absolute bias in nominal yields, however, has been rejected largely due to lack of support by the Commonwealth Treasury and the Reserve Bank, both of which have expressed the view that there is no basis for assuming such a bias exists.

From KPMG's perspective it is unaware of any broader evidence of independent valuers or other market participants systematically choosing not to rely upon Commonwealth Government Bonds as the basis for estimating the nominal risk free rate. We have previously highlighted one instance (in work submitted to the ERA) where Grant Samuel has not relied solely on market data when estimating the risk free rate.³⁰

Nevertheless, the AER, ESC and ERA have now chosen not to rely upon market yields on index-linked government bonds for estimating the real risk free rate. Instead, their approach is to make an independent forecast of the expected inflation rate and apply the Fisher equation, in conjunction with the nominal risk free rate, to estimate the real risk free rate.

As this approach essentially reverses the process of estimating the expected inflation rate from the real risk free rate, we consider that it is a reasonable alternative subject to the methodology used to derive an independent estimate of expected inflation.

²⁹ Economic Regulation Authority, Final Determination: 2008 Weighted Average Cost of Capital for the Freight (WestNet Rail) and Urban (Public Transport Authority) Railway Networks, 23 June 2008, para 49.

³⁰ KPMG, Weighted Average Cost of Capital, May 2005, page 25.

5.1.2 Estimating the expected inflation rate

The options for producing an independent estimate of expected inflation over a 10 year horizon include:

- Examining the historical evidence;
- Examining the outcomes of surveys of the expectation of investors, economists or the general public; and/or
- Relying on the forecasts of the RBA.

All of these options have significant limitations. More specifically, it is not obvious why historical evidence is likely to be of particular relevance given the changes in economic circumstances over time, and changes in the emphasis that has been placed on controlling inflation over time. The outcomes of surveys are hampered by the problems that affect surveys of this kind (See Section 7), but also because they typically provide a short term outlook. The remaining option is to rely on the forecasts provided by the RBA. The RBA typically produces short term inflation forecasts that reflect prevailing conditions, and is committed to its long term target of maintaining inflation between 2% and 3%. This approach has the limitation of assuming for the purposes of forecasting that the RBA will be successful in its task.

Of these options we consider that reliance upon RBA forecasts is a reasonable and transparent approach.³¹

The RBA's most recent statement on monetary policy produces six monthly inflation forecasts from December 2008 until December 2010.³² Rolling forward from the six months ending December 2008 for ten years and using an expected inflation rate of 2.5% (i.e. midpoint of the RBA's long term target) beyond the RBA's forecasting period for the remaining eight and a half years produces a 10 year expected inflation rate of 2.73%.³³

We note that in the ERA's recent final determination on the WACC³⁴ for freight and urban railway networks, the Authority adopted an inflation rate of 2.75%. This decision was made after consideration of the following data:

³¹ We have also identified another alternative approach that would avoid making an independent estimate of forecast inflation. This could be achieved by: (i) Using the real risk free rate taken from the index linked market as was previously done and estimating forecast inflation from the difference between nominal and index bonds using the Fisher equation; and (ii) Adjusting the CPI-X price setting mechanism to account for any differences between expected and actual inflation, as it pertains to the proportion of those prices that recover debt financing costs. In other words, in relation to debt financing costs the formula would be $CPI_{expected} + (CPI_{expected} - CPI_{actual}) \cdot X$. The inclusion of the differential between actual and expected inflation effectively ensures that the business locks in the real rate of return as it pertains to debt financing costs. In relation to all costs other than debt financing costs the formula would remain CPI-X. This would ensure that to the extent that the original estimate of forecast inflation proved to be incorrect, the business would be protected from any difference. Although the adjustment would be ex post, it would use only information that could be specified in advance.

³² The Reserve Bank of Australia, Statement on Monetary Policy, May 2008, page 67.

³³ Rounded to two decimal places.

³⁴ Final Determination: 2008 Weighted Average Cost of Capital for the Freight (WestNet Rail) and Urban (Public Transport Authority) Railway Networks, 23 June 2008, ERA, page 15

- The RBA's expectation that inflation will be at 3.5 per cent to the end of 2008;
- The RBA's medium term projection that inflation will fall gradually in 2009 and beyond to around 3 per cent to mid-2010; and
- A WA Treasury forecast of inflation in WA of 3.25 per cent in 2008/09, 3.0 per cent in 2009/10 and 2.75 per cent long term.

The ERA's approach in the railway networks determination indicates that more weight has been attached to the WA Treasury's long term projection than the RBA's forecasts. We note that this approach accords full weight to economic conditions in WA rather than to economic conditions nationally which has conventionally been the case in access regulation. However, the ERA's actual estimate of 2.75% for railway networks is broadly consistent with our estimate of 2.73%. Furthermore, the risk of overstating the expected inflation rate is minimized given that the ERA's estimate lies at the low end of the range of evidence it has considered.

5.1.3 Sampling window for measuring the risk free rate

It has been standard practice in regulatory determinations to adopt some period of historical averaging in estimating the risk free rate of return rather than an "on the day" rate. Given that the rates observed on any particular day could be temporarily influenced by market anomalies, KPMG agrees that some short term averaging of recent historical rates is desirable.

In theory, the most recent interest rates embody the latest information about market conditions, and therefore, the longer the period of averaging, the less weight would be attached to the latest market rates. This has led some regulators to adopt a shorter sampling window (e.g. 10 days).

KPMG is unaware of any rigorous technical analysis or justification that has been advanced to demonstrate a clear preference for either a 20 or different day sampling period. However, from a practical perspective, a sampling window that is too short could create problems for a regulated entity that is intending to seek to hedge over the sample period.

Clause 6A.6.2(c)(2) of the National Electricity Rules allows the regulated entity to propose the sampling period, and for the relevant period to be kept confidential until after it has occurred.

The ERA has expressed its preference for a 20 day sampling period. Western Power, however, seeks a sampling period of 60 trading days in order to better manage its interest rate risk in a debt market environment characterised by reduced appetite for risk on the part of investors and financial institutions. In particular, Western Power's preference is for the 60 day sampling period to be set:

- independently of ERA's final determination on its access arrangement; and
- with the aim of avoiding the period surrounding 30 June to minimise the impact of any market anomalies or illiquidity which may arise in the lead up to the end of the financial year.

It would also be desirable for the ERA to provide advance *confidential notice* to Western Power regarding the date on which the 60 day sampling period would commence, or end, to facilitate forward planning by Western Power with respect to hedging. The ERA's current WACC methodology envisages having the sampling period taken at the final day of the month prior to a decision on an access arrangement. However, to the extent that the final decision date is known in advance, pricing of debt may be distorted due to the market's anticipation of Western Power's debt re-balancing. We would expect that this issue should be resolvable through cooperation between the ERA and Western Power.

5.1.4 Conclusion

For the purposes of estimating an appropriate WACC for the SWIS, KPMG has:

- Derived an estimate of the nominal risk free rate by interpolating between the February 2017 and February 2019 Commonwealth Government Bond yields for the 60 days ending on 23 June. We have also converted this yield into an effective annual rate. This provides a nominal risk free rate of 6.45%.³⁵
- Adopted an expected inflation rate of 2.73%; and
- Therefore derived an estimate of the real risk free rate of 3.62%.

These numbers are obviously subject to market movements and would need to be revised closer to the time the ERA makes its final decision.

³⁵ Rounded to two decimal places.

6 Gearing and debt margin

KPMG considers that a 60% gearing ratio is a reasonable benchmark assumption to adopt for the purpose of establishing the cost of capital for the SWIS. This ratio is consistent with regulatory decisions around Australia. Prevailing market evidence does not provide a compelling case to justify a departure from this benchmark.

We have estimated a benchmark debt margin in the range of 336.6 to 365.8 basis points per annum (“bppa”) for the SWIS based on a BBB to BBB+ credit rating assumption. Our estimate is based on data on 10 year corporate bonds sourced from CBA Spectrum and reflects a 60 day trading average to 23 June 2008. It also includes an allowance of 12.5 bppa for debt establishment costs. It is recognised that the debt margin adopted for the purpose of the ERA’s decision-making will reflect the rates prevailing at the time(s) of those decision(s), or any agreement between the ERA and Western Power in relation to the sampling period for the measurement of the relevant rates.

We acknowledge that there has been some debate around the integrity of information sourced from CBA Spectrum. However, it is no longer feasible to demonstrate the systematic bias that is claimed to exist in the data. We also note that the ERA has relied upon data from CBA Spectrum in its recent final decision on the WACC for freight and urban railway networks.

6.1 Estimating gearing levels

In selecting an appropriate capital structure for the purposes of estimating WACC, it is standard practice to examine the gearing levels of other businesses operating in the same industry. Gearing levels adopted in other regulatory decisions are also a relevant consideration.

6.1.1 Market evidence

Table 2 below provides the observed gearing levels of comparable companies, where gearing is defined as net debt to total enterprise value. KPMG notes, however, that the sample of proxy companies available to establish a reasonable gearing assumption is relatively small and the evidence is mixed. In particular, a number of these groups own more than just regulated Australian energy network assets (e.g. APA, BBI, DUET, HDUF), making it difficult to obtain a transparent gearing estimate for regulated networks only. The available information also shows some significant variation in the gearing levels over time.

Table 2: Observed gearing levels of comparable companies

Company	2007	2008
APA Group (APA)	61%	72%
Babcock and Brown Infrastructure (BBI)	na	70%
Diversified Utilities and Energy Trust (DUET)	83%	73%
Envestra	89%	83%
Hastings Diversified Utilities Fund (HDUF)	42%	42%
SP AusNet	57%	60%
Spark Infrastructure	40%	59%

Source: Various ABNAMRO reports³⁶

In light of the current circumstances in the credit markets, the share prices of a number of these funds has come under considerable pressure and they have been making efforts to demonstrate the financial viability of their business models, including justifying the level of gearing.³⁷

6.1.2 Regulatory decisions

In Australia, an assumed gearing level of 60% has emerged as the regulatory benchmark for regulated electricity and gas network businesses, as shown in Table 3 below.

³⁶ Calculated as net book debt divided by net book debt plus the market value of equity.

³⁷ Australian Financial Review, Infrastructure and utilities present their case, 23 April 2008, page 32. See also <http://www.bbinfrastructure.com/media/342037/mar%20bbi%20securityholder%20newsletter.pdf>. Babcock and Brown Infrastructure argue that its gearing level is conservative. The AFR article referred to quotes it at 69%.

Table 3: Gearing values adopted in recent gas and electricity determinations

Decision	Date	Regulator	Gearing (D/V)
GasNet	April 2008	AER	60%
Victorian Gas Distribution	March 2008	ESC	60%
Victorian Electricity Transmission*	January 2008	AER	60%
Western Power Electricity T&D	March 2007	ERA	60%
Powerlink*	June 2007	AER	60%
SA Gas Distribution	June 2006	ESCOSA	60%
Queensland Gas Distribution	June 2006	QCA	60%
Country Energy Gas Distribution	November 2005	IPART	60%
Victorian Electricity Distribution	October 2005	ESC	60%
Alinta Gas Distribution	June 2005	ERA	60%
ETSA Utilities	June 2005	ESCOSA	60%
AGL Gas Networks	April 2005	IPART	60%
Queensland Electricity Distribution	April 2005	QCA	60%
NSW Electricity Distribution	June 2004	IPART	60%
Victorian Gas Distribution	October 2002	ESC	60%

* Decision issued by the AER under the NER

Having regard to the market evidence (including its limitations) and current regulatory practice, KPMG considers that a 60% gearing ratio is not an unreasonable assumption to adopt for the purpose of establishing the cost of capital for a highly asset-intensive energy network with regulated revenues.

6.2 Estimating the debt margin

For the purpose of determining the WACC for a regulated business, the debt margin is a premium added on to the risk free rate of return to derive the cost of debt financing. A number of factors influence the debt margin including:

- The credit worthiness of the entity, which is indicated by the credit rating of the entity. This rating in turn depends upon the financial ratios that flow from the firm's projected cash flows (given the benchmark regulatory assumptions made); and
- Debt raising / establishment costs.

This section examines these factors as well as the data sources that provide the appropriate information.

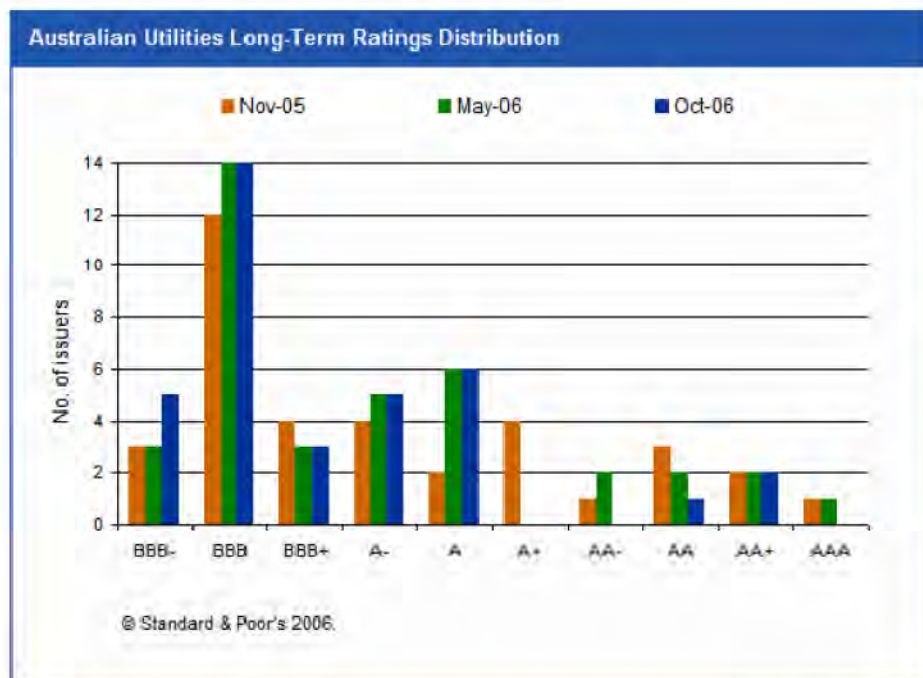
6.2.1 Credit rating assumption

The appropriate debt margin for a business will vary depending upon the assumptions made regarding the credit rating of the business. We have examined two key sources of information for the purpose of assessing an appropriate debt margin for Western Power:

- Market evidence on the credit ratings of comparable businesses; and
- Credit rating assumptions adopted by regulators in regulatory determinations of comparable businesses.

Market evidence

Information on the Australian utilities sector sourced from Standard & Poor's (S&P) indicates that the bulk of the issuers in the sector are currently rated "BBB" rather than "BBB+". However, we note that the sample of companies included within S&P's utilities database is very diverse and includes energy retailers, generators and other businesses operating in sectors upstream of energy networks. We do not consider that such companies would be representative of a benchmark energy network business. Accordingly, we believe it is necessary to examine the credit ratings of specific comparable entities included in S&P's analysis.



Source: Standard and Poors, Ratings Direct, Industry Report Card: Australian Utilities, 26 October 2006

S&P has recently produced an Industry Report Card.³⁸ Examining companies operating in the Australian energy networks sector, we find that:

³⁸ Standard and Poors, Industry Report Card: Australian Utilities' Credit Prospects Dimmed By Looming Shadow Of M&A, Climate, And Regulatory Risks, 9 May 2008.

- Envestra is rated: BBB-/Stable;
- DUET is rated: BBB-/stable;
- SP AusNet Group is rated: A-/Watch Negative; and
- Spark Infrastructure is not rated directly but assets it part owns (i.e. CitiPower, ETSA Utilities and Powercor) are rated: A-/Stable.³⁹

Determination of an appropriate benchmark credit rating assumption clearly depends upon the financial characteristics of those entities considered to represent an appropriate benchmark. Also relevant is the assumed benchmarking gearing applying to the business.

Regulatory practice

Table 4 below summarises the credit rating assumptions that have been adopted by Australian regulators for energy distribution businesses.

Table 4: Credit rating assumption in recent regulatory decisions

Decision	Date	Regulator	Assumed credit rating
GasNet	April 2008	AER	BBB+
Victorian Gas Distribution	March 2008	ESC	BBB+
Victorian Electricity Transmission	January 2008	AER	BBB+
Western Power Electricity T&D	March 2007	ERA	BBB to BBB+
Powerlink	March 2007	AER	BBB+
SA Gas Distribution	October 2006	ESCOSA	BBB
Queensland Gas Distribution	May 2006	QCA	BBB+
Country Energy Gas Distribution	January 2006	IPART	BBB
Victorian Electricity Distribution	October 2005	ESC	BBB+
AlintaGas Distribution	June 2005	ERA	BBB+
ETSA Utilities	June 2005	ESCOSA	BBB+
AGL Gas Networks	April 2005	IPART	BBB to BBB+
Queensland Electricity Distribution	April 2005	QCA	BBB+
NSW Electricity Distribution	June 2004	IPART	BBB to BBB+

The information from regulatory decisions supports the view that the appropriate credit rating is likely to be between BBB and BBB+, with the most likely rating being BBB+. A range of BBB to BBB+ is also consistent with the ERA's preferred methodology.⁴⁰

KPMG also notes that a study on the appropriate credit rating for a transmission business, prepared by Allen Consulting Group ("ACG") for the Electricity Transmission Network Owners

³⁹ There is no rating of APA, BBI or HDUF although some of the assets owned or part owned by these groups are rated. They are in the same range as the above examples.

⁴⁰ Paragraph 52 ERA February 2005 determination.

Forum⁴¹, advocated the use of a BBB+ credit rating for electricity transmission businesses. Whilst no direct conclusions were drawn regarding the use of a similar credit rating for electricity distribution businesses, KPMG notes ACG's observation that:

- *As a matter of principle, we consider that, as it is not possible statistically to distinguish the credit rating for a transmission and distribution entity that are otherwise identical, then it is more appropriate to treat these entities as being approximately similar and to 'pool' all observations to obtain a better estimate of the appropriate credit rating for the 'pool'. We note that, at a high level, the main cash flow characteristics of electricity transmission and distribution are similar – namely that both receive revenues that are calibrated to cost and then recalibrated at periodic intervals, and both are very capital intensive operations.*⁴²
- *The assumption that transmission and distribution entities are sufficiently similar to permit observations from both types of entities to be 'pooled' – and hence to provide a more robust estimate of the relevant parameter for the pool of entities – is consistent with the approach that Australian regulators typically adopt when deriving equity betas for regulated electricity transmission and distribution entities.*⁴³ and
- *...it is a reasonable assumption that the credit rating for otherwise identical regulated electricity and gas businesses would not be materially different, so that it is appropriate also to include gas businesses in the sample set.*⁴⁴

These statements by ACG would suggest that there is no strong basis upon which to conclude that the credit rating for a benchmark energy distribution business would be different from that of a benchmark transmission business.

Conclusion

Given the observed spread of the credit ratings for the companies that we considered (i.e. BBB- to A-) as reported by Standard & Poors and the 60% benchmark gearing assumption, we consider that a BBB to BBB+ credit rating would be reasonably representative of the credit rating that would apply to a benchmark electricity network business. It is also consistent with the ERA's preferred methodology.

6.2.2 Data sources

The ERA's preferred WACC methodology proposes to consider market evidence on debt margins sourced from CBA Spectrum and Bloomberg. However, as noted in ERA's recent determination on railway networks, limited reliance can be placed on Bloomberg as of November and December 2007 as it no longer publishes the relevant data for nine and ten year BBB+ rated corporate bonds in Australia due to the lack of a market for these bonds. Accordingly, a greater degree of reliance must necessarily be placed on data from CBA Spectrum.

As acknowledged by the ERA, there have been some concerns expressed over the integrity of data sourced from CBA Spectrum. These concerns were originally raised in a report

⁴¹ Allen Consulting Group, May 2006, Credit Rating for a Benchmark Electricity Transmission Business, A Report for the Electricity Transmission Network Owners Forum

⁴² ACG, May 2006, op cit, page 15

⁴³ ACG, May 2006, op cit, page 15

⁴⁴ ACG, May 2006, op cit, page 16.

commissioned by the Energy Networks Association (“ENA”) and undertaken by NERA in 2005. The evidence from this report indicated that the credit spread data provided by CBA Spectrum was under-stated by approximately 25 basis points for long dated corporate bonds:

The CBA Spectrum estimation procedure is such that CBA Spectrum estimated yields are expected to be, and in practice are, on average, less than actual yields for long dated, low rated bonds. Between 30 June 2003 and 10 May 2005, actual yields on Australian bonds with more than 6 years to maturity and ratings of A or below averaged 17.1 basis points higher than CBA Spectrum estimated yields on such bonds. For bonds with more than 8 years to maturity and ratings of A or below, the difference has averaged 22.2 basis points.

On this basis we consider that the minimum reasonable adjustment to CBA Spectrum estimates by regulators seeking to estimate the cost of debt on 10 year low rated debt is 22.2 basis points. Using only data from CBA Spectrum, our best estimate of the appropriate adjustment to CBA Spectrum estimates of yields on 10 year debt rated A or below is to add 25.6 basis points.⁴⁵

NERA attributed the under-statement in CBA Spectrum spreads to the estimation technique adopted by CBA Spectrum, which predicts the “fair value” yields on corporate bonds by fitting a set of curves to the data. NERA observed that the procedure understates the yields on longer dated and lower rated bonds because the prediction process is based upon the yield on a bond of the next highest credit rating of equivalent maturity:

For example, it introduces a phantom observation of a BBB rated 10 year corporate bond that has a credit spread that is equal to CBA Spectrum’s estimated credit spread for BBB+ 10 year bonds. Similarly, it introduces a phantom observation of a BBB+ 10 year bond that has a credit spread equal to CBA Spectrum’s estimated credit spread for A- 10 year bonds (and so on for higher credit ratings).⁴⁶

Given the lack of depth in the market for long dated bonds (particularly low rated long dated bonds), the estimation technique results in the predicted yields understating actual yields at the long end of the curve. NERA also compared CBA Spectrum predicted yields with Bloomberg yields and found that predicted yields understated actual yields by, on average, 25 basis points for low rated long dated bonds.

The information in Table 5 below is reproduced from the NERA report. It sets out the average difference in actual yields over CBA Spectrum fitted yields for a sample of seven bonds.

⁴⁵ NERA, Critique of available estimates of the credit spread on corporate bonds, A report for the ENA, May 2005, page 2. In submitting this report to the ESC as part of the 2006-2010 electricity distribution price review, the ENA noted that a copy of NERA’s report was provided to and discussed with representatives of CBA Spectrum, and that it had not identified any factual error in the report.

⁴⁶ NERA, op cit, page 5.

Table 5: Average differences between actual yields and CBA Spectrum fitted yields over the period 30 June 2003 through 10 May 2005 by bond

Bond	CFS Gandel 2010	Westfield	SPI Electricity	Tabcorp	Snowy	Stockland	CFS Gandel 2014
Average years to maturity	6.2	6.5	6.8	6.7	8.7	8.9	9.8
Credit rating	A	A	A-	BBB+	BBB+	A-	A
Average excess to CBA Spectrum (bp)	12.41	6.77	8.91	4.37	28.43	14.75	23.42

Source: NERA, Critique of available estimates of the credit spread on corporate bonds, A report for the ENA, May 2005, Table 2, page 10.

NERA also considered using data on yields from Bloomberg as an alternative to CBA Spectrum and concluded that actual yields were still understated but to a lesser extent. However, as noted earlier, Bloomberg no longer publishes relevant yields for nine and ten year BBB+ corporate bonds.

We note that NERA's analysis has been accepted by:

- The ESC in its 2006-2010 electricity distribution price review;
- The ERA in its last decision on Western Power's access arrangements and in its final decision on the access arrangements for the mid-west and south-west gas distribution systems owned by AlintaGas. In this decision, the ERA accepted the validity of NERA's analysis based upon advice it had received from the ACG⁴⁷; and
- The QCA in its decisions on the 2005 access arrangements for the gas distribution networks in Queensland, which allowed a 20-25 basis point premium to account for the downward bias in the data from CBA Spectrum.

However, we also note that NERA's analysis was rejected:

- By IPART in its 2005 decision on the access arrangements for Country Energy Gas, on the basis that it considered there was no credible evidence that CBA Spectrum consistently under-valued any class of bonds;⁴⁸ and
- More recently by the ESC in its 2008 Gas Access Arrangements Review, the AER in its decisions on SP AusNet and Electranet and the ERA in its recent determination on freight and urban railway networks.

⁴⁷ The Allen Consulting Group, Memorandum to Mr Peter Rixson, ERA, 11 July 2005 re: AGN cost of debt margin.

⁴⁸ IPART, Revised Access Arrangement for Country Energy Gas, Final Decision, November 2005, page 64.

Both the ESC and the ERA appear to have recently concluded that adequate reliance can be placed on CBA Spectrum data without the need to make any adjustment to CBA Spectrum yields.⁴⁹ By contrast, the AER's preference is to rely on Bloomberg data. In recent decisions, the AER has relied on extrapolated data from the 8 year BBB fair yield to replicate a 10 year benchmark BBB yield. The AER also undertook analysis which demonstrated that NERA's estimation of the bias was outdated or that the size of the bias has changed over time.⁵⁰

In our view, the reasoning provided by regulators for relatively quickly rejecting arguments they previously accepted in relation to the bias in CBA Spectrum fair value yields is not entirely convincing. That said, it is also the case that it is no longer readily feasible to demonstrate whether any bias exists due to limited data, which leaves regulators in a difficult situation. The limited information that is available would appear to imply that any understatement may have changed. We note that in the recent final decision on the WACC for freight and urban railway networks, the ERA's analysis did not uncover any evidence of systematic underestimation of yields by CBA Spectrum.

In our view, the practical reality is that there is an extremely high level of uncertainty in the credit markets at the current time and making an assessment of any bias that might exist in the illiquid long end of the market is likely to be fraught with additional difficulty and uncertainty. In these circumstances, to attempt to do so would in our view be unwise.

This issue can also be taken into account to some degree by taking a point estimate from the reasonable range for the credit ratings specified in the ERA's methodology.

Based on the considerations outlined above, we have relied on data from CBA Spectrum for 10 year BBB to BBB+ rated bonds average over the 60 days to 23 June 2008. We have therefore used a debt margin (before debt establishment costs) of 3.24% to 3.53%.

6.2.3 Debt establishment costs

This category of costs represents the transaction costs associated with raising debt capital and is paid to the bank or financial institution arranging such debt. We note that in the Australian Competition Tribunal decision on GasNet's appeal against the ACCC's decision on its transmission revenues, the Tribunal ordered that an allowance of 25 basis points be provided. There is, however, virtually no discussion in the GasNet decision concerning the rationale for the 25 basis points allowance and in subsequent decisions, neither the ACCC nor the AER have been compelled to treat the GasNet decision as a precedent in respect of this matter. It is also worth noting that the allowance in the GasNet decision is double the estimate adopted in many recent regulatory estimates of 12.5 basis points and since that decision, the ACCC has commissioned additional research by the ACG which suggests that the allowance should fall

⁴⁹ The ESC has relied upon advice provided by the Allen Consulting Group, 25 January 2008, Gas Access Arrangement Review 2008: updating estimates of debt margin for 20 trading days to November 2007 and December 2007, Memorandum to the Essential Services Commission. The ERA undertook its own analysis in the railway networks determination and did not find any evidence of systematic underestimation of yields by CBA Spectrum.

⁵⁰ AER, SP AusNet transmission determination 2008-09 to 2013-2014, January 2008, page 97. Notwithstanding this, it appears to agree with NERA's assessment of the limitations of CBA Spectrum. See footnote 86 on page 96.

somewhere between 8 bppa and 12.5 bppa, depending upon the size and frequency of the debt raising⁵¹.

Market information on debt establishment costs is difficult to access due to the lack of transparency in the domestic debt market. In the absence of such evidence, it is difficult to create a compelling case for a debt establishment cost much higher than 12.5 bppa.

6.2.4 Conclusion

Based on the analysis outlined above, we have estimated a debt margin (inclusive of debt establishment costs) of 336.6 to 365.8 basis points for a benchmark BBB-BBB+ rated energy network business geared to 60% in the current market environment.

⁵¹ The Allen Consulting Group, December 2004, Debt and Equity Raising Transaction Costs: Report to the Australian Competition and Consumer Commission

7 Market risk premium

For the purpose of establishing a WACC for the SWIS, we consider that 6% to 7% is a reasonable and conservative range to adopt. This range of values is supported by empirical data on long-term historical averages of the MRP in Australia. In particular, it takes into account recent academic research showing that MRP estimates based on pre-1958 data may be unreliable. We also note that the lower bound value of the range – 6% – is the value most commonly used by independent experts in valuations of companies subject to takeovers.

7.1 General

The equity market risk premium (“MRP”) represents the additional return over the risk-free rate of return that an investor would require as compensation for the risks of investing in a diversified equity portfolio. It is essentially a measure of investors’ appetite for risk.

Measurement of the MRP is a highly contentious issue. Notwithstanding this, regulators appear after a long and protracted debate to have settled on using a MRP of 6% in their decisions. The ERA’s position on the MRP, however, is somewhat unclear. We note that:

- The ERA’s preferred WACC methodology is silent on the ERA’s views on the MRP;
- In the previous determination on Western Power’s access arrangements for the SWIS, the ERA adopted a range of 5% to 6% for the MRP; and
- Most recently in its determination on railway networks, the ERA has adopted a point estimate of 6% for the MRP.

Given the lack of clarity over the ERA’s views, we consider that it is worthwhile revisiting the evidence on the MRP and the views surrounding its measurement. This section examines these issues in further detail.

7.2 Estimating the MRP

In theory, to estimate the MRP, it is necessary to measure the size of the risk premium that investors, on average, *require* over the risk-free rate to invest in the stock market. In essence, what it is really trying to determine is the *forward-looking* or ex-ante price that investors place on risk. The problem is that this forward-looking measure is not directly observable and the tools available to estimate the ex-ante MRP are inadequate.

In practice, there are three sources of evidence that can be used to estimate the MRP. These are:

- Reference to past levels of the MRP.
- Surveying of the expectations of investors or economists; and
- Applying ‘supply side’ approaches (such as the Dividend Growth Model).

In KPMG's view, the MRP is best estimated by reference to long term historical averages. Whilst all of the methodologies noted above are imperfect, we believe that past levels of MRP provide objective estimates of what the MRP has been and investors are likely to take into account past observations in forming their views on the required risk premium.

We do not advocate reliance on qualitative evidence from surveys for a number of reasons:

- Firstly, evidence from surveys are very much dependent upon the design of the survey question and the incentives of the survey promoter. For example, we are aware of past surveys which have indicated negative expectations of the ex-ante MRP which is irrational since investors expect to be compensated for risk⁵².
- We consider that estimates of the MRP produced by surveying brokers or fund managers or published in their marketing materials should be viewed with caution due to possible conflicts of interest. For example, it is possible that broker estimates may be biased in order to encourage individuals to actively trade in equities. In another example, the Economist has reported that Macquarie has used a variety of methods of triggering a revaluation of the assets it manages (and having a perverse incentive to do so to pay dividends other than out of operating cashflow), one of which has included *"reducing the rate used to discount cashflows because of a perceived reduction in risk, as it has on Britain's M6 motorway."*⁵³

We also do not advocate reliance on forward-looking supply side approaches to predict the MRP. In our view:

- Such approaches often require strong assumptions to be made regarding dividend growth rates in perpetuity, real GDP growth rates into perpetuity and constant levels of inflation, all of which are almost certain to be violated in reality⁵⁴. The persistence of the 'equity premium puzzle' warrants a high degree of caution to be applied to predictive approaches. This puzzle describes the inability of economic theory to rationalise the size of the historical US equity premium. As the founders of the puzzle have noted:

*"The puzzle cannot be dismissed lightly, since much of our economic intuition is based on the very class of models that falls short so dramatically when confronted with financial data. It underscores the failure of paradigms central to financial and economic modelling to capture the characteristics that appear to make stocks comparatively so risky."*⁵⁵

Furthermore:

⁵² Refer to the Jardine Fleming Capital Markets Survey 2001. It is irrational to for investors to demand a negative risk premium for investing in risky stocks versus risk free bonds. Investors can expect or forecast a negative equity risk premium, however, this would imply that the investors in the survey have been asked the wrong question.

⁵³ The Economist, "For whom the tolls swell", 17 April 2008.

⁵⁴ Refer Kortian, T. (1998), Australian sharemarket valuation and the equity premium, Dept of Finance, University of Sydney, unpublished manuscript. The study expressed considerable caution in using the dividend discount model due to the high degree of sensitivity of equity prices to changes in the dividend yield, which is in turn dependent upon the real bond yield, the rate of growth in real dividends per share and the equity premium. Kortian (1998) calculated that, if the dividend yield is currently 2%, then a 1% permanent decline in the equity premium would result in a 50% increase in share prices, all other things being constant. Such scenarios are highly unlikely to be borne out in reality.

⁵⁵ Mehra, R., and E. Prescott, The Equity Premium in Retrospect, Forthcoming in the Handbook of Economics of finance, Edited by G.M. Constantinides, M. Harris and R. Stulz, North Holland, Amsterdam.

“The data used to document the equity premium over the past 100 years is as good an economic data set as we have and this is long series when it comes to economic data. Before we dismiss the premium, not only do we need to understand the observed phenomena but we also need a plausible explanation why the future is likely to be any different from the past. In the absence of this, and based on what we currently know, we can make the following claim: over the long horizon, the equity premium is likely to be similar to what it has been in the past and the returns to investment in equity will continue to substantially dominate that in T-bills for investors with a long planning horizon.”

Given the lack of success that economic theory has had in rationalising the historical MRP to date, it would seem inappropriate to place weight upon studies that attempt to predict the ex-ante MRP using existing economic rationale.

7.3 Australian empirical evidence – long term historical averages

Empirical evidence based on the market risk premium in Australia indicates a historical average MRP in the range of 5% to 8%, with the majority of observations falling in the range of 6% to 8%. Table 6 below sets out the measured historical MRP in Australia reported in various studies and research.

Table 6: Measured historical MRP in Australia

Source	Period	Risk premium (%)
AGSM:		
Arithmetic average, incl. October 1987	1974-1995	6.2
Arithmetic average, excl October 1987	1974-1995	8.1
Arithmetic average ⁵⁶	1974-1998	4.8
Arithmetic average, incl. October 1987 ⁵⁷	1974 – Sep 2000	6.2
Arithmetic average, excl October 1987	1974 – Sep 2000	7.7
Officer (1989) – arithmetic mean	1882 – 1987	7.9
Officer (1989) updated – arithmetic mean ⁵⁸	1882 – 2001	7.2
Officer ⁵⁹ :		
Arithmetic mean	1946-1991	6.0 to 6.5
Hathaway (1996) ⁶⁰		
Arithmetic mean	1882-1991	7.7
Arithmetic mean	1947-1991	6.6
Gray (2001) (note 1)	1883 – 2000	7.3
Dimson, Marsh and Staunton (2000) ⁶¹	1900 – 2000	7.6
Capital Research (2005) ²	1875 – 2005	4.5 (adjusted) 6.0 (unadjusted)
South Australia Centre for Economics Studies (2005) ³	1974 – 2003	4.5% to 5.0%
Allen Consulting Group (2006) ⁴		
	1975 – 2004	7.70%
	1970 – 2004	4.04%
	1960 – 2004	5.27%
	1955 – 2004	6.43%
	1950 – 2004	6.77%
	1930 – 2004	6.58%
	1905 – 2004	7.15%
	1900 – 2004	7.26%
	1885 - 2004	7.17%
Brailsford, Handley & Maheswaran (2007) ⁶² (Note 5)	1883 – 2005	6.2%
	1958 - 2005	6.3%
Brailsford, Handley & Maheswaran (2007) – imputation credits valued at 100%		
	1883 – 2005	6.5%
	1958 – 2005	7.0%
- imputation credits valued at 50%		
	1883 – 2005	6.3%
	1958 - 2005	6.7%

⁵⁶ Refer ABN AMRO (1999) Submission to the Office of the Regulator General Victoria Regarding 2001 Electricity Distribution Price Review; the Cost of Capital Financing (Consultation Paper No. 4) p12. A copy of this is available at http://archive.esc.vic.gov.au/1999/electric_Conspap4Resp_abnamro.pdf

⁵⁷ Referred to in independent expert report by Deloitte Touche Tohmatsu dated 19 December 2000 to Woodside Petroleum shareholders in relation to a takeover offer by Shell Investments.

⁵⁸ ABN AMRO (1999), op cit, p12

⁵⁹ Officer, R.R. (1992), Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective, as updated for a 1993 Seminar at the University of Melbourne.

⁶⁰ ABN AMRO (1999), op cit, p12.

⁶¹ Dimson, Marsh and Staunton, "Twelve Centuries of Capital Market Returns", Business Strategy Review, 2000, Vol 11 Issue 2

⁶² Brailsford, T., J.C. Handley & K. Maheswaran, A Re-examination of the historical equity risk premium in Australia, April 2007, Working paper.

Source	Period	Risk premium (%)
Notes:		
1	Gray (2001) is based on an update of Officer's work as reported in S. Gray, Issues in Cost of Capital Estimation, 19 October 2001 downloadable at http://www.esc.vic.gov.au/PDF/2001/SubUQBS_GasPosPapOct01.pdf	
2	Capital Research Ltd 2005, Australian Market Risk Premium, January, Submission to the ESC Victoria in response to the Position Paper issued in relation to the 2005 electricity distribution price review.	
3	SACES, 2005, The Market Risk Premium for Australian Regulatory Decisions, 28 April, Adelaide, Submission to the ESC Victoria in response to the Position Paper issued in relation to the 2005 electricity distribution price review.	
4	Allen Consulting Group (2006), Envestra's Proposed Revisions to its Access Arrangements, as referred to in SFG (3 May 2006), Issues on the regulated rate of return for gas distribution assets: A report prepared for Envestra.	
5	Results are reported as arithmetic means and relative to bonds.	

7.3.1 Interpreting the historical evidence

In interpreting the evidence presented above, KPMG notes that the MRP estimates show some degree of variation but have remained largely within the 6% to 8% range. Although the degree of variation would appear to be relatively wide, we do not find the variance surprising given that it is widely accepted that the actual MRP varies from one point in time to another.

Where historical averages are used, KPMG would normally support an approach which takes a longer term view on the MRP as it leads to a lower standard error of the estimated MRP. This can be seen from previous work undertaken during the 2001 Victorian electricity distribution price review and shown in Table 7 below, which demonstrates that over the period 1883 – 2000, the average Australian MRP is 7.3% with a standard error of 1.56%, whereas the estimate from 1971 – 2000 is 4.8%, but is much less reliable with a standard error of 4.4%.

Table 7: Historical Australian Market Risk premium with varying start and finish years

Start Year	Finish Year	Mean %	Standard Error %
1883	2000	7.3	1.56
1883	1970	8.2	1.5
1971	2000	4.8	4.4

Source: Gray, S (2001), Issues in Cost of Capital Estimation, available at http://www.esc.vic.gov.au/PDF/2001/SubUQBS_GasPosPapOct01.pdf

More recently, however, Brailsford, Handley and Maheswaran (2007)⁶³ have highlighted that the data prior to 1958 that has conventionally been used to compute the historical market risk premium in Australia should be treated with caution due to data quality concerns. In their study, Brailsford et al found that using data from the period 1958 – 2005, the historical equity risk premium in Australia relative to bonds is 6.3% assuming zero value for imputation credits, 6.7% assuming imputation credits are valued at 50 cents in the dollar, and 7.0% assuming imputation credits are fully valued. Brailsford et al also conducted analysis which indicated their results are consistent with those reported by Officer (1989) and Dimson et al (2002) once data quality factors are taken into account.

Capital Research (2005) and SACES (2005)

We also draw Western Power's attention to the recent studies from Capital Research (2005) and the South Australian Centre for Economic Studies (2005) which are identified in Table 6. Both of these studies have been relied upon by a number of regulators to support the case for a lower MRP value. However, as outlined below, we consider that the results from these studies should be treated with caution.

Capital Research (2005) and SACES (2005) both claim that the long-term arithmetic average MRP observed in the market is likely to significantly overstate the expected MRP. They reach this conclusion after making various adjustments to their data, and estimate that the current MRP lies in the range of 4.5 to 6.0 percent. However, a critique of the methodologies employed in these studies by Gray and Officer (2005)⁶⁴ noted that it is inappropriate to make ad hoc adjustments to historical data for unanticipated events because unanticipated events are the reason that the market risk premium exists.

Gray and Officer (2005) also note that whilst the MRP is an ex-ante concept, it is difficult to obtain forecasts that can be used with any degree of confidence. Forward-looking models tend to have low forecast ability, and under such circumstances, it is common for many economic forecasts to be based on projections of historical data, relying on the notion that the expectations of investors will be framed on the basis of their past experiences.

Gray and Officer (2005) expressed preference for MRP estimates of between 6.4% and 7.7% after removal of the adjustments made by Capital Research and SACES, and application of their preferred methodology. The unadjusted data used in Capital Research (2005) and SACES (2005) also support the proposition that historical MRP is at least 6% over various measurement periods, both short and long.

Further support for Gray and Officer (2005) is provided in the recent 2008-2012 gas access arrangements review in Victoria. In commenting on the papers by Capital Research and SACES, Bishop (2007)⁶⁵ reinforced the concern raised by Gray and Officer (2005) regarding the arbitrary removal of data from time series information particularly in the absence of evidence on what might drive structural change in the MRP. Using data for the period 1974-2006, Bishop (2007) found that the average MRP has increased compared to SACES (2005)

⁶³ Op cit

⁶⁴ Officer, R. R. and S. Gray, (Aug 2005), "A review of market risk premium and commentary on two recent papers: A Report prepared for the Energy Networks Association"

⁶⁵ Bishop, S., Market Risk Premium: Commentary on Recent Papers, Capital Value, 24 October 2007.

which used data from 1974 to 2003. This was also the case with the ‘filtered’ MRP results using the technique applied in SACES (2005).

7.4 Market practice

KPMG is aware that it is common market practice to assume a value of 6% for the market risk premium in company valuations. This evidence is reflected in a 2005 KPMG study which examined the valuation practices of independent experts in conducting valuations of companies subject to takeovers.⁶⁶ Although the principal focus of the study was on the value adopted by experts in relation to imputation credits, the study also revealed that of those reports (i.e. 33 out of 118 reports) that adopted the Capital Asset Pricing Model for estimating the cost of equity:

- All adopted a value for the MRP within the range of 6% to 8%, and
- 25 reports (or 76%) adopted 6% as a point estimate for the MRP. The report observed that this value prevailed despite the fact that most expert reports acknowledged the uncertainty surrounding the measurement of the parameter and raised the possibility that the MRP has fallen below historical levels. This evidence suggested that such factors were not considered by expert valuers as being sufficient to warrant adopting a value for the MRP much higher than 6%, on average.

7.5 The measured MRP and the value of franking tax credits

KPMG also notes that post-1987 MRP data is biased downwards since the market index used to measure the MRP does not capture the average value of franking tax credits. We note that in its final determination on the 2003 Victorian gas access arrangements, the ESC estimated that the inclusion of the average value of franking credits since 1987 would add 0.2 percentage points onto the long term average. However, in the minutes to the Trinity Best Practice Committee Meeting which discussed the results of the Jardine Fleming Capital Markets Survey 2001⁶⁷, Professor Robert Officer stated that:

“...if you assume that franking credits represent about 20% of total stock returns, the historic ERP could be biased downward by as much as 1%.”⁶⁸

The results of Brailsford et al (2007) also suggest that taking into account imputation credits would raise the measured historical equity risk premium by as much as 0.7% (see Table 6 data).

⁶⁶ KPMG, Cost of Capital – Market practice in relation to imputation credits, prepared for the Victorian electricity distributors, August 2005.

⁶⁷ Jardine Fleming Capital Partners Limited, The Equity Risk Premium – An Australian Perspective, Trinity Best Practice Committee, September 2001.

⁶⁸ This increment of 1% estimated by Officer is also consistent with the increment that Mercer Investment Consulting advised that it would apply to the equity premium to account for imputation credits. Refer page 330 of the ESC’s 2003 Review of Gas Access Arrangements, Final Determination.

7.6 Regulatory decisions

Table 8 below sets out the MRP assumptions that have been recently adopted by Australian regulators for energy network businesses.

Table 8: MRP values adopted in recent energy network business regulatory decisions

Decision	Date	Regulator	MRP value
GasNet	April 2008	AER	6%
Victorian Gas Distributors	March 2008	ESC	6%
Victorian Electricity Transmission*	January 2008	AER	6%
Western Power Electricity T&D	March 2007	ERA	5% to 6%
Powerlink *	June 2007	AER	6%
SA Gas Distribution	October 2006	ESCOSA	6%
Queensland Gas Distribution	May 2006	QCA	6%
Country Energy Gas Distribution	November 2005	IPART	6%
Victorian Electricity Distribution	October 2005	ESC	6%
AlintaGas Distribution	June 2005	ERA	5% to 6%
ETSA Utilities	June 2005	ESCOSA	6%
AGL Gas Networks	April 2005	IPART	5.5% to 6.5%
Queensland Electricity Distribution	April 2005	QCA	6%
NSW Electricity Distribution	June 2004	IPART	5% to 6%

* Decision issued by the AER under the NER

With the exception of the NSW regulator, IPART, and the WA regulator, the ERA, regulators around Australia have consistently adopted a point estimate of 6% for the MRP. In respect of IPART, it is also worth noting that it now uses an estimate of 6% or a range with a mid-point of 6%. This is evident in its more recent decisions on:

- AGL Gas Networks – In the final decision, IPART commented that it was “... satisfied that a market risk premium of 5.5% to 6.5% uniformly distributed meets the requirements of the Code.”⁶⁹; and
- Country Energy Gas Networks – In its final decision, IPART stated that it was satisfied that CECG’s proposed market risk premium of 6.0 per cent was commensurate with prevailing conditions in the market for funds and met the requirements of Section 8.30 of the Code.⁷⁰

⁶⁹ Revised Access Arrangements for AGL Gas Networks, April 2005, Final Decision, page 97.

⁷⁰ Revised Access Arrangements for Country Energy Gas Networks, November 2005, Final Decision, page 64. It is also evident from its more recent decisions in the water and retail electricity sectors.

The ERA's position

In its 2007 determination in relation to Western Power, the ERA adopted a range of 5% to 6% for the MRP. This same approach was also adopted in relation to its 2005 determination on AlintaGas Distribution. However, more recently, the ERA would appear to have changed its position on the MRP, adopting an MRP of 6% in its final decision on the WACC for the Freight (WestNet Rail) and Urban (Public Transport Authority) Railway Networks.⁷¹

We note that the ERA's preferred methodology is silent on its views on the MRP. However, in its previous determination on Western Power, the ERA provided the following reasons for its views on the MRP:

- 1 Values above 6% reflect too great a weight being placed on analysis of historical returns in the Australian stock market, and insufficient weight being given to factors that suggest that the expectation of future market returns may be less than historical returns. These factors include:
 - Changes in the Australian stock market over the course of its history, particularly a shift in market composition away from resources stocks, which have higher risk and hence, on average, higher expected returns (although this trend may have reversed somewhat in recent times at least in terms of relative stock market valuation);
 - Changes in the Australian economy, particularly increased financial integration with other developed economies, which may enable greater diversification of risk and reduce the risk premiums required by investors; and
 - Declining transaction costs, which has also allowed greater diversification by market participants reducing the risk premium they require;
- 2 The Authority considered that the value for the MRP should reflect the expected MRP at the current time rather than historical averages of the realised MRP from past periods. International analysis on the former suggests that the MRP in the future can be expected to be lower than the MRP realised in the past;
- 3 Survey evidence reported by the Essential Services Commission in Victoria⁷² as part of the 2003 Gas Access Arrangements Review indicated that the historical MRP was 5.87% on average and that the average of future expectations of the MRP was about 1% less;
- 4 More recent forward-looking analyses of the MRP and surveys of market practitioners' expectations of the future MRP support the assumption of an MRP of 6% or less. This evidence has been noted in a report prepared by the ACG⁷³; and

⁷¹ Economic Regulation Authority, Final Determination: 2008 Weighted Average Cost of Capital for the Freight (WestNet Rail) and Urban (Public Transport Authority) Railway Networks, 23 June 2008.

⁷² Jardine Fleming Capital Partners Limited, September 2001, The Equity Risk Premium – An Australian perspective, Trinity Best Practice Committee.

⁷³ Allen Consulting Group, Cost of Capital for Queensland Gas Distribution, Report to the Queensland Competition Authority, December 2005.

- 5 Ex-ante estimates (from a range of different sources) of the MRP made for Australian equity markets using the dividend growth model (“DGM”) methodology suggest that historical realised MRP values will overstate the future MRP.

KPMG does not support the ERA’s rationale for adopting an MRP value in the range of 5% to 6% in its last determination for Western Power for the following reasons:

- First, the MRP is a parameter that has been subject to much debate particularly in relation to the way in which its value is empirically measured. As such, in arriving at a view on the appropriate value of the MRP, it is necessary to focus on the quality of the evidence produced by different measurement techniques. Whilst the ERA has questioned the use of historical averages of the realised MRP as a proxy for the future expected MRP, it has not adequately considered the quality of some of the alternative forward-looking methodologies that it has relied on, namely, survey-based evidence and estimates produced by the DGM methodology. Adequate consideration of the quality of the evidence would result in a lower weight being placed on estimates derived from forward-looking and survey-based methodologies.
- Second, the ERA relied heavily on analysis contained in a report prepared by the ACG for the Queensland Competition Authority (referred to as ACG (2005)), which suggests that long term historical average MRP measurements significantly overstate the expected MRP, and that structural changes in the composition of the Australian stock market and the Australian economy over time have reduced the volatility of the Australian market, which “should have” resulted in investors lowering their required rates of return⁷⁴. Although these factors have been advanced as being possible reasons for a reduced risk premium, ACG does not provide any hard evidence that investors have in fact reduced their required returns. We therefore believe that limited reliance should be placed on the views expressed in ACG (2005). ACG’s report draws support for its views by reference to reports prepared by Capital Research (2005)⁷⁵ and SACES (2005)⁷⁶ which attempt to adjust the historical realised MRP for non-recurring and other events, in order to arrive at what could be considered a normalised forward-looking MRP. However, as discussed in Section 7.3.1 above, the critique by Gray and Officer (2005)⁷⁷ and more recently Bishop (2007), of the ad-hoc data adjustments made by Capital Research (2005) and SACES (2005) provide compelling reasons to question the theoretical and empirical validity of that work.

In view of the above considerations, we consider that the ERA’s conclusions on the value for the MRP are not appropriately supported.

⁷⁴ Allen consulting Group (December 2005), op cit, page 64.

⁷⁵ Capital Research Ltd 2005, op cit.

⁷⁶ SACES, 2005, op cit

⁷⁷ Gray, S and R.R. Officer (2005), A review of the market risk premium and commentary on two recent papers – A report for the Energy Networks Association, August.

7.7 Conclusion

KPMG supports the estimation of the MRP by reference to long term historical averages. The evidence that we have reviewed provides strong support for an Australian MRP in the range of 6% to 8%. Within this range:

- 6% is the value most commonly used value by independent experts in valuations of companies subject to takeovers; and
- We are cognisant of the data quality issues associated with those empirical studies which rely upon Australian data prior to 1958, as reported in Brailsford et al (2007). In particular, we note that Brailsford et al (2007) estimate an MRP in the range of 6.3% to 7.0% (based on data from 1958 to 2005), depending on the value assumed for imputation credits.

We note that the ERA's determination on its preferred methodology for calculating the WACC for covered electricity networks is silent on its views in relation to the MRP. However, in its recent final determination on freight and urban railway networks, the ERA adopted an MRP of 6% after consideration of information on historical averages and current expectations of market participants.

KPMG concurs that current market practice is a relevant consideration in determining a reasonable value to adopt for the MRP. However, we do not consider that such evidence should be based upon the studies by SACES (2005) and Capital Research (2005) given the limitations of these studies.

Based on our examination of the remaining evidence discussed in this report, we consider that 6% represents a reasonable lower bound value for the MRP. Whilst there is still support for an upper bound value of 8% based on historical evidence, we note the data quality issues highlighted in Brailsford et al (2007) which led them to conclude that some existing historical estimates (particularly those using pre-1958 data) have overstated the MRP. On this basis, a value of 7% may provide a more conservative upper bound estimate.

8 Beta

For the purpose of estimating a WACC for the SWIS, we consider that it is reasonable to adopt a range of 0.90 to 1.10 for the equity beta. Our choice of values reflects the view that a reasonable range for the equity beta would have to include a value of 1.0, preferably as a central estimate.

In forming our views, we note that empirical measurement of the equity beta is an inherently difficult exercise due to the small sample size and data limitations. We are cognisant that there is considerable pressure from regulators to reduce the value of the equity beta, however, we question whether it is possible for regulators to conclude with a sufficient degree of confidence that current observations reflect a 'true' estimate of company betas. Comprehensive analysis undertaken for the Victorian gas distribution businesses by SFG Consulting suggests that there are strong reasons not to depart from an equity beta of 1.0, and it also recommends using 0.90 to 1.10 as a reasonable range.

8.1 Introduction

Under the CAPM, the total risk of an asset can be divided into two parts: systematic risk and unsystematic risk. Systematic risk is a function of broad macroeconomic factors that affect the prices of all assets. Unsystematic risk⁷⁸ is a function of the characteristics associated with a particular asset as opposed to the overall market.

Under CAPM theory, investors can eliminate unsystematic risk by holding a diversified portfolio of assets. The rationale is that in a diversified portfolio, positive events affecting some stocks are offset by negative events affecting other stocks, so that on average, the overall return on a diversified portfolio will equate to the weighted average expected return on all stocks in the portfolio. Hence, it is assumed that investors do not care about unsystematic risk and do not require any compensation for such risk in the form of a higher return. By contrast, diversification cannot eliminate systematic risk since it affects all stocks. Under the CAPM, the systematic risk of an asset is measured by its 'beta' factor, which reflects the contribution of that asset to risk of a diversified investor's portfolio.

In statistical terms, the beta factors reflect the extent to which possible future returns are expected to co-vary with the overall market return. A beta of 1 means the asset has the same risk as the market whereas a low risk asset will have a beta less than one and display less systematic response to market-wide events than will the average asset.

8.1.1 Estimation method and issues

Equity beta

Betas are usually estimated by regressing historical share market returns against a market index. There are a number of services that provide such estimates including, the Risk Measurement Service of the Centre for Research in Finance at the Australian Graduate School of

⁷⁸ Unsystematic risk is also commonly referred to as unique risk, diversifiable risk or non-market risk.

Management's ("AGSM") Centre for Research in Finance ("CRIF"), London Business School, Bloomberg, DataStream, and Value Line. These services can assist in quantifying the likely equity beta for a stock, however, we stress that such estimates provide a *guide* rather than a definitive estimate of the appropriate equity beta for a stock. There are a number of reasons for this.

- Estimation error is high. Confidence intervals around beta estimates are quite wide and in addition, betas vary over time and often, significantly so. The AGSM beta estimates shown later in Table 10 demonstrate the extent of the imprecision in the estimates.
- Beta estimates are highly sensitive to outlier observations. Some beta estimates can shift substantially (e.g. from negative to positive) when outliers are removed.
- In theory, the market portfolio under the CAPM should be a market value weighted index of the entire universe of investable assets – not just equity. However, in practice no such index exists. As a result, it is necessary to adopt a proxy for the market portfolio. An overall market index is the most common choice for a proxy, however, even so, many market indices exist and each one will produce a different measure of the equity beta for a stock.
- Beta estimates can be measured over different return intervals – daily, weekly (including weekly ending or starting on specific days) or monthly. Depending on the size of the return interval, return correlations between the stock and the market may or may not be properly captured.
- Beta estimates from different data sources are measured using different techniques and timeframes. For instance, CRIF at AGSM uses 48 monthly observations Bloomberg uses 60 monthly observations. These different measurement bases can cause differences in estimates.
- Comparables are used as a guide if the business under examination is not listed or there is too much estimation error to rely solely on the beta estimate for one business alone if it is listed. Unfortunately there are relatively few listed, pure play comparables. Often, comparables from other countries are used as a guide in order to present an expanded data set for consideration. However, interpretation of overseas data presents additional challenges because different tax regimes can influence financial leverage and different mixes of industries and sectors can mean betas relative to the home country index would not be the same as those relative to an Australian index. The Australian economy is quite unusual in that it is very heavily influenced by the resources sector. Thus translating betas from other countries to Australia requires careful consideration.
- Since financial leverage can vary across industries, countries and firms, and furthermore, financial leverage is a determinant of equity beta, it is common to de-lever comparable betas to arrive at an "asset" beta then to re-lever at the target financial leverage considered appropriate for the business in question. However, there are a number of different formulas that can be applied to de-lever/re-lever betas which adds a further layer of complexity.

- Regulated utilities face an asymmetry in their return distribution⁷⁹ due to limitations in upside price potential. There is some evidence to indicate that the conventional CAPM cost of equity understates the true cost of equity. Conine and Tamarkin (1985) demonstrates this with testing on a sample of 60 utilities over the period from 1971 – 1980 and their results indicated that on average, the cost of equity was understated by approximately 1.35 percentage points.⁸⁰ The Productivity Commission, in its draft report on the Review of the Gas Access Regime also noted that “*The total risk distribution is relevant considering ROR truncation. The reason being that the asymmetric truncation of unsystematic risk causes its mean to be less than zero, thereby reducing the expected value of ROR.*” [emphasis added]⁸¹

⁸¹ In particular, the Productivity Commission’s analysis highlighted that:

- Regulators typically institute benefit-sharing arrangements under price capping regimes when realised returns exceed expected returns to benefit users. However, “*In implementing such a process, the regulator risks truncating the distribution of the ROR (total risk). If this occurs, the expected value and standard deviation of the ROR for these regulated assets will be altered and the expected ROR will no longer be consistent with the choice of asset beta.*”⁸²; and
- The consequence of asymmetric truncation of returns for regulated utilities is that “*... as the degree of asymmetric truncation increases, the coefficient of variation increases, distorting the risk-return trade-off for the investment. Compared with the unregulated situation, the regulated investment offers a lower expected value of ROR for comparable levels of risk.*”⁸³

The discussion above serves to highlight that selection of an appropriate value for beta for a regulated utility entails more than merely selecting a number from a beta measurement service. It also requires an understanding of the limitations of the CAPM particularly as the concept is applied to regulated utilities that face an asymmetric truncated return distribution, the measurement biases that can arise, and the exercise of careful judgment. KPMG’s estimate of the appropriate value for beta is the outcome of a number of processes guided by theory, evidence and practice.

8.2 Equity beta estimates

8.2.1 Evidence from recent regulatory decisions in Australia

Table 9 below provides a summary of betas assumed during recent regulatory reviews of energy network pricing. The information displayed below indicates that most regulators are now adopting an equity beta value in the range of 0.80 to 1.00.

⁷⁹ Specifically, regulated utilities faced a truncated distribution of returns. Factors contributing to this includes regulatory lag, unexpected price inflation, and risks arising from the discretions afforded to price regulators.

⁸⁰ Conine, T.E., and M. Tamarkin, Implications of skewness in returns for utilities cost of equity capital, Financial Management, Winter 1985, p. 66-71. Specifically the study noted that the standard CAPM estimate for the utilities in their sample was 15.81% as compared with 17.16% under a model that was adjusted to deal with skewness.

⁸¹ Productivity Commission 2003, Review of the Gas Access Regime, Draft Report, Canberra, page 393.

⁸² Ibid, page 396.

⁸³ Ibid, page 400.

The approach used by most regulators has been to recognize that available empirical information suggests that equity betas may have declined in recent times; however, there is concern that the data is not sufficiently robust to enable full reliance on such data. Hence, regulators have also chosen to rely upon precedents set by other regulatory decisions. The outcome of this approach is reflected in equity beta values which place a higher degree of reliance on empirical data at the low end of the range and a lower degree of reliance at the high end of the range. The reverse applies in relation to the degree of reliance placed upon regulatory precedents.

Table 9: Beta values determined at recent network access arrangement reviews

Gas decision	Date	Regulator	Equity beta	Asset beta
GasNet	April 2008	AER	1.00	na
Victorian Gas Distribution ⁸⁴	March 2008	ESC	0.70**	na
Victorian Electricity Transmission*	January 2008	AER	1.00	na
Western Power Electricity T&D	July 2007	ERA	0.80-1.00	na
Powerlink *	June 2007	AER	1.00	na
Envestra SA	June 2006	ESCOSA	0.80-1.00	na
Queensland Gas Distribution	June 2006	QCA	1.10	0.60
Country Energy Gas	November 2005	IPART	0.80-1.00	0.32-0.4
Victorian Electricity Distribution	October 2005	ESC	1.00	na
ETSA Utilities	June 2005	ESCOSA	0.90	0.36
AlintaGas	June 2005	ERA	0.80-1.00	0.32-0.4
Qld Electricity Distribution	April 2005	QCA	0.90	0.45
AGL Gas Networks	April 2005	IPART	0.80-1.00	0.32-0.4
NSW Electricity Distribution	June 2004	IPART	0.78-1.12	0.35-0.45
Victorian Gas Distribution	October 2002	ESC	1.00	0.40-0.54
* Decision issued by the AER under the NER				
** The ESC provided a separate allowance to reflect a beta of 0.8.				

KPMG acknowledges that increasingly, the equity beta values adopted in recently regulatory decisions are reflecting the view that the equity beta for regulated network businesses have declined from their past levels. Nevertheless, KPMG remains unconvinced that the basis for such a conclusion is valid. KPMG understands that the market evidence on equity betas is sufficiently mixed and is highly affected by measurement errors. This matter is discussed further in the section below.

8.2.2 Market evidence – equity betas

AGSM data

As noted above, it is conventional practice to estimate an appropriate beta having regard to recent empirical evidence on the betas of comparable publicly listed companies.

⁸⁴ The ESC provided a separate allowance to reflect a beta of 0.8. Refer Final Decision: Gas Access Arrangement Review 2008-2012, 7 March 2008, page 13, 2007.

With the public listing of entities such as Spark Infrastructure, Hastings Diversified Trust, DUET and SP AusNet over recent years, the Australian proxy group has expanded and become more specific and therefore relevant compared to what was previously available (e.g. AGL, Alinta, GasNet, Envestra and the Australian Pipeline Trust – now the APA Group). Nevertheless the group of comparables remains small and in some cases these businesses have only been listed for a relatively short period of time and/or own assets other than regulated Australian energy infrastructure. A further problem is that the beta estimates of these companies display a high degree of variation.

Table 10 below, for example, sets out the betas of these seven Australian publicly listed comparable companies commonly included in the analysis of proxy betas, and highlights the extent of the instability of the data over time. The betas have been derived from the AGSM Risk Measurement Service as reported over up to the past seven quarters. The figures shown in parentheses indicate the high-low ranges provided by the AGSM.

Table 10: AGSM Equity Beta for selected energy network owners

Equity beta estimates measured over the 48 month ended ⁸⁵							
Company	Jun 2006	Sep 2006	Dec 2006	Mar 2007	Jun 2007	Sep 2007	Dec 2007
Envestra	-0.10 (-0.24 to 0.04)	-0.02 (-0.17 to 0.13)	-0.05 (-0.21 to 0.11)	0.08 (-0.1 to 0.26)	0.08 (-0.1 to 0.26)	0.13 (-0.05 to 0.3)	0.28 (0.09 to 0.46)
APA			0.55 (0.26 to 0.84)	0.50 (0.17 to 0.82)	0.53 (0.21 to 0.85)	0.56 (0.25 to 0.88)	0.68 (0.39 to 0.98)
DUET	0.37 (0.11 to 0.63)	0.50 (0.24 to 0.76)	0.50 (0.26 to 0.74)	0.56 (0.3 to 0.81)	0.52 (0.26 to 0.78)	0.73 (0.43 to 1.02)	0.89 (0.62 to 1.16)
SP AusNet	na	na	na	na	na	0.41 (0.09 to 0.74)	0.43 (0.16 to 0.70)
Spark Infrastructure	na	na	na	na	na	0.09 (-0.32 to 0.49)	0.11 (-0.22 to 0.44)
BBI	na	na	0.14 (-0.21 to 0.48)	0.12 (-0.27 to 0.51)	0.18 (-0.17 to 0.54)	0.26 (-0.09 to 0.60)	0.29 (-0.05 to 0.62)
Hastings Diversified Utility Fund	na	na	0.42 (0.15 to 0.70)	0.46 (0.19 to 0.72)	0.43 (0.18 to 0.68)	0.25 (0 to 0.50)	0.42 (0.16 to 0.69)

Source: AGSM Risk Measurement Service
 1 AGSM data for the March 2008 quarter were not available at the date of writing this report

It is evident that there is substantial variation in the estimates both over time, cross-sectionally and within the low-high estimates provided by the AGSM. The variation is, in part, attributable

⁸⁵ Betas have been estimated by applying the Ordinary Least Squares (OLS) technique

to the sensitivity of beta estimates to outlier observations. Despite the limitations in the data, looking across time, it is evident that betas have been trending upwards in recent times.

Methodological issues raised in SFG (2005a)

Comprehensive research and analysis on the estimation of the equity beta for Australian energy distribution businesses was originally undertaken by SFG (2005a)⁸⁶. This study identifies a range of methodological issues associated with conventional approaches used to estimate company betas. The key conclusion from the study is that beta estimates are often highly imprecise. Where this is the case, such estimates should not be regarded as the true “steady state” beta for the company. We consider that this is an important point to emphasise with the ERA.

The key points made in SFG (2005a) are:

- Estimates of beta obtained from commercial data service providers such the Risk Measurement Service (“RMS”) provided by the AGSM are typically measured mechanically. That is, they are estimated by applying the Ordinary Least Squares (“OLS”) technique without any adjustment for statistical outliers, non-representative data points, or market episodes such as crashes or bubbles. Without such adjustments, the statistical precision of estimates of beta is often very low:
- 95% confidence intervals constructed around the December 2004 AGSM estimates of the equity betas for AGL, Alinta, Envestra and APT (re-levered to 60% gearing), indicates that the range is so broad that the estimates are virtually meaningless. In most cases it is impossible to reject the hypothesis that the equity beta is well above 1.0, just as it is impossible to reject the hypothesis that it is below 0;⁸⁷
- The R^2 statistic, which is a measure of the proportion of variation in stock returns that is explained by variation in market returns, is also typically low for unadjusted beta estimates. Reference is made to Bowman and Bush (2004)⁸⁸ which recommended that beta estimates for comparable firms should be used only if the R^2 statistic is above 10%. Where more than 90% of the variation is caused by firm-specific diversifiable risk factors, estimates of beta are too unreliable to be of any use.
- Estimates of beta derived mechanically often may not make any sense. It was noted that:
“...for example, in the most recent beta report from the Risk Measurement Service at the AGSM (December 2004) more than 10% of the reported OLS beta estimates are negative. This implies that one in ten Australian firms can raise equity capital by promising returns lower than the yield on risk-free government bonds. Clearly, this is more a reflection of statistical problems in the mechanical analysis than prevailing market conditions. For this reason, OLS equity beta estimates from commercial data services should only ever be the starting point when determining a forward-looking

⁸⁶ SFG Consulting & Officer, 17 April 2005, The Equity Beta of an Electricity Distribution Business, Report prepared for ETSA Utilities (referred to as SFG (2005a)).

⁸⁷ SFG (2005a), op cit. para 4.3.14.

⁸⁸ Bowman, R.J. and S.R. Bush (2004), “A Test of the Usefulness of Comparable Company Analysis”, Department of Accounting and Finance, University of Auckland.

*equity beta and should always be subjected to and compared with the results of a much broader analysis.*⁸⁹

- In an earlier report, SFG (2004) noted that there was substantial time variation in beta estimates. In particular, “... it is not uncommon for beta estimates to change by more than 0.3 from one quarter to the next, even though the samples differ by only three observations. This further illustrates how fickle and unreliable standard beta estimates are.”⁹⁰ In that report, SFG goes on to conclude that the time series variation is most likely reflective of the statistical imprecision and unreliability of the equity beta estimates rather than any fundamental change in the structure of the businesses or the relationship between the businesses and the broad Australian market. This conclusion was preferred because:
 - The degree of time series variation was so large that it could not possibly have been driven by changes in the risk of the businesses – adopting that interpretation would imply that investors change their required return on these stocks by up to 3% from quarter to quarter; and
 - There were several instances where the change from one quarter to the next saw the estimated betas of different firms move in substantially different directions. The interpretation of this change is more consistent with firm-specific estimation errors than with the risk of the businesses having changed;
- There are a number of statistical techniques that could be used to improve simple OLS beta estimates. These are:
 - Removal of unrepresentative outliers. Outlier observations can often have a significant impact on an estimate of beta. AGSM beta estimates are based on a maximum of 48 return observations – given the few data points utilised, a single outlier can significantly influence the final estimate. The paper illustrates this point using AGL as an example:

“For example, AGL produced a +5% stock return on the back of positive results announced in September 2001. The fact that this occurred in a month in which the broad market was down 6% (primarily due to terrorist activities in the US) causes the estimated beta to be significantly lower than it would otherwise have been.”

If implemented appropriately, this process can often lead to noticeable improvements in the R^2 statistic.
 - Applying the “Blume” adjustment for non-persistent estimation error. SFG (2005a) reports that commercial providers of beta estimates, including Bloomberg and ValueLine, apply a statistical adjustment that is designed to correct for the type of estimation error that pervades simple OLS regression estimates. This adjustment is based on the work of Blume (1975) who shows that beta estimates exhibit mean reversion over time⁹¹. Blume (1975) recommended that a statistical adjustment be applied to simple OLS beta estimates to incorporate this observed mean reversion.

⁸⁹ SFG (2005a), op cit., para. 4.3.8.

⁹⁰ SFG (2004), 12 October 2004, The Equity Beta of an Electricity Distribution Business, Draft report prepared for ETSA Utilities. p.14.

⁹¹ That is, the estimate is more likely to move towards one from one period to the next.

The use of the Blume adjustment has been rejected by the ESC based on the advice of its consultants, ACG. This advice indicates that there is empirical support for the tendency for mean reversion in beta estimates, but it is argued that mean reversion was most likely due to the conscious diversification (i.e. through mergers and acquisitions) and gearing strategies employed by businesses, which caused companies with low betas to move towards higher betas. It is argued that such strategies are not undertaken by regulated businesses. The different view held by SFG (2005a) reflects a view on why mean reversion is observed in the data. SFG (2005a) considers that the explanation for mean reversion in beta estimates may lie in the possibility that the *estimates* of beta revert to one over time, but the true betas are stable over time. They postulate that a very low beta estimate is more likely to be contaminated by negative measurement error and a high beta estimate is more likely to be contaminated by positive measurement error. If these errors were random over time, this would manifest itself as beta estimates regressing towards one over time, even if the true betas were constant.

- Using longer data sets. A longer data set provides more observations but it also increases the likelihood that the nature of the business has changed over that time. Similarly, sampling more frequently (i.e. using weekly returns rather than monthly returns data) can increase the number of data points however, if there are thin trading problems in the data, this approach will exacerbate the problem. SFG (2005) notes that the theory behind the CAPM provides no guidance about the appropriate data period to be used to estimate equity betas. Commercial practice is to use four or five years of monthly data.
- After applying a range of statistical methods⁹² to several different data sets⁹³ with a view to determining the equity beta that best characterises the likely future relationship between the stock and market returns for an Australian energy distribution business, SFG (2005a) found that:

*"All of the empirical techniques we examine, when properly applied to a range of market data sources, lead us to the conclusion that the appropriate equity beta for an Australian energy distribution business (with 60% gearing) is at least one. An equity beta estimate of 0.8 is unreasonable in light of the empirical evidence and the purpose for which it is to be used."*⁹⁴

KPMG does not propose that market evidence should be ignored when estimating the equity beta. However, the measurement issues highlighted in SFG (2005a) provide some important reasons for exercising caution and common sense in the selection of an appropriate value for this parameter, particularly given the importance of regulatory certainty in regulatory access pricing.

The ESC's 2008 Gas Access Arrangements Review

Many of the issues highlighted above have been revisited in the context of the ESC's 2008 Gas Access Arrangements Review. It is therefore instructive to examine the information presented

⁹² The adjustments included the Blume adjustment, elimination of certain outlier observations and removal of the impact of the technology bubble (which involves eliminating data from July 1998 to June 2001)

⁹³ The data sets included a four year, five year and 3.5 year period. The latter was tested as this is the period since the end of the technology bubble.

⁹⁴ SFG (2005a), para. 1.19.

during that recent review. The review has included submissions by ACG, SFG, NERA and CECG.⁹⁵ These papers cover a number of issues including:

- The small number of comparables and the length of data which exists for each comparable;
- The degree of confidence that can be attached to beta estimates produced from the data;
- The appropriateness or otherwise of making statistical adjustments to that evidence;
- The reliability of recent estimates given market conditions and the high level of merger activity;
- The prevalence of proxy stock with debt like characteristics (i.e. hybrid / stapled securities);
- Other capital market evidence, the benchmarking of implied required returns on equity with the cost of debt and validity of relying on US data; and
- Consideration of the form of CAPM.

The ESC dismisses most of these arguments raised by SFG, NERA and CECG and has chosen to base its decision on data which clearly displays a wide degree of dispersion (negative in some cases). It is also worthwhile noting that:

- The ESC's consultants did not recommend an equity beta value to adopt, but merely reported on the available evidence;
- In its October 2005 decision on the Victorian electricity distribution businesses, the ESC was faced with a similar situation – a small number of comparables and similar issues on data quality, the ESC chose to adopt a value of 1.0 for the equity beta on the basis that the difficulties associated with interpreting the data called for less weight to be placed on market evidence and more weight to be placed upon regulatory precedents. That decision specifically noted that the ESC would consider placing more weight on market evidence *"...as the problems with the quality of data are remedied, the extent of information available improves, and techniques for interpreting that evidence are refined."*⁹⁶ The ESC's decision to adopt a lower equity beta value of 0.70 would suggest that they are now more convinced about the robustness of the market evidence, however, there is little information in the final gas determination on the factors that led them to this conclusion; and
- Whilst adopting an equity beta value of 0.70, the ESC has also allowed some additional operating costs to reflect an equity beta of 0.8 to take into account the interests of the

⁹⁵ ACG, Empirical evidence on proxy beta values for regulated gas distribution activities, June, 2007, ACG, Empirical evidence on proxy beta values for regulated gas distribution activities: Responses to submissions made to the Essential Services Commission, 18 February, 2008, NERA, Equity Beta for Gas Distribution: Report prepared for APLA, ENA and ETNOF, 25 October, 2007, SFG, Equity beta estimates for Victorian gas distribution businesses: Report prepared for Envestra, Multinet and SP AusNet, 25 October 2007, CECG, Estimating relative risk in the market for funds, 26 October, 2007.

⁹⁶ ESC, October 2005, Final Decision on the 2005-2010 Electricity Distribution Price Review, page 356.

businesses. This approach leaves the impression that the ESC was determined to create a new 'benchmark' for the equity beta in its final energy decision. This is the case because if it were to make the next decision, and it used its new approach, the appropriate equity beta would more than likely change in any case to reflect the most recent market data. In other words, it could have just as easily decided on 0.8 for the equity beta, because it would not create any precedent.

We understand that the ESC's decision is the subject of an appeal.

Finally, in a report commissioned by the Energy Networks Association on the problems associated with measurement of the equity beta, six academics argue that:

"In the absence of any information regarding the systematic risk of the firm, the best estimate of the equity beta of any stock is unity. Even where information is available, unity may still be the best estimate of the equity beta if that information contains substantial estimation error or is particularly imprecise."⁹⁷

We have seen no compelling evidence to suggest that the situation has changed since and, in most recently, there has been more considerably more rather than volatility in the markets, which has impacted on energy infrastructure more heavily than most because of the focus on credit market issues.

8.3 Conclusion

Given the inherent imprecision with the estimates of beta as discussed above, KPMG questions whether it is possible for regulators to conclude with a sufficient degree of confidence, that the equity betas of network businesses have in fact declined from the past. The inherent imprecision in available estimates of beta mean that it is difficult to conclude whether currently observed estimates of beta are lower than previous observations because of true market conditions or because of statistical error. Analysis by SFG suggests that it is the latter.

We observe that like the MRP, the issues surrounding the measurement of the equity beta are not new and have been widely debated amongst Australian regulators for a number of years. The initial response of most regulators to this concern has been to acknowledge the statistical uncertainty in empirical measurements and to adopt a value of 1.0 in line with established regulatory precedent, and also to give effect to qualitative considerations such as the desirability of reasonable certainty and consistency in the outcomes of regulatory processes over time, and mitigating the risk of regulatory error. However, the equity beta values adopted in more recent decisions have trended down.

In our view, a reasonable range of values for the equity beta would have to include 1.0, preferably as a central estimate. If a range of values were to be adopted, we consider that a reasonable range for equity beta is 0.90-1.10. This reflects the view of the SFG which recommended this range previously in work for Western Power when outlining a framework for

⁹⁷ Gray, S., Hall, J., Bowman, J., Brailsford, T., Faff, R and R. Officer, "The performance of alternative techniques for estimating equity betas of Australian firms", a report prepared for the Energy Networks Association, May 2005.Gray et al (2005), page 11.

quantifying estimation error in the setting of a regulated WACC on the basis that it is consistent with the totality of the market evidence.⁹⁸

⁹⁸ Strategic Finance Group, A Framework for Quantifying Estimation Error in Regulatory WACC, May 2005.

9 Imputation credits

We consider that a reasonable range to adopt for imputation credits is 0% to 50%. Recent developments on this parameter suggest that:

- There is no basis for regulators to argue for an increase in the value of gamma above 50%. Furthermore, a value of 50% is likely to overstate the appropriate value for gamma;
- There is good reason to question the appropriateness of a value of gamma of 50% since it relies upon evidence from studies that suffer from methodological flaws; and
- A value for gamma of zero is consistent with the market evidence and would appear to be consistent with a value for the MRP of 6%.

9.1 Introduction

The parameter represented by imputation credits or gamma (γ) in the WACC formula, represents the market value of every dollar of the tax credit associated with a franked dividend distributed to a shareholder.

The value attributed to gamma consists of two elements – the rate at which franking credits are distributed by the firm (“distribution rate”) and the rate at which franking credits are utilised by shareholders (“utilisation rate”).

There are currently three issues surrounding this parameter:

- The issues revolving around the different methodologies used to estimate a value for imputation credits;
- Market practice in relation to valuing imputation credits; and
- The consistency of the assumption made in relation the value of imputation credits in light of the assumptions made on the MRP.

9.2 Regulatory practice

Most of the earlier regulatory determinations in Australia have adopted a value of 50% for imputation credits. However, in more recent determinations, regulators have been prepared to accept a range of values for gamma, typically around 30% to 60%. Table 11 provides the relevant data.

Table 11: Value attributed to imputation credits in recent energy network business regulatory decisions

Decision	Date	Regulator	Assumed value of imputation credits
GasNet	April 2008	AER	50%

Decision	Date	Regulator	Assumed value of imputation credits
Victorian Gas Distribution	March 2008	ESC	50%
Victorian Electricity Transmission*	January 2008	AER	50%
Western Power Electricity T&D	March 2007	ERA	30% to 60%
Powerlink*	June 2007	AER	50%
SA Gas Distribution	June 2006	ESCOSA	35% to 50%**
Queensland Gas Distribution	May 2006	QCA	50%
Country Energy Gas Distribution	November 2005	IPART	30%
Victorian Electricity Distribution	October 2005	ESC	50%
AlintaGas Distribution	June 2005	ERA	30% to 60%
ETSA Utilities	June 2005	ESCOSA	50%
AGL Gas Networks	April 2005	IPART	30% to 50%
Queensland Electricity Distribution	April 2005	QCA	50%
NSW Electricity Distribution	June 2004	IPART	50%

* Decision issued by the AER under the NER

** The high end of the range was reduced from 0.6 on appeal.

As noted above, the value attributed to gamma consists of a distribution rate and a utilisation rate. The issues surrounding the estimation of these rates is discussed further below.

9.3 Estimating gamma from empirical studies

9.3.1 Distribution rate

Some regulators previously adopted a distribution rate assumption of 82%.⁹⁹ This assumption was based upon the study by Hathaway and Officer (1999), which found that the value of franking credits distributed in each year averaged 82% of the value of credits created.

An update of this study by Hathaway and Officer (2004) using more recent data and improved analysis estimates the appropriate distribution value at 71% for the period from July 1987 to June 2002¹⁰⁰. This ratio represents the average over all Australian companies that submitted tax returns over the 19 year period in question. In the absence of any other data, to the extent that reliance is placed on this approach to estimating the value of gamma, it is reasonable to rely upon the updated estimate provided by Hathaway and Officer (2004).

⁹⁹ ESC, 2003 GAAR Final Decision, page 393.

¹⁰⁰ Hathaway & Officer (2004), page 11. The study refers to this ratio as the access ratio.

9.3.2 Utilisation rate - empirical studies

A number of studies have focussed on measurement of the imputation credits utilisation rate. Table 12 below summarises the results from these studies. All of these studies use data from Australian-based companies, to create a sample that is representative of the overall Australian market.

Table 12: Empirical estimates of the utilisation rate of imputation credits

Study	Methodology	Utilisation rate estimate
Brown & Clarke (1993)	Dividend drop-off	72%
Bruckner, Dews and White (1994)	Dividend drop-off	33.5% - 68.5%
Walker & Partington (1999)	Dividend drop-off	88% or 96%
Hathaway & Officer (1999)	Analysis of tax statistics	60%
	Dividend drop-off	49% (large co., all stocks)
		44% (all companies, all stocks)
Chu & Partington (2001)	Rights issues	Close to 100% ¹⁰¹
Twite & Wood (2002)	Inference from analysis of trading in derivatives	45%
Cannavan, Finn & Gray (2004)	Inference from value of individual share futures and low exercise price options	0%
Hathaway & Officer (2004)	Analysis of tax statistics	40%
	Dividend drop-off	50%
<p><i>Sources:</i></p> <p>Brown, P. and A. Clarke, 1993, <i>The Ex-Dividend day behaviour of Australian share prices before and after dividend imputation</i>, <i>Australian Journal of Management</i>, 18, 1, pp. 1-40; Bruckner, K. N. Dews and D. White, 1994, <i>Capturing value from dividend imputation</i>, McKinsey & Company; Hathaway, N. and R. R. Officer, 1999, <i>The Value of Imputation Tax Credits</i>, Unpublished manuscript, Graduate School of Management, University of Melbourne; Hathaway, N. and R. R. Officer, 2004, <i>The Value of Imputation Tax Credits Update 2004</i>, Capital Research Pty Ltd; Walker, S. and G. Partington, 1999, <i>The Value of Dividends: Evidence from cum-dividend trading in the ex-dividend period</i>, <i>Accounting and Finance</i>, vol 39, p293; Cannavan, D., F. Finn and S. Gray, 2004, <i>The value of imputation tax credits</i>, <i>Journal of Financial Economics</i>, Vol. 73, Issue 1, July 2004; Chu, H. and G. Partington, 2001, <i>The market value of dividends: Theory and evidence from a new method</i>, working paper, University of Technology, Sydney, p39; Twite, G. and J. Wood, February 2002, <i>The Pricing of Australian imputation tax credits: Evidence from individual share futures contracts</i>, working paper.</p>		

It is worth briefly commenting on the most recent study by Hathaway and Officer (2004) which updates the work the authors previously undertook in 1999. The results of the 1999 study were heavily relied upon by regulators around Australia to support a value of 50% for imputation credits in regulatory revenue-setting.

¹⁰¹ Whilst the results suggest imputation credits are close to fully valued, it should be noted that the standard error of the estimate is 97% which indicates substantial variation around the mean estimate.

Hathaway and Officer (2004) arrived at their estimate of the utilisation rate firstly, by examining the rate at which individuals, superannuation funds and some companies redeemed imputation credits distributed to them¹⁰², and secondly, by applying dividend drop-off analysis. Using the redemption rate approach, the authors estimated an average utilisation rate of 40%, but they stressed that this ratio was affected by some necessarily broad inferences made regarding the rate of credit redemption for superannuation funds. Using dividend drop-off analysis, Hathaway and Officer (2004) estimated a drop-off ratio of around 51% of face value.¹⁰³ Combined with a distribution rate of 71%, Hathaway and Officer (2004) estimate the value of imputation credits at around 35%.

It is important to note that Hathaway and Officer (2004) highlighted that their estimated value of imputation credits ignores any uncertainty attached to the timing of payment of credits and size of dividend payments:

“Clearly our analyses demonstrate that imputation credits have significant value. However, a word of caution is in order. Both measures of value are taken after the company has announced the payment of the dividend and the credits. This means there is no uncertainty about the timing and the amount of the credit within the measures we obtain for the value of credits. Credits cannot be redeemed until distributed with accompanying dividends and stocks cannot be traded cum-dividend until dividends are declared. Hence both methods of valuing credits give conditional valuations: the value of the credit conditioned on the company deciding to pay a franked dividend. Neither method accurately measures the value of the credits which remain locked inside the company. Typically there is uncertainty about when such credits will be paid out and the amount of the credits to be issued ... To allow for this uncertainty in distribution we would have to apply a discount rate to allow for the uncertainty in accessing the credits. The exact discount rate remains obscure.”¹⁰⁴

In other words, the values estimated by Hathaway & Officer (2004) should be regarded as upper bound values.

Dividend drop-off analysis

As is evident from the above table, the existing empirical evidence on the utilisation rate of franking credits is dominated by studies that employ a methodology known as dividend drop-off analysis. Under this methodology, the utilisation rate is analysed by comparing the cum-dividend share price of a dividend-paying company with its ex-dividend share price. As the difference between these share prices (i.e. the drop-off) theoretically represents the value of the money distributed, any decline in the share price in excess of the cash dividend entitlement is assumed to be attributed to the value of the imputation credit attached to the dividend.

KPMG has a number of concerns with the quality of the evidence on gamma from dividend drop-off studies. Our review of advice provided by Professor Stephen Gray indicates that the

¹⁰² Note that this definition of the utilisation rate is different to that advocated by Envestra in its 2006 proposed access arrangements for gas distribution in Queensland. Envestra would appear to have defined the utilisation rate as the rate at which tax paid was converted into imputation credits. This notion of the utilisation rate was challenged by Lally (refer: Lally, M., A Review of the Value of Imputation Credits for Regulatory Purposes, December 2005) who argued that this definition of the utilisation rate implied a value close to 1 given that there was nothing in the legislation which suggested that tax paid did not immediately convert into imputation credits. We do not regard the arguments in Lally (Dec 2005) as being relevant to the discussion in this report as it dealt with Envestra's specific calculations which adopted different definitions to Hathaway & Officer (2004).

¹⁰³ Hathaway & Officer (2004), page 24.

¹⁰⁴ Hathaway & Officer (2004), page 25.

studies by Bruckner, Dew and White (1994) and the dividend drop-off analysis contained in Hathaway & Officer (1999) suffer from the statistical problem of multicollinearity, which makes it difficult to separate the value of cash dividends from the value of imputation credits.¹⁰⁵ This problem occurs because the cash dividend and the imputation credit variables are highly correlated, making it impossible to obtain a reliable measure of their individual coefficients. Professor Gray's advice notes that the methodological flaw in Bruckner, Dews and White (1994) means that the study could just as easily support the view that imputation credits are of negligible value.¹⁰⁶ Indeed, such a result would be consistent with a number of research papers which suggest that cash dividends are fully valued by those who trade around ex-dates. Gray suggests that such evidence, coupled with the estimate of the joint effect of dividends and imputation credits, implies that imputation credits have negligible value.

For similar reasons, Gray also notes that the results of the dividend drop-off analysis of Hathaway & Officer (1999, 2004) are unreliable. Gray demonstrates that summing the values of the cash dividends (in table 1 of Hathaway & Officer) and the franking credit (in Table 2 of Hathaway & Officer) yields results that suggest that "... a \$1 dividend and an accompanying 64 cent franking credit are associated with a drop of around \$1 in the stock price"¹⁰⁷, which implies that franking credits are worthless.

In relation to the study by Walker & Partington (1999) (refer Table 12), Gray's analysis indicates that the main concern with this study is its focus on a special market available at the ASX which is very small and which exists only for a very limited number of shares. The results of this study display an extremely wide variation in the estimates of the value of dividends and franking credits for different ex-dividend events, which Gray notes is unusual given the nature of market examined in the study.¹⁰⁸

Inference from value of individual share futures and low exercise price options

Cannavan Finn and Gray (2004)

A published study by Cannavan, Finn & Gray (2004) employs a methodology that compares the differences in the pricing of certain derivative securities and their underlying shares. Cannavan, Finn & Gray (2004) infer the value of imputation credits from the value of individual share futures ("ISF") and Low Exercise Price Options ("LEPOs"), as compared with the price of the underlying shares. Advice provided by Professor Gray suggests that this methodology has several advantages over the dividend drop-off regression technique:

- *"Every time an ISF or LEPO trades within one minute of a trade in the underlying share, it is possible to infer the value of dividends and imputation credits. Thus, instead of two observations each year for each company, there are potentially thousands. This increased sample size brings statistical benefits and also enables calculations to be done on a company-by-company basis."*

¹⁰⁵ Refer Strategic Finance Group, October 2004, The Value of Imputation Franking Credits: Gamma, Report for AGL in relation to the ESC Electricity Distribution Review.

¹⁰⁶ *Ibid*, page 19, 20.

¹⁰⁷ *Ibid*, page 23.

¹⁰⁸ *Ibid*, page 29.

- *ISFs and LEPOs trade well in advance of ex-dividend dates, so prices are not contaminated by the activities of short-term arbitrage traders.*¹⁰⁹

The results in Cannavan, Finn & Gray (2004) suggest that market participants place a low value on imputation credits, particularly since the 1997 introduction of the 45-day holding period rule:

*"We find that: (i) cash dividends are fully valued relative to futures payoffs, (ii) prior to the 45-day rule, imputation credits were valued at up to 50% of face value for high-yielding firms, and (iii) since the 45-day rule, imputation credits are effectively worthless to the marginal investor of ISFs and LEPOs."*¹¹⁰

On this basis, Professor Gray has suggested that setting gamma equal to zero is more appropriate than assuming a 50 percent value for gamma.

Valuation of imputation credits, Allen Consulting Group, December 2005 and March 2006

A study undertaken by the Allen Consulting Group (ACG) for the QCA¹¹¹ seeks to obtain a more current estimate of the value of imputation credits (i.e. more current than Cannavan Finn and Gray (2004)). The key conclusion from ACG (2005) is that in the period from July 2003 to June 2005, investors were valuing distributed imputation credits at 74% of their face value. This is reflected in the value of the implied Theta (θ). Across the whole 2000-2005 period, the average distributed value of the credits was 29%. This result led ACG to draw the following conclusion:

*"Thus, ACG's empirical analysis supports the proposition that the imposition of the 45-day rule in 1997 did eliminate the value that franking credits previously had. However, the strongly statistically significant result for the past two years indicates that, presently at least, imputation credits are being valued in the Australian market at around three quarters of their face value. Such a result is consistent with the notion that currently Australian tax paying investors are the marginal (price setting) investors in large Australian companies."*¹¹²

However, ACG also noted that it was puzzling why the valuation impact of franking credits was not seen immediately after the introduction cash rebate in July 2000.

In advice provided by ACG to ESCOSA on the 2006 proposed revisions to Envestra's gas distribution access arrangements, ACG drew upon these same conclusions. In the draft decision on Envestra's proposed access arrangements, ESCOSA advocated the adoption of a range of 0.35 to 0.60 for the value of imputation credits. ESCOSA stated that in arriving at this range, it had relied upon ACG's analysis which provided support for a value for gamma as high as 0.74, reflecting a distribution rate of 100% and a utilisation rate of 74%. It also relied upon ACG's observation that in the recent Hathaway and Officer (2004) study, time series data on utilisation rates indicated that whilst the average over the period of study was 0.35, utilisation rates had climbed to around 60% in more recent periods. Based on what is considered to be a balanced

¹⁰⁹ Ibid, page 27.

¹¹⁰ Cannavan, D., F. Finn and S. Gray, 2004, The value of imputation tax credits, Journal of Financial Economics, Vol. 73, Issue 1, July 2004, page 26.

¹¹¹ Allen Consulting Group, Cost of Capital for Queensland Gas Distribution, Report to the Queensland Competition Authority, December 2005

¹¹² Allen Consulting Group, Cost of Capital for Queensland Gas Distribution, December 2005, Report to the Queensland Competition Authority, page 45

consideration of the evidence, ESCOSA concluded that a range of 0.35 to 0.60 was appropriate for gamma.

The integrity of ACG's analysis has been challenged by Envestra's consultants, SFG Consulting. During the course of the debate, SFG identified a number of cases of double-counting and data misclassification with respect to the data used by ACG¹¹³. These claims were reviewed by ACG, and resulted in a significant change to the results for the July 2003-June 2005 period of ACG's analysis¹¹⁴. Specifically, the difference between the means for 100% and 0% franked dividends fell to 0.21 and the implied θ for the period was reduced to 0.49¹¹⁵. In light of these changes, it is now no longer possible to rely upon ACG's analysis to support a value for gamma above 50%.

It should be noted that SFG also raised a number of other concerns regarding ACG's analysis. Specifically, SFG argued that even after the corrections were made, there is no economic or statistical reason why there should be a shift in the value of distributed franking credits between the July 2000 to June 2003 and the July 2003 to June 2005 periods. Furthermore, SFG reasons that if the hypothesis is that the introduction of the cash tax rebate in July 2000 increased the value of distributed franking credits for the marginal investor, then the relevant result from ACG's analysis is the result for the entire July 2000 to June 2005 period. This result indicates that the mean value of distributed franking credits is 29%.

Envestra successfully appealed the decision by ESCOSA to use a range of 0.35-0.60, and it was subsequently reduced to 0.35-0.50.

More recently, this debate has continued in the context of the ESC's 2008 Gas Access Arrangements Review. A number of reports prepared by SFG¹¹⁶ on behalf of the Victorian gas businesses examined the empirical estimation of gamma and the relationship between the value assigned to imputation credits and the MRP.

The ESC decided that depending on the application of differing assumptions in relation to investor preferences, the value of imputation credits can be wide ranging, from zero to full valuation. The ESC concluded that the empirical evidence implies a gamma range of either up to 1 or 0.72, which is a significant departure from its previous position.¹¹⁷ However, it concluded that given the range of assumptions implicit in the empirical estimates, it would be inappropriate to raise the gamma assumption from the previous value of 0.50.

Notably, the ESC does not consider the evidence drawn from market practice.

¹¹³ SFG Consulting, 18 August 2006, Value of distributed imputation credits implied by large, high-yield firms from 2000-2005, Report prepared for Envestra.

¹¹⁴ Allen Consulting Group, 14 September 2006 Memorandum to ESCOSA on Preliminary response to SFG report on the value of distributed imputation credits.

¹¹⁵ It should be noted that SFG's analysis of ACG's work indicated that the results for the July 2000-June 2003 were also affected, however, no corrections have been reported by ACG.

¹¹⁶ SFG, The impact of franking credits in the corporate cost of capital: Empirical evidence; 22 March 2007; SFG, Internal consistency in regulatory estimates of the value of franking credits, 22 March 2007; SFG, The impact of franking credits on the cost of capital of Australian companies, 25 October 2007.

¹¹⁷ This appears to be based on a utilisation rate of 1 or 0.75 and a distribution rate of 1.

9.4 Market practice

It is worth noting that it remains common market practice to assume that imputation credits are not fully valued or not valued at all¹¹⁸. Evidence drawn from expert reports on takeovers to support such practices was provided in recent analysis, which showed that of 122 reports reviewed only 48 (or 39%) provided support showing how they had arrived at the WACC used in their reports. Of these, 42 (or 88%) used the classical CAPM model and made no adjustment for dividend imputation. Only six reports made an adjustment to reflect dividend imputation¹¹⁹. Furthermore, of the seven reports (6%) that did attribute value to imputation credits, it appears that five attributed little or zero net effect on the value of the company being assessed.¹²⁰

This study goes on to provide a long list of conceptual grounds cited in reports for not adjusting for imputation credits, including:

- The value of franking credits is dependent on the tax position of each individual shareholder;
- There is no evidence that acquirers of businesses will pay additional value for surplus franking credits;
- There is little evidence that the value effects of dividend imputation are being included in valuations being undertaken by companies and investors or the broader market;
- Foreign shareholders are the marginal price-setters of the Australian market yet many such shareholders cannot avail themselves of the benefit of franking credits; and
- There is a lack of certainty about future dividend policies, the timing of taxation and dividend payments and consequently about franking credits.

More recently:

- In 2005 KPMG undertook similar work to Lonergan, which found that none of the valuation reports that used the CAPM assigned a value to imputation credits¹²¹; and
- A 2005 paper by Truong, Partington and Peat, shows that about 80% of CFOs ascribe no value to gamma¹²².

¹¹⁸ Lonergan does not state which form of CAPM was used in each of the expert reports he reviewed. Based on our experience, however, market practitioners tend to utilise the domestic form of the CAPM. This is evident from their approach to estimating parameters such as the risk free rate, beta and the market risk premium.

¹¹⁹ Lonergan, W., Autumn 2001, "The disappearing returns, why dividend imputation has not reduced the cost of capital", JASSA, page 13.

¹²⁰ Lonergan, W., Autumn 2001, op cit, page 14.

¹²¹ KPMG, Cost of Capital – Market practice in relation to imputation credits, prepared for the Victorian electricity distributors, August 2005.

¹²² Truong, G., G. Partington and M. Peat, Cost of Capital Estimation & Capital Budgeting Practice in Australia. Working Paper, University of Sydney & Conference Proceedings, AFAANZ 2005.

KPMG believes that this market evidence is compelling, and should be afforded considerable weight, particularly in light of the uncertainties associated with much of the more theoretical and empirical work on gamma.

9.5 Consistency between franking credits and the market risk premium

A recent published study by Gray and Hall (2006)¹²³ draws into question the internal consistency of regulators assuming a value for gamma of 0.5 and a value for the market risk premium of 6%. By deriving the mathematically deterministic relationship between the value of franking credits and the MRP, Gray and Hall (2006) demonstrate that the values that can be reasonably used for these parameters are dependent upon information on dividend yields and effective tax rates. In doing so, Gray and Hall (2006) shows that the regulatory practice of attributing a value of 50% for imputation credits and 6% for the MRP is internally inconsistent.

Gray and Hall (2006) observe that the standard procedures for estimating the MRP in the CAPM ignore the value of franking credits. If franking credits do affect the corporate cost of capital, their value must be added to the standard estimates of MRP. This requirement was demonstrated in Officer (1994), and is shown below:

$$\text{MRP (fc)} = R_f + \text{MRP (dc)} / (1-t) / [1-t(1-\gamma)] - R_f$$

Where MRP (fc) and MRP (dc) are the respective MRPs with and without franking credits, R_f is the risk free rate, t is the corporate tax rate and γ is gamma.

Based on this, Gray and Hall (2006) go on to demonstrate that irrespective of whether it is assumed that the MRP value of 6% used by regulators is measured with or without franking credits, a value of 6% for the MRP used with a corporate tax rate of 30% and a value for gamma of 50%, implies a dividend yield on the market portfolio that is much higher than that observed in the market in practice. This combination of values for the MRP, gamma and the tax rate is therefore internally inconsistent.

Gray and Hall (2006) go on to examine various ways of restoring consistency in the relationship. They note that the simplest approach (involving a change to a single parameter), is to adopt a value for gamma of zero. Adopting a value for gamma of zero in combination with a value of 6% for the MRP would produce implied dividend yields that were consistent with empirical observations. There are also a range of combinations of parameter changes that could be applied to restore consistency assuming the MRP is set at 6%, however, most of these involve implausible scenarios.

KPMG is aware that during the 2006-2010 Electricity Distribution Price Review, the issue of consistency between the value of franking credits and the MRP was raised by the distributors by reference to similar analysis conducted by SFG¹²⁴. In the ESC's Final Determination for that

¹²³ Gray, S and J. Hall, Relationship between franking credits and the market risk premium, Accounting and Finance, 46, 2006, pp. 405-428.

¹²⁴ SFG Consulting, The Relationship between Franking Credits and the Market Risk Premium, Implications for the Regulatory Cost of Capital, 18 August 2005.

review, the ESC – based on advice from the ACG – rejected SFG’s analysis for the following reasons:

“In deciding between the values generated by the SFG and ESC/Hathaway methods, it is important to note that the results from applying the SFG methods depend upon the assumption that is adopted about the average effective tax rate of listed entities (that is, tax paid as a proportion of economic income). SFG has not presented any empirical justification for this input, but has merely assumed that the rate is equal to the statutory rate of taxation. The SFG methodology is also dependent upon the view taken on the market risk premium.” (page 406)

The ESC’s Final Decision argued that if economic income (defined as the return from franking credits, dividends and capital gains, that is, the return on equity) from the market portfolio was 12% as SFG had assumed, it could be expected that the rate of tax as a proportion of economic income would be substantially less than the 30% corporate tax rate also assumed by SFG. In support of this position, the ESC relied on evidence in Hathaway (2005):

“Hathaway (2005, p. 10) shows that the average earnings yield (accounting income as a proportion of equity value) of listed entities over the period since 1990 has averaged approximately 6 per cent. Thus, if average economic income over this period were indeed 12 per cent of equity value, this information would suggest that accounting income would be approximately half of economic income. It follows that if the rate of tax paid on accounting income was 30 per cent (which itself may overstate the effective tax rate of firms), the rate of tax paid as a proportion of economic income would be about half of this rate (i.e. 15 per cent).” (footnote 122).

By altering the assumed corporate tax rate in SFG’s model to 15%, the ESC went on to demonstrate that the franking credit yield derived from SFG’s approach would be consistent with the ESC / Hathaway’s approach.

KPMG notes that Gray and Hall (2006) contains a discussion of the concept of the corporate tax rate assumption. Gray and Hall (2006) note that:

- In their model, the corporate tax represents the corporate tax rate that is implied by the corporate taxes paid by all Australian firms in aggregate over time. In this model, timing differences eventually reverse such that over a large sample of firms any such differences would be diversified away. The concept of an effective tax rate that is due to timing differences has no place in this model; and
- The most plausible reason for an effective tax rate being lower than the statutory corporate tax rate is that a portion of the profits earned by Australian firms are earned offshore and taxed in another jurisdiction. An effective tax rate of 15% therefore refers to the ratio of Australian corporate taxes to total (domestic and offshore) corporate profit.

Gray and Hall (2006) also refer to recent analysis by Buffini and Fabro (2005)¹²⁵ which report that the average tax rates of Australia’s largest 150 listed firms is 27-28.5 per cent.

In the ESC’s 2008 Gas Access Arrangement Review it relies on the work of Lally to refute the work of Gray and Hall (2006) on consistency.

This debate is continuing in the academic literature.¹²⁶

¹²⁵ Buffini, F. and A. Fabro, 2005, Push to ease growth in corporate tax, Australian Financial Review, 29, 1-51

In the absence of a clear conclusion in regard to this on-going debate, we believe that the most appropriate solution is to rely on the market evidence. That evidence, suggests that the market values imputation credits at a low level (and that this is consistent with a MRP of 6%). This is consistent with the views expressed by SFG regarding the relationship between the value of imputation credits and MRP.

9.6 Conclusion

Recent developments on the value of gamma suggest that:

- There is no basis for regulators to argue for an increase in the value of gamma above 50%;
- More recent research demonstrates that there is good reason to question the appropriateness of a value of gamma of 50% since it relies upon evidence from studies that suffer from methodological flaws;
- More recent research demonstrates that a value of 50% is likely to overstate the appropriate value for gamma; and
- A value for gamma of zero is consistent with the market evidence and would appear to be consistent with a value for the MRP of 6%.

That said, a considerable degree of uncertainty surrounds the estimation of the appropriate value for gamma. Most of that uncertainty relates to theoretical and empirical arguments. By contrast, the market evidence is unambiguous and in our view compelling. We are unaware of any regulators either refuting the market evidence or its relevance.

KPMG therefore believes that the most appropriate range to adopt for gamma is 0% to 50%.¹²⁷

¹²⁶ Lally, M, 2008, The relation between franking credits and the market risk premium: a comment, Accounting and Finance 48, 153-158, and Gray, S and J Hall, 2008, Relationship between franking credits and the market risk premium: a reply, Accounting and Finance 48, 133-142.

¹²⁷ If a point estimate is to be used, we recommend a value of zero be adopted for gamma, as there is little basis on which to select a point estimate between zero and 50% and the evidence points to a lower rather than a higher value