Western Power Corporation

Cost of Capital Issues in the ERA's Draft Decision on the South West Interconnected Network

Further Report for Western Power

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1 Introduction

1.1 Background

Western Power's South West Interconnected Network ("SWIN") is subject to access regulation under Western Australia's Electricity Networks Access Code ("the Code"). Under the Code, Western Power is required to submit a proposed access arrangement to the Economic Regulation Authority ("ERA") that establishes, amongst other things, revenues and prices for third-party access to the network. Part of this process involves applying a Weighted Average Cost of Capital ("WACC") to a capital base established for the SWIN.

In March 2006, the ERA issued its draft determination on the proposed access arrangements for the SWIN. The draft determination requires Western Power to amend its proposed access arrangement to reflect a pre-tax real WACC of 6.0 per cent.

The pre-tax real WACC assessed by the ERA as being appropriate for the SWIN is substantially below the pre-tax real WACC of 7.3 per cent originally proposed by Western Power. Amongst other things, the ERA's assessed WACC reflects:

- A different approach taken by the ERA to the selection of an appropriate point estimate for the pre-tax real WACC from a range of feasible values, which was in turn derived from what the ERA regarded as reasonable parameter input values. By contrast, Western Power's proposed pre-tax real WACC of 7.3% is consistent with the mean value produced by applying standard Monte Carlo simulation techniques to various parameter values (and value ranges) recommended by KPMG in its report to Western Power on WACC issues[1]; and

- Different parameter input values for a range of parameters including, but not limited to:

  - the market risk premium ("MRP"). The ERA has adopted a range of 5% to 6%, compared with a feasible range of 6% to 8% as recommended by KPMG;

  - the equity beta. The ERA adopted a range of 0.8 to 1.0, compared with a range of 0.9 to 1.1 as recommended by KPMG; and

  - the value of imputation credits. The ERA adopted a range of 30-60%, compared with a range of 0-50% as recommended by KPMG.

Western Power has requested that KPMG provide a response to the ERA's assessed WACC in its draft decision. This report outlines our views on the ERA's assessment, specifically with respect to the value for the parameters set out above.

[1] KPMG, Western Power Corporation – Weighted Average Cost of Capital, May 2005.

1.2 Summary of KPMG's comments

1.2.1 Market risk premium

KPMG does not agree with the ERA's proposed range of values for the MRP. In assessing the appropriate value, the ERA has not given sufficient weight to the problems associated applying ex-ante methodologies and evidence from survey-based approaches. The use of historical average estimates of the MRP as the basis for establishing the forward-looking MRP also suffers from limitations, however, KPMG considers that this approach produces more statistically reliable estimates as compared with ex-ante and survey-based methodologies.

Recent studies by Capital Research (2005) and SACES (2005) which are referred to by the ERA also do not provide reliable evidence of the future MRP. The data adjustments in these studies are ad-hoc and can inappropriately remove the impact of unexpected events which should be reflected in the MRP.

Based on the above, KPMG believes that the ERA has not offered any sound reasons for rejecting the range of 6% to 8% originally put forward by KPMG and Western Power.

1.2.2 Equity beta

KPMG does not agree with the ERA's proposed range of values for the equity beta. Notwithstanding that the ERA has cited empirical evidence that supports a declining trend in the equity beta, there are significant issues associated with measurement of the equity beta such that it is not possible to conclude that any apparent decline in equity beta values are not in fact due to measurement problems. These measurement issues are outlined in detail in section 3.

KPMG also considers that the ERA's presumption that the equity beta value for Western Power should be lower than 1.0 because it is to be subject to a revenue cap form of price control is not well supported. Our analysis indicates that a revenue cap form of price control can both reduce the business' correlation with market returns and increase the volatility of the returns of the business, relative to that for a price-capped business. The overall effect on beta would therefore depend on which of these effects dominates.

For these reasons, KPMG considers that the equity beta range of 0.9 to 1.10 originally assessed in our May 2005 report remains valid.

1.2.3 Value of imputation credits

KPMG does not consider that the ERA's reasons for rejecting the range of zero to 50% originally proposed by KPMG and Western Power, are valid. In the first instance, based on the evidence that the ERA claims to have reviewed, it is unclear to us how the ERA arrived at its conclusion that a range of 30% to 60% is more appropriate. In particular, no explanation has been offered for the ERA's dismissal of the evidence in Cannavan Finn and Gray (2004), which suggests that the value of gamma is zero.

Furthermore, KPMG has strong reservations in relation to the study by ACG (2005) which the ERA has referred to. We consider that the design of this study is questionable given some of

the apparently anomalous results which the study suggests. Details of our concerns are outlined in section 4.

1.2.4 Our updated assessment of WACC

Based on the views that we have set out in this report, we have re-assessed the reasonable range for the pre-tax real WACC for Western Power's SWIN to be from 5.95% to 9.02%, with a midpoint value of 7.29%. This corresponds with a range of 5.02% to 6.59% as assessed by the ERA in its draft decision. Furthermore, we note that the ERA's proposed point estimate value of 6% is at the bottom end of the range that we have assessed.

Whilst we have updated our assessment of the WACC for the SWIN as requested by Western Power, we do not consider that the ERA's draft decision has provided a justifiable basis upon which to decline to approve Western Power's proposed WACC. It is our understanding that under the Electricity Networks Access Code 2004 ("the Code"), the ERA's task is to approve Western Power's access arrangement for the SWIN if it has met the Code objective, and if not, the ERA should provide reasons why. We are unable to find this analysis in the draft decision.

2 Market risk premium (MRP")

2.1 The ERA's position

The ERA has proposed to adopt a value for the MRP in the range of 5% to 6% in deriving a feasible range of values for the cost of capital for the SWIN. The ERA has acknowledged that this decision varies from the view expressed in its WACC Determination that the appropriate value for the MRP is 6.0 per cent, but has not sought to clarify what new evidence has emerged since its WACC Determination to justify adopting a lower value for the MRP. Nevertheless, the ERA considers its draft decision assessment to be appropriate for the following reasons:

- The Authority is of the view that values above 6% that were contemplated by Western Power's consultants, 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;
  - 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;
- The Authority considers 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;
- Survey evidence reported by the Essential Services Commission in Victoria[2] as part of the 2002 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;
- 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 Allen Consulting Group[3]; and

[2] Jardine Fleming Capital Partners Limited, September 2001, The Equity Risk Premium – An Australian perspective, Trinity Best Practice Committee.
[3] Allen Consulting Group, Cost of Capital for Queensland Gas Distribution, Report to the Queensland Competition Authority, December 2005.

- 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.

2.2 KPMG's response

KPMG does not consider that the ERA's rationale for adopting an MRP value in the range of 5% to 6% is soundly based for the following reasons:

- Firstly, 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.

- Secondly, the ERA has relied heavily on analysis contained in a report prepared by the Allen Consulting Group ("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 should have resulted in investors lowering their required risk premiums. Although these factors have been advanced as being possible reasons for a reduced risk premium, ACG does not provide any hard evidence of this. We therefore believe that limited reliance should be placed on the views expressed in ACG (2005). Reference is made to reports prepared by Capital Research[4] and the South Australian Centre for Economic Studies ("SACES")[5] 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, the critique by Gray and Officer (2005)[6] of Capital Research (2005) and SACES (2005) provide compelling reasons to question the theoretical and empirical validity of that work.

It is relevant to note that the issues surrounding the measurement of the forward-looking MRP are not new and have been widely debated amongst Australian regulators for several years. Despite this, no Australian regulator is currently advocating the adoption of a value for the MRP as low as 5%. The NSW regulator IPART previously adopted 5% to 6% in its determinations but recently shifted to a range of 5.5% to 6.5% in its April 2005 final determination on the access arrangements for AGL Gas Networks. Furthermore, the proposed value for the MRP

[4] 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.
[5] 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.
[6] 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.

under the Australian Energy Market Commission's ("AEMC") draft rules for regulation of electricity transmission networks is 6%.

2.2.1 MRP measurement issues

In KPMG's report to Western Power which accompanied Western Power's proposed access arrangement for the SWIN, KPMG outlined the shortfalls associated with the measurements of the MRP using approaches such as the DGM and survey-based evidence. This was an important component of our rationale for choosing to accord greater weight to historical estimates of the realised MRP as a proxy for the future expected MRP.

The key issue with estimating the MRP is that a very wide range of values for the MRP can be supported if one elects to rely upon a sufficiently broad range of methodologies. However, some estimates will inevitably be more robust and reliable than others due to methodological issues. Under these circumstances, an important part of the process of establishing a reasonable range of input values for the MRP is to place less weight on those estimates that are produced using questionable methodologies such as ex-ante approaches.

On the issue of methodological drawbacks in relation to the DGM, our May 2005 report noted that:

- The major methodological drawback with using the DGM is that it assumes that dividend yields, growth in dividends and expected inflation are constant into perpetuity. These are strong assumptions which in reality are almost certainly to be violated; and

- The MRP values inferred from the DGM are highly sensitive to the dividend yield assumptions.

In relation to survey evidence, we noted that such evidence should be viewed with some scepticism given that the results tend to be aligned with the incentives of the survey promoter. More importantly, we specifically commented on the survey evidence that the ERA has referred to and attributed to the ESCV's gas access arrangement review, noting that the Trinity Best Practice Committee which evaluated the results of that survey had expressed doubt in relation to whether the survey was flawed because some respondents to the survey indicated that they expected a negative risk premium.[7]

None of the above matters would appear to have been taken into account by the ERA in its consideration of the merits of the MRP value recommended by KPMG. Furthermore, we note that whilst the ERA has expressed preference for a current ex-ante estimate of the MRP, some of the evidence that it has relied upon appears to be rather dated.[8]

Further reasons to remain sceptical about ex-ante approaches are:

[7] KPMG Report, page 31.
[8] For example, the ERA refers to a 1998 study by K. Davis and a further 2002 study by Lally in footnote 244 of its draft decision.

- The continued failure of economic theory to explain why predicted MRPs (i.e. based on what economic theory or fundamentals suggests the MRP should be) have consistently understated the actual measured MRP (i.e. the "equity premium puzzle"); and

- A recent US working paper[9] which examines the empirical performance of a range of variables and models that attempt to predict the equity premium, has concluded that the empirical performance of such models is very weak. Whilst this research is still in working paper stage, the key conclusion of the paper is that:

  "In sum, by assuming that the equity premium is "like it always has been", an investor would have predicted just as well."[10]

KPMG maintains that the use of historical estimates of the realised MRP as a proxy for the future expected MRP remains warranted and that the questions associated with the relevance of past estimates should not be over-stated particularly given the problems associated with the alternative of using statistically volatile ex-ante estimates of the MRP and survey evidence that reflect inherently biased views.

The evidence that we reviewed in our May 2005 report remains relevant and provides strong support for an Australian MRP in the range of 6% to 8%. Importantly, a value for the MRP in this range is also internally consistent with a value for imputation credits in the range of zero to 50%, as proposed by Western Power.

2.2.2 MRP issues in ACG (2005)

The ERA has made reference to a range of factors related to the structure of Australian stock market and the Australian economy in forming its view that future market returns may be less than historical returns. These same reasons are discussed in ACG (2005).

It is important to note that whilst ACG (2005) offers a range of structural reasons why the forward-looking MRP may be lower than the historical realised MRP, no hard evidence is provided to support their proposition. The only evidence that is offered in ACG (2005) relates to the studies by Capital Research (2005) and SACES (2005), both of which have been critiqued and dismissed by Gray and Officer (2005).

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 selective 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) 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:

"There are many economic events that affect stock returns. To eliminate those that are claimed to be unexpected and non-recurring would be to leave a scant and practically useless data set.

[9] Goyal, A. and I. Welch, A Comprehensive Look at the Empirical Performance of Equity Premium Prediction, January 2006, Yale ICF Working Paper No. 04-11.
[10] Ibid, page 29.

Indeed it is precisely because there are unexpected events that affect markets in different ways that there exists a MRP in the first place! Rather than selectively eliminate from the data events that are considered to be unexpected, the preferred approach is to analyse a longer data set that contains both positive and negative shocks."[11]

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. Furthermore, evidence presented in table 8.1 of ACG (2005) also supports an MRP of at least 6%. This evidence is reproduced in the table below.

Table 1: Historical realised market risk premium in Australia

Period of estimation	Period length (years)	Average MRP (%)	Gamma increment (average)	Gamma adjusted mean excess return (%)
1975-2004	30	7.70	0.65	8.34
1970-2004	35	4.04	0.55	4.59
1960-2004	45	5.27	0.43	5.71
1955-2004	50	6.43	0.39	6.82
1950-2004	55	6.77	0.35	7.12
1930-2004	75	6.58	0.26	6.84
1905-2004	100	7.15	0.19	7.34
1900-2004	105	7.26	0.18	7.44
1885-2004	120	7.17	0.16	7.33

Based on the arguments and data set out above, we do not find any compelling reasons to reject the proposition that for the purpose of estimating the cost of capital for the SWIN, it is reasonable to assume a value for the MRP in the range of 6% to 8%.

[11] Op cit, page 3.

3 Equity beta

3.1 The ERA's position

The ERA has proposed to adopt a value for the equity beta in the range of 0.8 to 1.0 in its draft decision. The ERA has pointed out that the market evidence on equity betas for electricity and gas distribution businesses geared to 60% supports a value significantly below 1.0. In particular, Australian and US evidence referred to in ACG (2005) reports equity beta values for gas and electricity utilities in the order of 0.5 to 0.7.

The ERA, however, has noted that adoption of an equity beta of 0.5 to 0.7 represents a substantial departure from regulatory precedent in Australia. This departure may not be warranted given evidence presented by ACG (2005) that:

- Equity beta estimates using weekly data have shown a rising trend in recent times, and such data tends to lead equity beta estimates based on monthly data; and

- Beta estimates are characterised by extremely large estimation errors, and hence, a value of 1.0 which is consistent with regulatory precedent lies within reasonable statistical confidence limits for such beta estimates.

Notwithstanding that the ERA accepts the empirical evidence provided in ACG (2005), it has not concurred with ACG's conclusion that a reasonable value for the equity beta should be 1.0. This reflects the fact that the SWIN is to be regulated under a revenue-cap form of price control, and the ERA's consideration that this form of price control has the effect of substantially lessening the exposure of Western Power's transmission and distribution businesses to demand risk.

3.2 KPMG Response

3.2.1 Revenue cap form of price control

Based on our review of the ERA's draft decision, it would appear that the form of price control applying to Western Power was a determining factor underlying the ERA's decision to set the range for the equity beta at 0.8 to 1.0. Indeed, the ERA states that:

"In this regard, the Authority considers that a particularly pertinent factor is the revenue-cap form of price control to be applied to Western Power. This form of price control has the effect of substantially lessening the exposure of Western Power's transmission and distribution businesses to demand risk, and hence to risk associated with fluctuations in economic activity and electricity demand."[12]

Hence, although ACG (2005) concluded that "*…the empirical evidence, together with the desirability of maintaining stability in regulatory decisions over time and consistency in regulatory decisions across companies justifies the use of an equity beta of 1.0 (for a gearing*

[12] ERA draft decision, para. 635.

level of 60%) for the Queensland gas distribution network service providers"[13], consideration of the same empirical evidence led the ERA to conclude that a lower equity beta of 0.8 to 1.0 ought to apply to Western Power because it was subject to a revenue cap rather than a price cap form of price control.

KPMG does not consider that the ERA's conclusion is necessarily valid. In assessing the validity of the ERA's conclusion that the application of a revenue cap form of price control warrants a lower equity beta (at 60% gearing) in the cost of capital, KPMG notes that:

1 The equity beta reflects the interaction of the following factors:

- The correlation between the **returns** of the firm and **returns** on the equity market ($CORR_{im}$);
- The volatility of firm returns; and
- The volatility of market returns.

2 The revenue cap form of price control does have the effect of reducing the sensitivity of the firm's revenue to demand fluctuations, as compared with a price-capped firm. To the extent this reduced sensitivity flows through to the earnings of the business, it would also follow that $CORR_{im}$ would be lower for the revenue capped firm than for the price-capped firm.

3 However, the earnings, and hence returns, of firms that are subject to a revenue cap form of price control are potentially also more sensitive to fluctuations in costs, as compared to firms that are subject to a price cap. This is because demand fluctuations will have an impact on costs but not revenue under a revenue cap, but would have an impact on both revenue and costs under a price cap. As a result, a revenue capped business is likely to experience greater volatility in returns (i.e. the second factor impacting on beta) as compared with a price capped business[14]. Since equity holders in revenue capped firms potentially face greater cash flow and earnings volatility as compared with equity holders in a price-capped business, they are likely to demand compensation in the form of a higher beta (for the same level of gearing).

Based on the above analysis, it is clear that a revenue cap form of price control can both reduce correlation with market returns and increase the volatility of the returns of the business, relative to that for a price-capped business. The former has the effect of reducing the equity beta relative to a price-capped business whilst the latter has the effect of increasing the equity beta relative to a price-capped business. The overall effect on beta would therefore depend on which of these effects dominates – a question which is difficult to resolve. On this basis, the ERA's presumption that a lower equity beta of 0.8 to 1.0 ought to apply to Western Power because it was subject to a revenue cap rather than a price cap form of price control, is not well supported.

[13] ACG (2005), page 58.
[14] The recent experience of the electricity distribution businesses in NSW (particularly those operating in metropolitan areas) provides a case in point, and was a major factor in driving a change in the form of regulation to a weighted average price cap form of price control in NSW.

3.2.2 Measurement issues

KPMG considers that a value of 0.8 which is at the low end of the ERA's proposed range understates the appropriate equity beta value for Western Power. Notwithstanding the ERA's reference to empirical evidence which suggests a decline in equity beta values for electricity and gas network businesses generally, there are significant problems with the accurate measurement of the equity beta. These problems imply that it is not possible to conclude that the apparent decline in equity beta values are not in fact due to measurement problems.

The re-levered equity beta values for Australian proxies reported in Table 7.1 of ACG (2005) suggest that there is cause for concern with the measurement of data. For example, the values as at 14 October 2005 range from -0.91 for AGL to 1.75 for Alinta. We question whether the observed equity beta of -0.91 for AGL makes any sense. The estimate implies that investors require a return from investing in AGL that is less than the return they would obtain by investing in risk free government bonds. This interpretation of the equity beta for AGL defies commercial common sense and goes against one of the fundamental principles of finance theory, which is that investors require a premium for investing in equity versus risk free bonds.

Furthermore, the equity betas for the five comparable companies reported in ACG (2005), even after being re-levered to 60% gearing, are vastly different. If these firms have been chosen on the basis of their comparability with each other and with Western Power, we question why the beta estimates should not exhibit some degree of consistency with each other. In our view, it is possible that these firms are – at least to some extent - comparable to each other and to Western Power, but the explanation as to why the re-levered beta estimates are so different may lie in the possibility that the *estimates* of beta are statistically unreliable. The alternative is that they are not in fact comparable to each other or to Western Power, in which case, they do not provide a credible basis upon which to establish an equity beta for Western Power.

Comprehensive research and analysis on the estimation of the equity beta for Australian energy distribution businesses has recently been undertaken by SFG (2005a)[15]. 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;[16] and
  - 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

[15] SFG Consulting & Officer, 17 April 2005, The Equity Beta of an Electricity Distribution Business, Report prepared for ETSA Utilities (referred to as SFG (2005a)).
[16] SFG (2005a), op cit. para 4.3.14.

estimates. Reference is made to Bowman and Bush (2004)[17] 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 equity beta and should always be subjected to and compared with the results of a much broader analysis."[18]

- 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.*"[19]. 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

[17] 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.
[18] SFG (2005a), op cit., para. 4.3.8.
[19] SFG (2004), 12 October 2004, The Equity Beta of an Electricity Distribution Business, Draft report prepared for ETSA Utilities. p.14.

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 time[20]. Blume (1975) recommended that a statistical adjustment be applied to simple OLS beta estimates to incorporate this observed mean reversion.

  The use of the Blume adjustment was previously rejected by the Victorian ESC. Whilst the ESC acknowledged the empirical support for the tendency for mean reversion in beta estimates, it argued that mean reversion was most likely due to the conscious diversification and gearing strategies employed by businesses, which caused companies with low betas to move towards higher betas. No evidence, however, was presented to support the ESC's contentions. SFG (2005a) therefore consider that the ESC has rejected the Blume adjustment in error. 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 methods[21] to several different data sets[22] 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

[20] That is, the estimate is more likely to move towards one from one period to the next.
[21] 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)
[22] 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.

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."[23]

In light of these findings, KPMG questions the ERA's choice of a value of 0.8 at the low end of its preferred equity beta range.

KPMG has referred extensively to the research conducted by SFG (2005a) in the discussion above in order to emphasise the complex issues that are involved in interpreting estimates of equity betas. We do not propose that market evidence should not be used in estimating the equity beta, but rather that such data should be interpreted with caution and common sense. Gray et al (2005)[24] argues that:

"In the absence of information any 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."[25]

Given the inherent imprecision with the estimates of beta as discussed above, KPMG questions whether it is possible for ACG (2005) and the Authority to conclude with a sufficient degree of confidence, that the true equity betas are currently at lower levels than they were at the last price determination. The inherent imprecision in available estimates of beta mean that it is difficult conclude whether currently observed estimates of beta are lower than previous observations because of true market conditions or because of statistical error. Specifically, our analysis suggests that a lower bound value of 0.8 for the equity beta is not reasonable. On this basis, KPMG recommends that Western Power urge the ERA to consider lifting the low end of its equity beta range.

3.2.3 Recommended equity beta range

KPMG's preference is to maintain the equity beta range of 0.9 to 1.1 as originally proposed in our May 2005 report. We noted in that report that we concurred with the view expressed in SFG (2005b)[26] that due to the uncertainties associated with the measurement of the equity beta, the appropriate equity beta assumption for use in regulatory decisions should be centred around 1.0 for a 60% geared energy business[27]. This range recognises that the mean estimate for the equity beta is likely to be around 1.0, and provides for the uncertainty surrounding the true value of the equity beta.

We would also add 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 several years. The response of most regulators to this concern has been to acknowledge the statistical

[23] SFG (2005a), para. 1.19.
[24] Another study on techniques for estimating equity betas is: 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.
[25] Gray et al (2005), page 11.
[26] Strategic Finance Group, The Equity Beta for an Energy Distribution Business, 10 February 2005 (referred to as SFG (2005b)).
[27] KPMG May 2005 report, page 44.

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 the risk of regulatory error. Indeed, we note that the AEMC has proposed to adopt a value of 1.0 in its draft rules for the regulation of electricity transmission revenues. This value retains the ACCC's December 2004 proposal to adopt a value of 1.0 for the equity beta in its Statement of Regulatory Principles for the Regulation of Transmission Revenue.

4 Value of imputation credits

4.1 The ERA's position

The ERAs draft decision proposes to adopt a value for imputation credits (denoted by "gamma") in the range of 30% to 60%. In arriving at this conclusion, the ERA states that it has had regard to:

- evidence and analysis referred to in ACG (2005), which:
  - notes that regulators have generally adopted a value for gamma of 50%, but both the ACCC and ESC Victoria have argued that this represents the minimum value for gamma;
  - estimates values of gamma under taxation arrangements applying since 1 July 2000, and which finds that gamma values of about 75 per cent may be expected for utility companies;
- evidence from Hathaway and Officer (2004)[28] which estimates gamma at between 28% and 36%. This study updates previous work from these authors, which regulators around Australia have to date relied upon to justify a value for gamma of 50% as being reasonable; and
- evidence from Cannavan, Finn and Gray (2004) which provides support for a value of zero for gamma in the period after the introduction of the 45-day rule.[29]

After considering the above evidence, the ERA concludes that:

*"In the absence of additional definitive information and taking **all** of the abovementioned studies into account, the Authority considers that a reasonable range for the determination of gamma is 0.3 to 0.6."*[30] *[emphasis added]*

4.2 KPMG response

The ERA has proposed to adopt a range of 30% to 60% for the value of imputation credits. It is unclear from the draft decision how the ERA arrived at this conclusion, particularly since the evidence that the ERA claims to have reviewed would suggest a range of zero to 75%. Notwithstanding this lack of clarity in how the ERA has made its decision, we make the following comments in relation to the evidence that the ERA has reviewed:

- Hathaway & Officer (2004) conclude that their updated value for gamma is around 36%. This conclusion is based on the average utilisation rate observed during the period from

[28] Hathaway, N. and R.R. Officer, (2004), The Value of Imputation Tax Credits: Update 2004, Capital Research Pty Ltd, p.8.
[29] Cannavan, D., Finn, F and S. Gray (2004), The value of dividend imputation tax credits in Australia, Journal of Financial Economics, Vol. 73, pages 167-197.
[30] ERA Draft Decision on the SWIN, March 2006, para. 670.

1986 to 2004. It should be noted that the authors made this conclusion notwithstanding that their data suggested that the value of franking credits in the hands of shareholders may have increased (to up to 60%) in the latter years of the period they examined. KPMG is aware that regulators such as the ESC in Victoria and their consultants, ACG, have elected to impose their own conclusions on the work of Hathaway and Officer, by claiming that it is appropriate to attribute a value as high as 60% for gamma. We contend that this interpretation of the data is inappropriate and not supported by any evidence which indicates that the latest trend can be regarded as being permanent rather than transitory. It also represents a major change to the position previously adopted by the ERA and by Australian regulators universally, which was to adopt the average value for franking credits in Hathaway & Officer (1999). We note in this respect that, prior to the issue of the updated Hathaway and Officer (2004) paper, the ERA has paid particular regard to the evidence previously provided by these authors in setting gamma. In its Draft Decision on Alinta's gas access arrangements, it stated:

"*In Australia, regulators under the Code have generally adopted a "γ" value of 0.5 based on the 1999 study by Hathaway and Officer, which estimates gamma at close to 0.5. The Authority takes the view that this assumption is appropriate for the GDS (Gas Distribution System).*"[31]

- The ERA indicates that it has considered the evidence from Cannavan Finn and Gray (2004) in arriving at its reasonable range, but appears to have dismissed that evidence without explanation. This research has been published in a top tier international academic journal and has been subject to widespread scrutiny. We see no basis for the ERA to dismiss this evidence.

- The ERA has referred to the conclusions of recent work undertaken by ACG (2005) in relation to the value of imputation credits. This work seeks to obtain a more current estimate of the value of imputation credits (i.e. more current than Cannavan Finn and Gray (2004)), particularly since the recent changes made to the taxation rules in relation to the ability of individual taxpayers to claim a refund for imputation credits. The key conclusion from ACG (2005) is that investors are valuing imputation credits at 74% of their face value. Assuming a distribution rate of 100%, ACG (2005) concludes that the value of gamma is around 75%. Notwithstanding the results of their study, however, ACG recommended that a reasonable range of values for gamma is between 35% and 60%.

  KPMG has strong reservations in relation to the integrity of the conclusions arising from ACG (2005). In particular, we consider that the design of the study is questionable given that:

  - The results imply that in the 2003-2005 sub-period, $1 of cash is worth much less than $1 to the recipient investor. This observation is anomalous and warrants further investigation;

[31] Economic Regulatory Authority, Draft Decision on the Proposed Revisions to the Access Arrangement for the South-West and Mid-West Gas Distribution Systems, February 2005, page 77.

- The study was deliberately not designed as a regression analysis in order to avoid statistical problems such as multi-collinearity. However, it also results in a failure to control for the size of the drop-off in share prices caused by general market movements. Whilst this may not affect the relativity of the results in each sub-period, it does affect the absolute value of the drop-off;

- Whilst the results are not statistically significant, the differences in the mean drop-offs in the first two sub-periods in ACG's analysis are negative. This implies that imputation credits are negatively valued in those periods – a result which does not make sense; and

- ACG(2005) applies a distribution rate of 100% to the utilisation rate of franking credits[32] to arrive at the value of gamma but provides no support for this assumption apart from the statement that utilities would have an incentive to distribute all of their franking credits over time. Even if this there was objective evidence of this, the maximum distribution rate would not be 100% since companies do not distribute their imputation credits instantaneously at the time they are generated.

KPMG considers that these are critical questions which place the results of ACG (2005) in question and at present, remain unanswered by ACG. We strongly believe that the results of ACG (2005) should not be relied upon until this research is critically scrutinised.

A further issue raised in our May 2005 report was the need for consistency between the values adopted for gamma and the MRP. Recent work by SFG Consulting[33] suggests that there is a mathematically deterministic relationship between the value of gamma and MRP, which indicates that:

- An MRP of 6% is consistent with a value of 0 for franking credits; and

- An MRP of 8.5% is necessary to support a value of 50% for franking credits.[34]

The ERA has not provided any arguments to reject SFG's work in this area.

The arguments set out above suggest that a reasonable value for gamma currently lies between zero (based on Cannavan Finn and Gray (2004)) and 50% (based on Hathaway and Officer (1999) and regulatory precedents). This range also takes into account updated evidence in Hathaway and Officer (2004).

KPMG continues to maintain that a value of zero is likely to be the most valid assumption for gamma. However, based on the evidence that the ERA has considered, the uncertainties with respect to measurement of gamma, and noting the need for internal consistency between the values adopted for the MRP and gamma, we believe that would be reasonable to conclude that the value of gamma lies in the range of zero to 50%. This range of values is consistent with an MRP in the range of 6% to 8%.

[32] Note that Hathaway & Officer (2004) provides empirical evidence that suggests that the distribution rate is 71%.
[33] Gray, S, The relationship between franking credits and the market risk premium, 18 August 2005.
[34] KPMG, Weighted Average Cost of Capital (for Western Power), May 2005, page 60.

5 Other issues

5.1 Estimating the real risk free rate

In addition to our comments on the MRP, equity beta and value of imputation credits, KPMG considers that it is relevant to update the comments in our May 2005 in relation to the estimation of the real risk free rate. We have sought to highlight this issue given the fact that Western Power's proposed access arrangements for the SWIN is being determined at a time when:

- interest rates in Australia are at historically low levels;
- the supply of Commonwealth government bonds has diminished to virtually zero; and
- there is continuing widespread concerns over the small size and illiquidity of the Commonwealth index-linked bond market.

Given that the cost of capital for the SWIN will be used to set SWIN's revenue for the next regulatory period, it is important to consider whether the conventional practice of estimating the real risk free rate from prevailing spot market data, should be modified to reflect the prevailing rates or adopt a longer term perspective.

5.2 UK evidence

The justification for departure from the conventional approach for estimating the real risk free rate is based on the principle that the observed rates are biased in some way because of special factors which have distorted the normal pricing of indexed linked securities, or cyclical market considerations. In our May 2005 report, we provided evidence that UK regulators had acknowledged such factors by seeking to adjust the risk free rates used in their decisions to reflect longer term considerations. This evidence included the following:

- In 2002, notwithstanding its stated preference for relying on market data, the Competition Commission noted that there was widespread recognition that gilt yields had been affected by special factors – such as increased demand from pension funds and relatively low UK Government borrowing levels – which have placed upward pressure on gilt prices, and hence, resulted in lower yields[35]. As a result, the Competition Commission recommended a range of 2.5%-2.75% for the real risk free rate when 10 year gilt yields were around 2.3%.
- In 2004, OFGEM's initial proposals for the Electricity Distribution Price Control Review noted that the low level of the risk free rate was a key issue for the review[36]. The regulator noted that given the sensitivity of the cost of capital to the risk free rate, and the considerable uncertainty surrounding the sustainability of its current levels, a cautious approach was warranted in setting the cost of capital for the review. Under these

[35] Competition Commission, BAA: A report on the economic regulation of the London airports companies, 2002, p. 172. It also noted that in more recent times corporate bonds had declined.
[36] Ofgem, Electricity Distribution Price Control Review: Background information of the cost of capital, March 2004, 12.

circumstances, OFGEM considered that it would be appropriate to adopt a range for the risk free rate of 2.25% to 3.0% for the real risk free rate, at a time when 10 year gilts were around 1.9%.

We have identified more recent evidence from the UK which continues to strengthen the case for adjusting the real risk free rate.

In 2005, the UK telecommunications regulator OFCOM argued that the very low nominal risk free rate should not be mechanistically reflected in a lower return on equity:

""the nominal rate for 5-year gilts has fallen over the last year and mechanistically applying a 3 month average of the most recent data would lead to a risk free rate of 4.5% or less. Such an estimate would, however, be low by historic standards, and Ofcom believes that some weight should be given to a longer-term perspective, suggesting that the use of a slightly higher risk free rate would be more appropriate."

"Taking account of both current and recent historical evidence, Ofcom's view is that it is appropriate to use a value of 4.6% for the nominal risk free rate. This is somewhat higher than the current rate of about 4.2% to 4.3% (which are lower than historic averages), but consistent with a longer term averages and a real risk free rate of 2.0% and a rate of inflation of 2.5%."[37]

The UK water regulator, OFWAT has also argued for a departure from the conventional approach of relying on prevailing market data for similar reasons:

"Real yields on medium maturity index-linked gilts (maturity of ten years and above) have averaged just under 2% over the last six months and just above 2% over the last five years. Consequently, the short-term data supports a risk-free rate of just 2.0%. Current gilt yields are significantly below the long-term average. Analysis of time series data confirms a shift from yields in the range of 3-4% to yields of just over 2% from late 1998. The average gilt yield is 2.5% if averaged over eight years; it is 3.0% if averaged over 13 years. Over the period since 1980, real returns have averaged 4.2%

"Our estimate for the risk-free rate is in the range 2.5% to 3%. It is based on the longer run level of yields on medium term index-linked gilts rather than the current rate which the evidence suggests is historically low. Since our draft determinations, real yields have declined further, albeit very marginally. We do not think this is sufficient to warrant a change in our approach and to simply take account of the current market spot rate would not lead to a sustainable WACC over the medium term."[38]

This decision therefore reflected an adjustment of around 50 to 100 basis points to the prevailing real risk free rate.

5.3 Australian evidence

There is little evidence of Australian regulators adopting similar practices to UK regulators with respect to the real risk free rate. However, KPMG notes that in the 2005 electricity distribution

[37] Office of Communications, Ofcom's approach to risk in the assessment of the cost of capital, 23 June 2005, p 15.
[38] Ofwat, Future water and sewerage charges 2005-10: Final determinations, Appendix 5, Cost of Capital.

price review in Victoria, the ESC accepted evidence put forward by the electricity distributors that the pricing of 10 year index-linked government bonds was distorted due to the maturity of one series of bonds. This had the effect of increasing the demand for the benchmark 10 year index-linked bond (as investors rebalanced their investment portfolios), and hence, depressing its yield.

The ESC accepted the validity of this argument and adjusted its estimate of the real risk free rate by choosing a value that was based on a 20 day period that was unaffected by the artificially depressed yields. This approach by the ESC implies acceptance of the thinness of the index-linked government bond market as a special factor that warranted departing from its conventional approach.

5.4 How the ERA could apply an adjustment

KPMG considers that there is anecdotal evidence which suggests that Australia's bond markets are – like UK government bond markets - being affected by special or cyclical factors which has ramifications for observed market yields. Furthermore, the general principle that the risk free rate, like the MRP, ought to reflect a longer term perspective, would appear to be intuitively appealing. This is particularly so given that the MRP represents excess equity returns over the risk free rate.

One way of giving effect to this principle is to estimate the real risk free rate by reference to an expected inflation rate of 2.5%, which represents the midpoint of the 2-3% long term target inflation range adopted by the Reserve Bank of Australia ("RBA"). Assuming that the pricing of nominal government bonds is "efficient" but that the index-linked government bond market may be affected by special factors, it is possible to solve for the real risk free rate using the Fisher equation.

For example, using a 20 day averaging period ended 1 May 2006, the pre-tax real WACC for Western Power's SWIN would be calculated using:

- A nominal risk free rate of 5.57%; and

- A real risk free rate (consistent with an expected inflation rate of 2.5%) of 3.00%. This compares to a value of 2.39%, and implies an adjustment of +61 basis points, if the real risk free rate had been estimated as a 20 day average ended 1 May 2006.

Holding all other parameter values constant as per the draft decision, the resulting pre-tax real WACC would be 7.38% (or 7.22% if the top 10th percentile was eliminated), compared with values of 6.59% and 6.43% respectively in the ERA's draft decision.

6 Our updated assessment of WACC

Based on the views that we have set out in this report, we have re-assessed the reasonable range for the pre-tax real WACC for Western Power's SWIN to be from 5.95% to 9.02%, with a midpoint value of 7.29%. This corresponds with a range of 5.02% to 6.59% as assessed by the ERA in its draft decision. Furthermore, we note that the ERA's proposed point estimate value of 6% is at the bottom end of the range that we have assessed.

We also make the following comments in relation to the ERA's overall approach on WACC:

1 Based on our understanding (and as outlined in our May 2005 report), the Electricity Networks Access Code 2004 (the Code) establishes a form of regulation that requires Western Power to develop an access arrangement to be submitted to the ERA for approval. The criteria for approval to be used by the ERA is whether the access arrangement meets the Code objective. Section 4.28(b) of the Code removes the ability of the ERA not to accept Western Power's access arrangement if it has met the Code objective and the detailed requirements at chapter 5 of the Code.

   In our review of the cost of capital issues raised in the ERA's draft decision, we have been unable to find any analysis of the ERA's assessment of Western Power's proposed WACC against the Code objective, nor any reasons why the ERA considers that the WACC proposed by Western Power does not meet the Code objective. Notwithstanding this, we have addressed the various issues on the cost of capital in the ERA's draft decision as requested by Western Power.

2 Furthermore, in arriving at a range for WACC that we consider to be reasonable, KPMG has not adopted the approach taken by the ERA to eliminate the top and bottom 10th percentiles of the calculated range. The calculated WACC range derived by the ERA reflects an outcome obtained by applying reasonable values for various input parameters. Consequently, we can see no basis for the regulator to further eliminate the top and bottom 10th percentiles of the range.

Our assumptions with respect to parameter values are set out in the table below.

Table 2: Updated WACC assessment

	Low	High	Midpoint
Nominal Rf	5.57%	5.57%	5.57%
Real Rf	2.39%	2.39%	2.39%
Equity beta	0.90	1.1	1.00
Market risk premium	6.0%	8.0%	7.0%
Inflation	3.11%	3.11%	3.11%
Debt proportion	60%	60%	60%
Equity proportion	40%	40%	40%
Debt margin	1.225%	1.425%	1.33%
Tax rate	30%	30%	30%
Value of imputation credits	50%	0%	25%
Pre-tax real WACC	**5.95%**	**9.02%**	**7.29%**

Note:

1. *The nominal and real risk free rates have been calculated as 20 day averages ended 1 May 2006.*
2. *We have not sought to adjust the debt margins assessed by the ERA in the draft decision.*
3. *The values shown for the MRP are those that we consider to be consistent with the range of values adopted for imputation credits.*

In assessing the reasonableness of the overall calculated WACC range set out in the table above, it is relevant to note that despite mounting evidence from the UK that regulators are seeking to adjust the risk free rates used in their determinations of the cost of capital to reflect longer term considerations, we have not factored into our calculations an adjustment to the real risk free rate to reflect longer term considerations, as suggested in the discussion at section 5.4 of this report at this point in time.

Inclusion of an adjustment to the real risk free rate of 61 basis points (as suggested at section 5.4) would have resulted in a pre-tax real WACC ranging from 6.58% to 9.67% (midpoint of 7.93%), which is significantly higher than range shown in ***Table 2*** above. In this sense, we consider that the pre-tax real WACC that we have assessed as being reasonable for the SWIN, may also be regarded as being conservative.