

**REVIEW OF ESCOSA'S DECISION ON
ETSA UTILITIES EQUITY BETA**

A Report for Johnson Winter & Slattery

Prepared by NERA

**April 2005
Sydney**

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1 INTRODUCTION

1. ETSA Utilities Pty Ltd (ETSA) has retained NERA to provide an assessment as to whether there are any material errors in the economic facts or interpretation of economic facts in ESCOSA's *Electricity Distribution Price Review 2005-2010: Statement of Reasons and Final Determination* (the Final Determination) in relation to its methodology for setting ETSA's equity beta.

2 SUMMARY OF CONCLUSIONS

2. ESCOSA is required to use the CAPM to set the WACC for ETSA Utilities for the next regulatory period. In the current period ETSA Utilities has an equity beta of 1.13, (assuming a level of debt gearing of 60%). In its Final Determination, which is the subject of our analysis in this report, ESCOSA has set an equity beta of 0.8, with an assumed level of debt gearing of 60%. This amounts to a reduction of 29% on the equity beta, and a reduction of 35% on the compensation for risk of equity investors when the reduction in the market risk premium is also taken into account.
3. In our view, the ESCOSA determination contains serious errors of fact and logic.
 - a. **Australian Market Data:** ESCOSA asserts that 0.8 is at the upper end of equity β s, however observed, for the last 4 years, with the re-levered β from the latest market data justifying a beta of 0.3. We demonstrate that both statements are wrong, even assuming that such data are an appropriate basis for judgment. It was also wrong of ESCOSA to give little or no weight to earlier historical proxy betas, given, for example, the need to avoid bias caused by the technology bubble.
 - b. **Domestic Regulatory Precedent:** In its Draft Determination, ESCOSA stated that the range of regulatory decisions in relation to equity beta was between 0.7 and 1.2, and considered it important that its equity beta (0.8) fell within that range. The Draft Determination could only put forward that range because it contained a figure from the Queensland Competition Authority (QCA) which the QCA has since recognised involved a number of computational and other errors and has now been revised by the QCA (and ESCOSA) from 0.7 to 0.9. The equity beta recommended by ACG was 1.0 but adjusted by the QCA for reasons peculiar to Queensland distribution. The Final Determination incorrectly reported beta ranges (including ETSA Utilities own beta range) rather than actual beta figures. For fully privatised energy companies, we calculate the correct range of regulatory decisions to be 0.97 to 1.20, with an average (mean) of 1.01. This is acknowledged by ESCOSA as the correct comparable. 0.8 is well outside this range and well below this figure. In addition, faced with such a range of 0.97 to 1.20, ESCOSA has had to abandon its earlier approach of placing the beta within the regulatory range, although this is not explained or even adverted to.
 - c. **International Benchmarks:** ESCOSA concludes that 0.8 is "not inconsistent with international benchmarks" (page 142 of the final Determination), being a decision of the UK Regulator (Ofgem), and also certain US data. This conclusion is wrong. In particular, ESCOSA does not consider the final Ofgem decision, which has a beta of 1.0 (it also incorrectly states the draft range is 0.6 to 1.0, whereas it was in fact 0.75 to 1.0 when gearing is taken into account). Further, ESCOSA did not consider 70 recent US regulatory decisions because it wrongly considered that

Discounted Cash Flow analysis is incompatible with the CAPM. The 70 decisions, which show an implied beta of 1.0, should be taken into account.

4. It follows that the Australian market data, the Australian Regulatory precedents and the International benchmarks all show an equity beta of, or very close to, 1.0 is appropriate.
5. Determining beta to be 0.8 in these circumstances:
 - a. does not foster a stable regulatory framework;
 - b. underestimates the incentive necessary for ETSA Utilities' investors to invest in the business (which is not in the long term interests of end users), which is a significantly worse result than overestimating beta because of the asymmetric risks involved; and
 - c. is unreasonable.

3 EQUITY BETA

3.1 The Weighted Average Cost of Capital

6. ESCOSA must determine the weighted average cost of capital (WACC) for ETSA. This will ultimately depend on the riskiness of investing in ETSA, with higher risk implying a higher WACC and, therefore, higher regulated revenues.
7. As its name suggests, the WACC is comprised of the interest costs associated with debt weighted by the assumed proportion of debt finance plus the cost of attracting equity investors weighted by the assumed proportion of equity finance (which is simply one minus the assumed proportion of debt finance). For example, if a company finances 60% of their investments with debt and 40% with equity (60% debt gearing) and the interest rate on debt is 5% and the cost of attracting equity is 10% then:

$$\begin{aligned} \text{WACC} &= 5\% \times 0.6 + 10\% \times 0.4 \\ &= 7\% \end{aligned}$$

8. ESCOSA, and other Australian regulators, do not set the WACC based on the actual financial structure of the regulated business. Rather, ESCOSA sets a benchmark financial structure which, in ETSA's case, assumes ETSA finances 60% of all investment through debt and only 40% through equity. This is a high level of debt financing relative to the average for listed Australian companies (which is around 30%).
9. Assuming a high level of gearing has two effects, on one hand it tends to reduce the WACC because more weight is given to relatively cheaper debt. However, there is no 'free lunch' in capital financing and an increase in the level of debt financing tends to increase both the risks attached to equity and the risks attached to debt (ie, the risk of default) – which tends to increase both the cost of equity and debt.

3.2 What has ESCOSA Decided

10. Schedule 10 of the Electricity Pricing Order (EPO) requires that ESCOSA set ETSA's weighted average cost of capital (WACC) using the capital asset pricing model (CAPM). The CAPM is simply a theoretical set of relationships that explain what return a rational investor will require to invest in a particular stock given the level of expected risk. The CAPM takes into account the expected sensitivity to non-diversifiable risk (equity beta), as well as the expected return on the market and the expected return on the risk free rate.
11. ESCOSA is therefore required to determine a number of CAPM parameters including the equity beta. The equity beta is a measure of the riskiness of investing in ETSA's equity and depends on, amongst other things, the assumed level of debt held by ETSA.
12. ESCOSA has adopted an equity beta of 0.8 and a level of debt 'gearing' of 60%. This equity beta is inconsistent with that adopted by other Australian regulators of privately owned energy businesses who have set an equity beta of 1.0 or higher, associated with the same debt gearing. The effect of this is that equity investors in other privately owned regulated energy businesses receive 25% ($1.0/0.8-1=0.25$) higher compensation for risk than do investors in ETSA. In today's dollars, this difference in compensation is equivalent to a reduction in ETSA's revenues of around \$13.7m per annum for each of the next five years.
13. ESCOSA's decision also has the effect of reducing the regulatory equity beta by around 29% relative to the current regulatory period. This 29% reduction results from the combination of:
 - a. an increase in the assumed level of debt gearing from 55% to 60%; and
 - b. reducing the equity beta from 1.13 (gearing 60%)¹ to 0.8 (gearing 60%).
14. In other words, ESCOSA's decision reduces investors' compensation for risk (reduces equity beta) while at the same time increasing the assumed level of debt - which ordinarily would result in an increase in the compensation for risk. An equity beta of 1.00 at a gearing of 55% would increase to an equity beta of 1.13 at a gearing of 60% holding all other parameters at the middle of the provided range. This is also consistent with an equity beta that would be derived from transformation formulas that de-lever/re-lever equity beta for different gearing levels.² Thus, when

¹ At a gearing of 55%, equity beta equates to 1.0.

² ESCOSA's formula for estimating the impact of gearing on the equity beta is set out on page 132 of the Final Determination and would result in an equity beta of 1.13. It is also consistent with the formula the ACCC uses (the 'Monkhouse formula') to adjust equity betas for different levels of gearing. Using the Monkhouse formula, an

compared at a constant 60% level of gearing, ESCOSA's current decision reduces the equity beta from 1.13 to 0.80 – which is a reduction of 29% $((1.13-0.80)/1.13)$.

15. The actual decrease in an equity investors' compensation for equity risk is also impacted by ESCOSA's decision to lower the market risk premium from 6.5% to 6%. The combined effect of these three decisions is to lower an equity investors' compensation for risk by around 35% relative to the current regulatory period.

equity beta of 1.0 at a gearing level of 55% is equivalent to an equity beta of 1.13 at 60% (assuming a debt beta of zero as both the ACCC and ESCOSA do).

3.3 The Impact of Gearing on Equity Beta

16. The CAPM is based on the principle that the more risky a business venture the greater the return investors require in order to entice them to finance that venture. The CAPM measures risk in two ways. The first measure of risk is the 'asset beta' which is the risk that attaches to the underlying assets of the business before those risks are magnified by any debt financing (hence the term 'asset beta'). A business is said to have a high asset beta if, even with no debt financing, its profits would be highly sensitive to the state of the economy (eg, its profits would fall dramatically in a recession and rise rapidly in a boom).
17. The second measure of risk is the equity beta. The equity beta measures the risk that shareholders face after an adjustment has been made to account for the impact of a company's actual level of debt. If a company has zero debt the equity beta is equal to the asset beta. However, as a company increases its exposure to debt the riskiness of its equity increases and its equity beta rises above the asset beta.
18. This financial leveraging of risk is explicitly discussed in Schedule 6.1 of the National Electricity Code (the Code) which states:

The risk premium sought by equity investors will be a function of:
 - *The underlying market risk (volatility) of the pre-financing cash flows of the investment, and*
 - *The level of financial risk, which is in turn dependent on the capital structure of the entity.*
19. Replacing equity with debt concentrates the underlying risk of the business in a smaller number of shareholders. This increases the volatility of returns, and therefore the risk, attached to equity. For example, the need to pay debt obligations before paying dividends makes it harder to pay dividends in 'bad years'. In the extreme, very high levels of debt make it possible for even a mild recession to force a company into insolvency. On the upside, high levels of debt reduce the number of remaining shareholders with whom the 'spoils' of an economic boom must be shared – amplifying the benefits to shareholders of a 'good year'.
20. 'Debt gearing' is the term given to describe this profit amplification process. A company is said to have zero gearing if it has no debt and 50% gearing if it finances its investments 50% with debt and 50% with equity (and so on). As a general guide, shares in a company that is 50% financed by debt and 50% financed by equity will be around twice as risky (have twice as high an equity beta) as shares in the same company that is 100% equity financed.

21. In the context of ESCOSA's decision, the assumed level of gearing (60%) more than doubles ETSA's equity beta relative to a zero level of gearing. As discussed above, this assumption of 60% debt allows ESCOSA to assume as a benchmark that relatively expensive equity has been 60% replaced with relatively cheaper debt. However, at the same time as assuming that ETSA is 'loaded up' with relatively cheap debt it is unreasonable not to account fully for the impact of this assumption on the implied riskiness of equity. An important question is whether ESCOSA has adequately compensated for these risks, ie, has it set the equity beta high enough for its assumed level of gearing?

3.3.1 Comparing ETSA against the 'average' company

22. The average level of gearing on the ASX is around 30%.³ This means that, other things equal, we would expect ESCOSA to assume ETSA has higher risks than the average company on the ASX – because ESCOSA has assumed it has about double the average level of gearing. Even if one believed that ETSA had lower underlying risk (asset beta) than the average company on the ASX, the high level of assumed gearing could be expected to increase the risk attached to its equity (equity beta) above the level of the average firm.

23. In other words, it would be incorrect to attempt to compare the level of underlying risk between companies by reference to the risks that attach to their equity – as these risks depend on the company's gearing as well as its underlying risk. In the CAPM the level of risk associated with holding a diversified portfolio that matches the composition of the stock market is, by definition, assigned an equity beta of 1.0. If an individual company's equity beta is 1.0 then it has the same level of risk as the average in the market portfolio. However, this says nothing about the relative level of underlying risk.

24. For example, historical estimates give Rupert Murdoch's 'News Corporation' an equity beta of around 2.0 – suggesting that it is twice as risky as the average stock. However, a large part of this risk is due to relatively high levels of gearing. At a gearing level of around 60% debt (ie, the same gearing that ESCOSA has assumed for ETSA), News Corporation is roughly two times as heavily geared as other ASX listed companies.⁴ It is also roughly 60% more heavily geared than Kerry Packer's Publishing and Broadcasting Limited (PBL) which also operates in the media industry. It would therefore be wrong to assume that because News Corporation's equity returns are more volatile than PBL's, the underlying business activities at News Corporation are more risky. It is quite possible, even likely, that the higher volatility of News Corporation's equity is explained by its higher levels of debt.

³ Source: ACG has quoted an unsourced gearing ratio for the ASX 200 on 18 August 2004 of 30%. (*Dalrymple Bay: Analysis of Proxy Betas*, September 2004, report to the QCA).

⁴ All data quoted in this paragraph was sourced from www.commsec.com.au on 18 March 2005.

25. Assuming an equity beta of 1.0 for ETSA does not imply that the underlying risk associated with ETSA's activities is equal to the average for companies on the ASX. In fact, because ESCOSA is assuming a materially higher than average level of gearing, an equity beta of 1.0 implies that ETSA's underlying risk is materially less than that of the average ASX listed corporation. It is possible to quantify this using the equation used by ESCOSA to adjust the equity beta for different levels of debt gearing, specifically:

$$\beta_a = \beta_e * (1 - \text{debt gearing})^5$$

26. This equation means that an equity beta of 1.0 at a debt gearing level of 60% is associated with an asset beta (representing underlying risk) of 0.40. The average asset beta on the ASX can also be estimated using the same equation. The average equity beta on the ASX is, by definition, 1.0 and is associated with an average level of gearing of 30%. This implies that the average asset beta on the ASX is around 0.70.
27. That is, assuming an equity beta of 1.0 at a gearing of 60% is equivalent to assuming that the average firm on the ASX is 75% more risky than ETSA ($0.70/0.40 - 1 = 0.75$). This is the standard assumption by Australian regulators. By contrast, assuming an equity beta of 0.80 at a gearing of 60% (as per ESCOSA's final decision) implies an asset beta of 0.32 which implies that the average firm on the ASX is 219% more risky than ETSA ($0.70/0.32 - 1 = 1.19$).
28. These results are summarised in the below table.

Table 1
Underlying Levels of Risk

Benchmark	Gearing	Equity beta	Asset beta	Underlying risk of average ASX company as a % of estimate for regulated company
Average of regulatory precedent	60%	1.0	0.40	175%
ESCOSA's final decision	60%	0.8	0.32	219%
The average company on the ASX	30%	1.0	0.70	na

⁵ See page 132 of the Final Determination where this equation is described. In its general form this equation also includes a term for the debt beta. However, on page 133 ESCOSA provides reasons for setting the debt beta to zero that also hold in this context. It is also the case that other regulators, such as the ACCC and the ESC, set the debt beta equal to zero. Setting the debt beta above zero would not materially change the later analysis.

3.4 ESCOSA's Interpretation of Historical Proxy Betas

29. Equity risks taken into account in the CAPM depend on the expected sensitivity of returns on a stock to changes in the average return on the market (say, the average return on the ASX). If a company's equity is expected to exactly match the average return on the ASX then that company has an equity beta of 1.0. If a company's equity is expected to outperform the ASX in a good year (boom) and under perform against the ASX in a bad year (recession) then it is said to have a high 'correlation with the market' and will have an equity beta greater than 1.0. Similarly, if a company is expected to outperform the ASX in a recession and underperform against the ASX in a boom then that company has an equity beta of less than 1.0.⁶
30. In accordance with accepted Australian practice, ESCOSA attempted to estimate 'historical proxy betas' for a number of regulated businesses during specific periods. In doing so it has used very limited statistical techniques and analytical tools. The proxy betas so generated look backwards at the relationship between an individual stock and the market. To the extent that, during the period under consideration, the return on the stock is highly correlated with the return on the market it is assigned a high 'historical proxy beta' and *vice versa*.

3.4.1 Theoretical limitations of historical proxy betas

31. Historical proxy betas do not measure investors *expectations* of risk – that is they do not measure the equity beta. The true equity beta is forward looking and is the equity beta that investors believe will hold in the future. Historical data can assist in determining this, however, unless investors' expectations for the future are solely based on the historical data under consideration then caution must be used in simply adopting what the historical data 'spits out'.
32. This criticism of historical proxy betas is especially strong when the data period used is relatively short. The usual analogy exists with weather forecasting. Using a short period of data to estimate the historical proxy beta is similar to forecasting next month's weather on the basis of the average temperatures for the last month. While such a methodology may be 'better than nothing' there will generally be superior methodologies available for predicting the weather (eg, using satellite data). Moreover, historical predictions are most likely to be useful if they are based on a very long history of the weather experience in that month – unless there is some reason to believe that climate has changed over time.

⁶ The intuition behind this definition of risk is that a dollar of returns is more valuable to investors when they are poor (ie, in a recession) than when they are rich (ie, in a boom). As a result, investors regard stocks that tend to perform relatively well in a recession (ie, perform less badly than other stocks) as low risk.

33. The same is true of historical proxy betas. In order for them to be relevant one must assume that what happened in the past during the period used to estimate the proxy beta is likely to give as good indication of what will occur in the future. However, if investors have other information available to them, such as their own analysis of the company's activities and strategies, then they are unlikely to blindly base expectations solely on what happened in the past - just as meteorologists are more likely to estimate tomorrow's weather by reference to satellite data than yesterday's weather.
34. Even if investors did forecast risk solely on the basis of historical proxy betas, they would tend to estimate those proxy betas over a period that they believed was 'representative' of future periods. Unless they had reason to believe that the nature of the company or the market as a whole had changed over time, investors would tend to use data from the longest time period available to them - as this is the best way of ensuring that the choice of time period does not artificially affect the estimated equity beta. Continuing the weather analogy, a meteorologist predicting average temperatures in March 2006 would be more likely to use average temperatures in March over the last 100 years, adjusted to take account of any global warming trend, than to rely solely on average temperatures in March 2005.

3.4.2 ESCOSA's interpretation of historical proxy betas

35. ESCOSA's Final Determination reports all of its evidence of historical proxy betas graphically and reports them as an average of the individual historical proxy betas for the selected comparable companies. This represents a departure from the information reported in the Draft Determination which not only reported average historical proxy betas but also reported the individual values for some of those historical proxy betas. In particular, Table 10.2 from the Draft Determination has been omitted in the Final Determination.
36. ESCOSA's conclusions on the Australian historical proxy beta data is set out in the following quotations from the Final Determination.

"The Commission notes that, if it were to have regard exclusively to the latest market evidence, it would adopt a re-levered equity beta of approximately 0.3." (Page 140)

"... the Commission has retained the equity beta of 0.8 for a gearing level of 60% debt -to-assets. This is at the upper end of observed equity betas, however measured, over the past four years." (Page 142)

37. Even if the historical proxy beta data relied upon by ESCOSA is the only data which should be relied upon, in our opinion, ESCOSA is wrong in its interpretation of that data. The first quote is incorrect and inconsistent with ESCOSA's own evidence presented in the Final Determination. Figure 10.3 shows that the most recent average

weekly domestic historical proxy betas relied on by ESCOSA are for August 2004 and average more than 0.80. Moreover, this is an *average* of the historical proxy betas for 5 different firms that, while not reported in the Final Determination, range from 0.05 to 2.03.⁷ The average of these observations is 0.82 but the statistical precision is very low.

38. In fact, based on these observations the true mean of the observations could be as high as 1.29 using the standard 95% statistical confidence interval.⁸ This means that ESCOSA can only conclude with statistical confidence that the mean historical equity beta of the comparable companies during that period was not greater than 1.29. It cannot rule out with confidence that the mean of the comparable companies' equity beta is between 0.82 and 1.29. As a matter of statistics applied to the relevant data ESCOSA's statement "that if it were to have regard exclusively to the latest market evidence, it would adapt a re-levied equity beta of approximately 0.3" is wrong.
39. Moreover, the above confidence interval does not take into account that an individual company, such as ETSA, may well have a higher equity beta than the average of the comparables, ie, there is also uncertainty around how comparable the comparables are. When this is taken into account, as the Australian Competition and Consumer Commission ("ACCC") has suggested it should be⁹, the proper confidence interval is much wider still.
40. In order to be true, ESCOSA's interpretation of 'latest market evidence' must define this term to cover only the period in Figure 10.3 where historical proxy betas were at their lowest point. That is, it must exclude the most recent estimates of 0.82 and exclude prior estimates of 1 and above. Such 'cherry picking' of the available data does not lend itself to appropriate decision making.
41. For the same reasons the second quote is, at best, liable to mislead. ESCOSA can not statistically describe a value of 0.8 as being at the "***upper end of observed equity betas, however measured, over the past 4 years***" without some analysis of the statistical precision of those estimates. Indeed, the most recent historical proxy beta estimates for the five companies chosen by ESCOSA as comparable show one with an equity beta above 1.0 (AGL) and one with an equity beta above 2.0 (Alinta). Moreover, the historical proxy beta for AGL, as measured by the AGSM in September 2003, was

⁷ See Table 10.2 of the Draft Determination.

⁸ On page 172 of the Draft Determination, ESCOSA states that the 95% confidence interval around the 0.82 estimate is ± 0.47 - giving an upper bound estimate of equity beta of 1.29.

⁹ The ACCC state in its decision background paper on the *Statement of Regulatory Principles for the Regulation of Electricity Transmission Revenue*:

"The ACCC acknowledged that this assumption was simplistic [ignoring the uncertainty surrounding the comparable] and maybe it would be more accurate to consider the confidence intervals for individual equity betas." (page 105)

actually negative. That is, using ‘recent’ but different data periods the measured equity beta for one company has risen from a negative value to a value above 1. That is, if historical proxy betas are taken at face value, AGL has gone from having negative risk to being more risky than the market in a relatively short period.

42. As already stated, ESCOSA cannot rule out with confidence that the true mean historical proxy beta, based on the latest 60 weeks of reported observations, is as high as 1.29. As a matter of statistics applied to the relevant data ESCOSA’s statement is also wrong.
43. Historical proxy betas are nothing more than the results of statistical regression analysis applied to data from a particular period. In our view, it is incorrect and improper for ESCOSA to rely on the headline results of that regression analysis without properly interrogating and discussing the statistical uncertainty surrounding those estimates. This is particularly so given the extremely small sample size of generally less than 5 companies.

3.4.3 ESCOSA’s focus on ‘recent’ market evidence

44. In any event, ESCOSA’s focus on ‘latest market evidence’ and the ‘past four years’ of data is inconsistent with its own analysis and amounts to an error in the interpretation and use of historical proxy betas. If the underlying regulated activities and the factors affecting market returns do not change over time then it is appropriate to assume that the risks attached to those activities do not change either. ESCOSA has expressed the view that the risks associated with regulated assets are relatively constant over time in a different context. In particular, ESCOSA rejected the proposal that common practice be followed and historical proxy betas be adjusted upwards by the ‘Blume’ adjustment. ESCOSA rejected this on the grounds that the Blume adjustment assumed risks changed over time while regulated business risks did not change over time.

“... the Commission agrees with the Victorian ESC’s findings on this matter. In particular, it notes that the equity beta required is for ETSA Utilities’ regulated activities only, and is consistent with the benchmark gearing level of 60 per cent debt-to-assets. Accordingly, it would be misleading to take into account the tendency for betas of firms to migrate towards one, due to diversification of activities and changes to gearing levels, and would result in the beta estimate not reflecting “prevailing conditions” in the market for investments having a similar nature and degree of business risk as those faced by ETSA Utilities.” (Page 137)

45. The relevant section of the Victorian ESC’s discussion states:

“As the Commission’s objective is to estimate the cost of capital for a pure-play regulated gas distributor for a benchmark capital structure, it

concluded that it would be inappropriate to take account of such a tendency [for equity beta to revert to 1.0 over time].”¹⁰ (Emphasis in original. Square brackets inserted by NERA for context.)

46. Put simply, ESCOSA (and the Victorian ESC) have argued in one context that the risks associated with regulated businesses are relatively stable over time – and therefore low values for historical proxy betas should not be adjusted upwards as is common market practice. However, ESCOSA has separately decided to treat as reliable historical proxy betas, based on four years of data, which demonstrate marked, not to say violent, fluctuations that, if taken at face value, could only be consistent with marked changes in risk. In doing so, ESCOSA largely ignores data from prior years that puts historical proxy betas at around 1.0 as demonstrated in Figure 10.2 of ESCOSA’s Final Determination. Figure 10.2 is based on Table 10.1 of ESCOSA’s Draft Determination and we reproduce the historical proxy beta data in that table below.

¹⁰ Page 341 of ESC 2000 Final Determination Review of Gas Access Arrangements.

Table 2
Data from ESCOSA's (Draft Determination) Table 10.1
Equity BETA at 60% gearing (debt beta =0)

	Historical proxy beta based on 5 years of monthly data preceding each quarter	% of ACG's 'contaminated data' falling within estimation period [^]
Sep 99*	1.02	36%
Dec99*	0.95	43%
Mar00*	0.79	50%
Jun00*	0.98	57%
Sep 00*	0.99	64%
Dec 00*	1.01	71%
Mar 01*	1.01	79%
Jun 01*	0.81	86%
Sep 01*	0.60	93%
Dec 01*	0.58	100%
Mar 02*	0.70	100%
Jun 02*	0.58	100%
Sep 02*	0.36	100%
Dec 02*	0.35	100%
Mar 03*	0.31	100%
Jun 03*	0.34	93%
Sep 03*	0.20	86%
Dec 03*	0.23	79%
Mar 04*	0.23	71%

**From ESCOSA Draft Determination Table 10.1*

*[^]Mid 1998 to end 2001. See ACG report *Queensland Distribution Network Service Providers – Cost of Capital Study*, December 2004, page 47.*

47. It is inconsistent, given ESCOSA's argument that the risks associated with core regulatory activities are stable over time, to ignore historical proxy betas measured over periods prior to the 'last four years'. If the sudden drop in historical proxy betas in recent years cannot be explained by a drop in underlying risks, then the data must be called into question. If risks are constant over time then either the earlier period historical proxy betas (around 1.0) are wrong or the later period historical proxy betas (around 0.3) are wrong. In the absence of a theoretical or historical reason to favour one set of estimates, it is theoretically and statistically wrong to focus more on the later figures than the earlier.
48. Moreover, ESCOSA actually presents compelling reasons why earlier estimates should be favoured over later estimates. That is, ESCOSA presents arguments why later estimates of historical proxy betas may be *less* reliable than the earlier estimates. In particular, ESCOSA argues that data over the last four years has been

contaminated by the ‘tech bubble and burst’ resulting in misleadingly low estimates for historical proxy betas.

“The Commission undertook significant analysis in its draft Price Determination to evaluate its impact on the historical proxy beta values in both Australia and the USA. It concluded that although it cannot be absolutely certain that the technological “boom and bust” has had a material impact on observed betas, there is some evidence supporting the hypothesis that it may have caused a short term aberration.” (Pages 135 to 136)

49. The Allen Consulting Group (“ACG”) has put the same case to, and been accepted by, the QCA:

“...we consider there to be a sound basis for questioning whether the estimates of betas that include data between the period commencing in about mid 1998 and the end of 2001 would deliver an unbiased estimate of the expected (future) beta for these stocks¹¹

50. The last column of the above table identifies the extent to which the relevant historical proxy betas in Figure 10.2 of the Final Determination have been based on data from within the period identified by ACG as potentially biasing results. A figure of 100% means that the relevant proxy beta has been based on data that includes all of the period identified by ACG (and so on for lower percentages). A figure of 0% means that the beta estimate has not used any data from within the period identified by ACG.

3.4.4 A reality check on historical proxy betas

51. NERA, on behalf of ETSA, discussed the problems with historical proxy betas in response to ESCOSA’s Draft Determination. ESCOSA’s response to NERA’s analysis in the Final Determination was to state:¹²

“Expectations, in this context, do not relate to what an investor would like to earn in the future (because clearly most people would prefer a larger return than a smaller return), but rather relates to what a prudent investor could reasonably expect to earn. This reasonable expectation must be influenced by what past results have been.” (Emphasis added)

¹¹ See below. See also ACG report *Queensland Distribution Network Service Providers – Cost of Capital Study*, December 2004, page 44.

¹² Final Determination, page 134.

52. We agree that a “*reasonable expectation must be influenced by what past results have been*” and provide the following table as a ‘reality check’ on ESCOSA’s estimated historical proxy betas.

Table 3
Market Returns on Companies¹³

Companies	Period Reviewed	Annualised Stock Returns	Annualised Return on ASX*
Australian Gas Light	10-years	19.3%	12.2%
Envestra	29 Aug 1997 – current	19.5%	10.8%
Australian Pipeline Trust	13 Jun 2000 – current	22.6%	10.2%
GasNet Australia	17 Dec 2001 – current	13.4%	11.8%
Alinta	17 Oct 2000 – current	42.0%	9.4%
Average		23.3%	10.9%

* *Annualised returns are based on the ASX2000 Accumulation index.*

53. This table states that, for the five companies¹⁴ examined by ESCOSA, the average annualised return over the entirety of their existence (or for the last 10 years in the case of AGL) has been 23.3%. This is more than double the average return on the stock market over equivalent periods (10.9%). In all cases the individual companies have outperformed the stock market in a period when the stock market itself has performed well. The above figures are not adjusted to a benchmark 60% gearing, if they were then the returns on infrastructure companies would be even higher.
54. These figures provide a ‘reality check’ on the relevance of ESCOSA’s historical proxy betas. Over the same period that ESCOSA claims ‘latest market data’ supports the view that the above firms only deserve 30% of the average compensation for equity risks (ie, historical proxy betas averaging around 0.3) they have actually received over 200% of the average compensation for equity risk. If the above firms really do have between 30% of the average level of risk on the stock market, as ESCOSA claims ‘recent’ historical proxy betas suggest, then it is a striking statistical anomaly that they have all actually received much higher returns than the market since their inception (or over the last 10 years in the case of AGL).
55. In terms of ESCOSA’s exhortation that ‘*reasonable expectation must be influenced by what past results have been*’, ESCOSA’s reasoning requires that potential investors in ETSA:

¹³ Annualised returns are calculated assuming that all dividends and capital returns are re-invested at the closing price on the day the share goes ex-dividend.

¹⁴ Final Determination, page 138. United Energy has been delisted from the Australian Stock market for the past 21 months and has been excluded from our comparison.

- a. ignore what comparable firms have, since their inception, actually delivered to equity investors; and instead
 - b. focus solely on the statistical artefacts that are historical proxy equity betas.
56. We find this to be an extreme, and potentially dangerous, assumption. It is certainly not an assumption that is required for proper application of the CAPM.¹⁵

3.4.5 Conclusions

57. Having presented arguments why earlier proxy beta estimates are not just equally as reliable as later estimates (stable risks over time) but actually *more reliable* (the impact of the tech boom and bust), ESCOSA nonetheless focuses on the fact that its choice of a 0.80 equity beta is '*at the upper end of observed equity betas, however measured, over the past 4 years*' and that '*the latest market evidence*' supports an equity beta of 0.3.
58. We consider that, even without carrying out a sophisticated statistical deconstruction of the data and procedures relied on by ESCOSA, it is possible to conclude that ESCOSA has not properly interpreted its own data. In particular, ESCOSA has committed errors of fact and logic in:
- a) alleging that a value of 0.80 is at the upper level that would be statistically supported by observations of historical proxy betas using data from the last four years; and
 - b) giving low or zero weight to historical proxy betas from earlier periods despite the fact that logic and consistency requires that earlier beta estimates be given equal or greater weight due to:
 - i. ESCOSA's view that the underlying level of risk attached to regulated businesses is stable over time, which, other things equal, means that earlier observations should be given the same weight as later observations; and
 - ii. the evidence presented by ESCOSA that other things are not equal and that recent estimates are more likely to be biased (downwards) due to contamination of data by the 'technology boom and bust'; and

¹⁵ In terms of the assumptions of the CAPM, by relying on monthly/weekly historical proxy betas ESCOSA is implicitly assuming that the investment horizon for equity investors is a month/week. In reality, investors have a much longer investment horizon, generally measured in years not months. This is especially true for investors in energy infrastructure companies which are generally closely held or, more often, simply not listed – suggesting a very long investment horizon. This is also consistent with the Australian Competition Tribunal's GasNet decision ([2003] AcompT 6) and Schedule 10 of the EPO which both require the use of a 10 year risk free rate in an attempt to match the life of the underlying assets and, implicitly, investors investment horizon. The reason that monthly and weekly historical proxy betas are commonly estimated is not because there is a general perception that this is the length of the investment horizon, rather, it is because of the need to have large numbers of observations to

- iii. giving no weight to the fact that, monthly and weekly historical proxy beta estimates aside, the comparable businesses have actually returned considerably higher returns than the stock-market over the entire period of their existence (or 10 years in the case of AGL).
59. ESCOSA's methodology can be compared with deciding to predict next March's average temperatures based on the last 4 years of data even though it is known that temperatures in those years were the lowest on record for reasons that are not expected to continue into the future.

perform the required statistical procedures. One should always 'sanity check' the results of such calculations against long term performance of the relevant companies.

3.5 ESCOSA's Interpretation of Overseas Evidence

60. ESCOSA's Final Determination argues that it is appropriate to have regard to UK regulatory precedent, which it believes sets an equity beta range of between 0.6 and 1.0, but it is not appropriate to have regard to US regulatory precedent. The justifications provided by ESCOSA are factually erroneous as is ESCOSA's reporting of UK regulatory precedent.

3.5.1 UK regulatory precedent

61. On page 142 of the Final Determination, ESCOSA refers to a publication by the UK energy regulator, Ofgem. The relevant publication is a March 2004 Policy Document on the cost of capital. ESCOSA summarises and interprets Ofgem's analysis thus:

“Ofgem, in its recent price reset for the electricity distribution businesses in UK, completed a review of the appropriate cost of capital. As part of the review, it commissioned Smithers & Co to undertake a study of the relevant beta estimates. As noted by ECCSA, in its submission to the Commission's present review, Ofgem concluded that:

“Given the Smithers & Co report and Ofgem's own analysis of the evidence, Ofgem has adopted a range for equity beta of 0.6 – 1 for its cost of capital calculation”

Given the UK Regulator's decision and the derived beta from the US data, the Commission believes that the beta of 0.8 is not inconsistent with international benchmarks.

62. The first point to note is that the low end of this range is for a 50% level of gearing (see Table 1 of page 28 of the Ofgem report). When this is adjusted to a 60% level of gearing using ESCOSA's delivering formula the bottom of the range rises to 0.75. That is, properly constructed at a 60% gearing level, the range identified by Ofgem is 0.75 to 1.0 (not 0.6 to 1.0).
63. More importantly, ESCOSA fails to explain that this is a Draft Determination and does not represent Ofgem's final decision on the appropriate range for the equity beta. Following consultation on the draft document from which ESCOSA quotes, Ofgem in its Final Proposals actually set a post tax real cost of equity which was based on:

“For these Final Proposals, given the investment focus of the review, Ofgem has adopted a post-tax real cost of equity figure of 7.5 per cent for these Final Proposals. This is the top end of the range published in the March 2004

Policy Document and is 25 basis points higher than the figure used for modeling purposes in the Initial Proposals.”¹⁶

64. That is, Ofgem’s final decision was to set the return on equity, of which the equity beta is a component, at the top of the range considered in the draft document referred to by ESCOSA. If one examines Table 1 on page 28 of Ofgem’s draft document, it is apparent that the top of the range equity beta is equal to 1.0. Using this equity beta and the top of the range of the other parameters gives the ‘***post-tax real cost of equity figure of 7.5***’ referred to in the above quote.
65. In other words, having regard to UK regulatory precedent, set after proper consultation on its draft position, lends strong support to the adoption of an equity beta of 1.0. This is not just restricted to the adoption of an equity beta but also the reasoning why Ofgem chose from the very top of the range. In particular, Ofgem was concerned that the historical proxy betas that it had observed were highly unreliable.

“As part of this review, Ofgem commissioned Smithers & Co to present a report on beta estimates for a range of companies in the electricity and water sectors. Smithers & Co found strong evidence of parameter instability for several of the companies. This was problematic given that a fundamental assumption underlying the traditional CAPM approach is that beta remains stable over time. The report presented two possible interpretations of the data in this situation.” (Page 105, paragraph 8.42.)

66. The response by Ofgem to this statistical uncertainty was, consistent with regulatory stability and regulatory caution, to continue to set the equity beta at 1.0. Although this was also ESCOSA’s proposed approach in its 2004 Preliminary Views paper, by the Final Determination ESCOSA has effectively ignored this statistical uncertainty and has decided to adopt an equity beta that is 30% less than that used in the last regulatory period and 20% less than that adopted by other Australian, UK (and as we shall discuss below, US) regulators.

¹⁶ See page 106, para 8.45, of Ofgem, Electricity Distribution Price Control Review: Final Proposals, November 2004

3.5.2 US regulatory precedent

67. In response to ESCOSA's Draft Determination and on behalf of ETSA, NERA provided information on US precedent. NERA's material can be summarised as stating:
- a. US regulators uniformly set the cost of equity consistent with an equity beta of greater than 1.0. This information goes to relevant regulatory precedent; and
 - b. US regulators have continued to do so despite very sharp drops in the observed historical proxy betas for US regulated businesses. This information goes to the issue of how other regulators have responded to the drop in historical proxy betas for utilities, which many believe has likely been associated with the tech bubble.
68. ESCOSA has argued that it can not have regard to US regulatory precedent because:

“The method stated in ETSA Utilities’ submission is an alternative method to the CAPM for estimating the cost of equity capital, which is referred to as the dividend growth model in Australia and the discounted cash flow (DCF) model in the US. While it is possible to ‘back out’ an equity beta given an estimate of the cost of equity capital derived using the dividend growth model, such an approach implies, in substance, replacing the use of the CAPM for estimating the cost of equity for ETSA Utilities’ regulated activities with the use of the dividend growth model. While it may well be that the dividend growth model has attractive features, the EPO mandates the use of the CAPM for the current price review, and so the proposed approach must be rejected.” (Page 136)

3.5.2.1 ESCOSA is wrong

69. This statement is wrong and is based on a misunderstanding of the CAPM. The capital asset pricing model is a model of investor *behaviour*. It describes *why* investors will perceive some types of equity as more risky than others. Discounted cash-flow (DCF) analysis is simply the application of the mathematical truism which states that the current market value of equity will always, by definition, be equal to investors' expected future dividends discounted by investors' cost of equity.
70. ESCOSA argues that, because DCF is called the dividend growth model (DGM) by some Australian regulators and, is not called CAPM they must be different. In fact, DCF analysis is consistent with the CAPM and is capable of being applied within a CAPM framework. Indeed, DCF analysis is the cornerstone of all finance theory, including the CAPM.
71. DCF states that today's value of equity can be expressed as the sum of future earnings discounted at investors' forward looking cost of equity. If you happen to

know today's value of equity and the expected level of future earnings then it is simply a mathematical exercise to determine the discount rate (cost of equity) that investors are using to value that equity.

72. If the inputs into the DCF analysis are accurate it will, by definition, estimate the CAPM risk adjusted cost of equity (provided of course that the CAPM correctly describes the way investors behave). In order for the DCF analysis to be inconsistent with the CAPM, it would have to be the case that investors do not behave consistent with the CAPM. Indeed, later in the final Decision ESCOSA has regard to DCF analysis in relation to the estimation of the MRP and does so without any apparent view that it is inconsistent with the CAPM.¹⁷

3.5.2.2 *Why is DCF used to estimate the cost of equity in the US but not Australia?*

73. The problem with using DCF analysis to estimate the cost of equity is that it requires one to know, or estimate, investors' forward looking expectations of future dividends (and dividend growth). In most capital markets there are relatively few independent forecasts of future earnings and, consequently, there is a high level of statistical uncertainty surrounding DCF projections of the cost of equity for a particular company. However, in the US there is a very deep market for analysts' projections of company's future earnings. (In this regard it is illustrative to note that between 2001 and 2004 70 US regulated electricity distribution companies had their return on equity set.)
74. Given this, US regulators have available to them extra information on investors' forward-looking expectations that Australian regulators do not. Unsurprisingly, US regulators take advantage of this when estimating the cost of equity. US regulators can, and do, choose to have regard to historical proxy betas when attempting to determine the relative risks that apply to regulated businesses. However, given the existence of reasonably reliable estimates of *investors' current forward-looking expectations* they tend to focus more heavily on DCF analysis as a means of directly estimating investors required return on equity. It is also true that, this approach reduces the risks associated with misinterpreting historical proxy beta estimates.
75. In so doing, US regulators operate in a manner that is consistent with the spirit of the EPO which requires that the cost of equity capital 'reflect prevailing conditions in the

¹⁷ On page 147 ESCOSA states:

"...the studies employed various proxies for expected capital gains – such as dividend growth, earnings growth, and gross national product (GNP) growth. The results that were reported by the Victorian ESC showed that the alternative estimates of the historically-expected equity premium were consistently lower than the average of the historical returns premium to equities."

In the studies referred to, capital gains are estimated as the change in the value of equity using DCF analysis and dividend growth to predict how equity will appreciate over time. Of course, in the above quote the use of DCF provided an argument for lowering CAPM parameters not raising them.

market for investments'. In our opinion this makes US regulatory precedent more relevant not less.

3.5.2.3 *What did US regulators decide?*

76. There is a large database of all US state regulatory decisions on the cost of equity. The below table summarises all 70 decisions for electricity distribution businesses made between the end of 2000 and mid 2004. Because the DCF estimates the required return on equity (parameter k_e in Schedule 10 of the EPO) directly it effectively estimates both the equity beta and the market risk premium simultaneously.

77. However, it is possible to 'back out' the implied equity beta (β_e) in these decisions on the basis of an assumed market risk premium (MRP) and an observed risk-free rate (r_f). This is done using the CAPM (and EPO) formula which states:

$$k_e = r_f + \beta_e * MRP$$

78. As we know k_e and r_f from each regulator's decision all we need to assume is a value for the MRP in order to calculate the implied value of the equity beta (ie, $\beta_e = (k_e - r_f) / MRP$). If we assume an implied market risk premium of 6% (as used by ESCOSA) then the average implied equity beta over that period is 1.09.¹⁸ It is also true that this is within a very tight range – with the lowest estimate being 0.94 and the highest being 1.26. In order for the implied average equity beta to go below 1.0 it would be necessary for the market risk premium to be greater than 6.5% (which is higher than the premium assumed by ESCOSA).

¹⁸ Weighted by the number of decisions in each period.

Table 4
US Regulatory Authorised Equity Returns

Period	Equity returns (k _e) (average)	Number of decisions	Average 10y Treasury Security yield [‡]	Implied equity beta (assuming an MRP of 6%)
2001 1 st Quarter	11.38	2	5.05	1.06
2001 2 nd Quarter	10.88	2	5.27	0.94
2001 3 rd Quarter	10.78	8	4.98	0.97
2001 4 th Quarter	11.50	6	4.77	1.12
2001 Full Year	11.09	18	5.02	1.01
2002 1 st Quarter	10.87	5	5.08	0.97
2002 2 nd Quarter	11.41	6	5.10	1.05
2002 3 rd Quarter	11.06	4	4.26	1.13
2002 4 th Quarter	11.20	7	4.01	1.20
2002 Full Year	11.16	22	4.61	1.09
2003 1 st Quarter	11.47	7	3.92	1.26
2003 2 nd Quarter	11.16	4	3.62	1.26
2003 3 rd Quarter	9.95	5	4.23	0.95
2003 4 th Quarter	11.09	6	4.29	1.13
2003 Full Year	10.97	22	4.02	1.16
2004 1 st Quarter	11.00	3	4.02	1.16
2004 2 nd Quarter	10.40	5	4.60	0.97
2004 Year-to-date	10.63	8	4.31	1.05
Average	11.00	70	4.51	1.09

[†] The data is an extension of those contained in the, 22 January 2004 Regulatory Research Associates, Inc. entitled *Major Rate Case Decisions – January 2002 – December 2003 Supplemental Study*.

[‡] The Federal Reserve Board, *Statistics: Releases and Historical Data* G13 monthly data.

79. In our opinion, US regulatory precedent is most relevant when attempting to identify regulators who have set compensation for beta risk consistent with **current market conditions**. However, the weight given to this will depend on the extent to which, amongst other things, beta risk for regulated US businesses is reflective of beta risk for regulated Australian businesses. In this regard we note that the Victorian ESC examined this issue and argued that, because US businesses are subject to lower levels of risk by the US regulatory regime,:

“...asset beta estimates for the US firms should be adjusted upwards or accorded less weight when deriving a proxy beta for the Victorian gas distributors.” (page 343)

3.5.2.4 What have US regulators made of low historical proxy betas

80. The regulatory decisions referred to in Table 4 have been made despite US historic equity betas over the same period giving much lower values. In fact, the ESC

reported historic proxy betas for US firms of 0.2 and ACG submitted similar calculations for the ACCC.

81. Where recent evidence on expected beta risk is observable it very often is wildly different from historic proxy betas over the same period – as evidenced by the above US regulatory decisions which supports the conclusion that historical proxy betas are generally not regarded as faultless estimators of true CAPM risk and, in particular, that they have recently been heavily influenced by the market conditions resulting from the technology bubble.

3.5.2.5 *Is ‘backing out’ an equity beta problematic?*

82. ESCOSA argues that the approach taken by NERA to infer an equity beta from US regulatory decisions is problematic:

“Similarly, the submission has also proposed ‘backing out’ an implied equity beta from a range of recent US regulatory decisions. The submission suggests that the majority of these decisions have been estimated using the dividend growth model. The ‘backed out’ equity beta cannot be interpreted as an estimate of the equity beta using a standard methodology. Rather, the approach proposed by ETSA Utilities amounts, in substance, to estimating the risk premium element of the cost of equity capital for ETSA Utilities with reference to US regulatory decisions. Irrespective of the merits of such an approach, it is not an application of the CAPM as mandated by the EPO.

Moreover, there are a number of computational issues in this analysis, such as the gearing levels assumed in each decision and whether the assumed MRP of 6% is relevant.” (pages 136 and 137)

83. As noted above, NERA’s approach is in fact consistent with the CAPM. A second objection raised by ESCOSA concerns what it describes as ‘*computational issues*’. All computational issues, properly considered, suggest that US regulators set compensation consistent with an equity beta of greater than 1.0.
84. In particular, the implied equity beta depends solely on the assumed MRP as the risk free rate is observable and recorded in the regulators decision. We have used the same MRP that ESCOSA assumes in its Final Determination (and which ESCOSA describes as conservative). In order for the implied equity beta to fall below 1.0 we would have to assume an even higher MRP (above 6.5%). If the implied equity beta was equal to 0.8 then the MRP would have to be above 8%. While this is possible it would tend raise to questions concerning whether ESCOSA’s chosen MRP was appropriate.
85. The only other issue raised by ESCOSA is gearing. However, gearing levels used by US regulators are actual gearing levels which average much less than 60%. In order

for the implied equity betas to be consistent with a 60% gearing level then they would have to be increased even further above 1.0.

3.5.3 Conclusions

86. ESCOSA's reporting of international regulatory precedent is, wrong in fact and involves conceptual errors. In particular:
- a. ESCOSA incorrectly reports Ofgem's draft position on the cost of capital as giving rise to a range of 0.6 to 1.0 for the equity beta. The correct range, when adjusted to 60% gearing as is required, is 0.75 to 1.0;
 - b. ESCOSA fails to note that, following consultation on this draft position, Ofgem adopted an equity beta of 1.0 for UK electricity distributors;
 - c. ESCOSA incorrectly claims that discounted cash flow analysis is inconsistent with the CAPM and on this basis claims that US regulatory precedent cannot be considered. On the basis of this flawed reasoning ESCOSA fails to have regard to the 70 US regulatory decisions presented where equity returns are associated with an implied equity beta in excess of 1.0 (assuming an MRP of 6%); and
 - d. The other reason ESCOSA gives for not having regard to US regulatory decisions is that to do so would 'raise a number of computational issues'. When these computational issues are properly addressed the implied US equity beta is higher than that provided by ESCOSA.

3.6 ESCOSA's Reporting and Interpretation of Domestic Regulatory Precedent

87. ESCOSA's final decision states that the betas used by other Jurisdictional Regulators are one of the three primary sources that ESCOSA used in its determination. The relevant extracts from the decision are provided below:¹⁹

“An issue requiring consideration is the decisions by other Jurisdictional Regulators. Table 10.3 provides recent decisions made by Regulators.

The Commission considers that recent decisions of other regulators provide insight into the parameters consistent with prevailing market conditions for the relevant regulated entities. The Commission also notes that the decisions marked by an asterisk reflect privately owned firms (or firms which, at the time, were expected to become private shortly) and thus are also benchmarks for private sector firms as contemplated by clause 7.2(c) of the EPO.”

88. We agree with the view expressed by ESCOSA that the equity betas adopted by other regulators are informative of current market conditions. If ETSA is competing for scarce investment funds with other similar regulated businesses but ETSA can not offer the same returns then this will increase its difficulty in attracting equity. It is also true that other regulators have gone through a process of interpreting available information and have made decisions based on that information. Therefore, their decisions are informative of what others believe to be the risks associated with investing in similar businesses.
89. However, ESCOSA's discussion of domestic regulatory decisions in its Final Determination is appreciably shorter than that contained in the Draft Determination which also stated:²⁰

“...given its concerns about the quality of current market data, the Commission also considers that the estimates adopted by other regulators provide further evidence about current market requirements and should also be taken into account. ... as discussed above, regulators have adopted a range of between about 0.7 and 1.2, with many adopting 1 (or approximately 1). The Commission considers that a value that is within the range adopted by regulators is appropriate, but also considers it appropriate to place weight on the market evidence of betas.....”

90. ESCOSA's failure to discuss in the Final Determination the range adopted by regulators is conspicuous. The Final Determination corrects an error in the Draft

¹⁹ Final Determination, page 142.

²⁰ Draft Determination, page 177.

Determination such that the 0.7 bottom of the range disappears. As we show below, the properly constructed range of regulatory precedent for private companies is 0.97 to 1.2 (with a mean of 1.01 and a range for all business, both privately and publicly owned, at 0.9 to 1.2). ESCOSA's equity beta of 0.8 falls well below the bottom of both ranges. ESCOSA's failure to explain why it no longer '*considers that a value that is within the range adopted by regulators is appropriate*' is a major defect in its Final Determination.

3.6.1 Removal of the QCA 2001 precedent

91. In its Draft Determination ESCOSA stated a range for regulatory precedent of between 0.7 and 1.2. The bottom figure of ESCOSA's draft range is an equity beta of 0.71 provided by the Queensland Competition Authority's (QCA) 2001 electricity distribution decision. However, the 2001 QCA decision has now been omitted from the regulatory precedents set out in table 10.3 of the Final Determination.
92. In our opinion, there are a number of forceful reasons why ESCOSA is correct to omit the QCA's 2001 decision, in particular:
 - a. in deriving the 0.71 equity beta the QCA committed a mathematical error which resulted in the QCA's estimate suffering from a material downward bias. The QCA has since been advised of, and accepted the existence of, this mathematical error;²¹
 - b. the QCA has also since recognised that its 2001 analysis of historical data was likely to have been contaminated by the 'technology bubble' on stock markets –

²¹ On page 101 of the QCA's *Regulation of Electricity Distribution - Draft Determination* (December 2004) accepts the criticisms on its approach to estimating the debt beta by Associate Professor Martin Lally. On page 85 of the report from Associate Professor Martin Lally to the QCA, *The Cost of Capital for Regulated Entities* (October 2004) Lally illustrates the error with the following conclusion:

If the debt beta were estimated using the Authority's method in equation (7), on page 12, then an estimate would be around .20 (based on a debt premium of .012 and a market risk premium of .06). Coupled with equation (42), this would lead to an estimated equity beta for the firm of interest of 1.10 compared to the true value here of 1.18. (Emphasis added).

On page 130 he concludes:

"[T]he Authority's procedure for estimating the debt beta from the debt premium is flawed on account of ascribing the entire debt premium to systematic risk. The effect of this is likely to be an underestimate of the cost of capital, and therefore revenues..."

The QCA agrees with Lally and states on page 101:

The Authority's view was that its current approach was likely to overstate the value of the debt beta and that the Lally approach (that is, setting the value to zero) would generally result in less error than the Authority's current approach, given the typical relationship between the leverage of regulated firms and their comparators. Therefore, the Authority concluded its current approach to estimating the debt beta should be changed.

Consistent with the above quote from Associate Professor Lally, the reason for overestimating the debt beta reduces the estimated WACC is that it results in an underestimate of the impact of gearing on the equity beta – and hence results in an underestimate of the equity beta.

with the consequence that estimated equity betas, on which the 0.71 equity beta was based, were misleadingly low;²²

- c. in its latest Draft Determination the QCA has corrected for the above mathematical error and has taken into account the problems with historical beta estimates. In doing so it has arrived at an equity beta at 0.90;²³ and
- d. in doing so the QCA has explicitly accepted the advice of its cost of capital consultants, ACG (who have also provided information and analysis to ESCOSA on this topic, for example, see notes to Figures 10.3 and 10.4 of the Final Decision), that the nature of the regulatory regime in Queensland lowers risk relative to the average Australian electricity distributor for whom ACG argues the appropriate equity beta is 1.0.²⁴

3.6.2 Factual error in reporting ETSA's current equity beta

- 93. ESCOSA's table 10.3 describes the current regulatory decision as setting a range for equity beta applicable to ETSA under the EPO as being between 0.83 and 1.20 for a 60% level of debt gearing.²⁵ As described above, it is possible to determine that the actual level of equity beta adopted by the SA Government at a 60% gearing level was 1.13.²⁶ However, even if one was interested in the range of equity beta considered by the SA Government, ESCOSA's table 10.3 is incorrect because the range quoted is *not* for a constant gearing of 60%.
- 94. ESCOSA's footnote to table 10.3 makes clear that "***The SA Government used a range of gearing levels of between 50 per cent and 60 per cent". The SA

²² See page 103 of the QCA's *Regulation of Electricity Distribution - Draft Determination* (December 2004).

"The Authority accepts that the dot-com bubble may have affected the measurement of betas over recent years, and that measures of beta using data from this period may underestimate the true value of beta, including the 0.71 equity beta adopted by the Authority in its 2001 Final Determination."

²³ See *ibid*, page 103

²⁴ See ACG report *Queensland Distribution Network Service Providers – Cost of Capital Study*, December 2004, page ix where they state:

"The Allen Consulting Group considers that the empirical evidence, together with the desirability of maintaining stability in regulatory decisions across time and consistency in regulatory decisions across companies justifies the use of an equity beta of 1.00 (for a gearing level of 60%) for the average regulated electricity distributor. However, we are of the view that there are a number of unique factors to the Queensland regulatory regime that would suggest that the systematic risk of the Queensland electricity distributors is less than their interstate counterparts. As such, we consider an equity beta of 0.90 for a gearing level of 60% when deriving the revenue caps for the Queensland DNSPs can be justified."

See also page 103 of QCA's Draft Determination where they state:

"On balance, the Authority has decided to accept ACG's recommendation and will adopt an equity beta of 0.90 for the purposes of this Draft Determination."

²⁵ Table 10.3 makes it clear that this is for a gearing level of 60% in the title of the last column which states "Proxy Equity Beta (60% D/A)" where D represents debt and A represents assets (ie, D/A=60% implies gearing of 60%).

²⁶ See also James Bennett's statutory declaration of 16 April 2005.

Government's range for the equity beta was, by definition, also a function of its range for ETSA's gearing. The higher values in that range are associated with a gearing of 60% but the lower values of that range are associated with a gearing of less than 60% - with the lowest value of 0.83 associated with a gearing of 50%.

95. It is therefore incorrect to represent 0.83 to 1.2 as the range considered by the SA Government associated **with a gearing of 60%**. It is possible to derive the correct lower bound of the range considered by the SA Government when adjusted from 50% to 60% gearing. When this adjustment is performed the range considered by the SA Government at 60% gearing becomes 1.04 to 1.20.²⁷ It is therefore misleading to describe the SA Government's range for ETSA's equity beta geared at 60% as 0.83 to 1.2.
96. The above analysis makes clear, in a way that ESCOSA's table 10.3 does not, that ESCOSA also proposes to set the equity beta well below the range of values originally considered by the SA Government (when an appropriate adjustment for gearing is performed). ESCOSA's equity beta of 0.8 is 23% lower $((1.04-0.80)/1.04 - 1 = 0.23)$ than the bottom of the range considered by the SA Government at the time of privatisation.

3.6.3 'Adopted' versus 'considered' values for equity beta

97. There are other aspects of ESCOSA's reporting of regulatory precedent that are liable to mislead or are factually incorrect. Table 10.3 of ESCOSA's decision represents its summary of Australian regulatory precedent on equity beta. Table 10.3 is replicated below with an additional column on the right providing NERA's opinion of the actual regulatory decisions implemented rather than the range of values considered. ESCOSA's representation (in the second column) includes ranges for equity beta associated with a number of decisions. In particular, ranges are reported for: the NSW Distributors; ETSA Utilities; AGL; Albury Gas Company; and Great Southern Networks.

²⁷ This uses ESCOSA's own formula for estimating the impact of gearing on the equity beta [see page 132 of the final decision]. It is also consistent with the formula the ACCC uses (the 'Monkhouse formula') to adjust equity betas for different levels of gearing. Using the Monkhouse formula, an equity beta of 1.0 at a gearing level of 55% is equivalent to an equity beta of 1.12 at 60% (assuming a debt beta of zero as both the ACCC and ESCOSA do).

Table 5
Updated Table 10.3
Proxy Equity Beta used by Australian Regulators in Relevant Decisions

Industry	Year	ESCOSA's Reporting of Proxy Equity Beta at 60% Gearing	Equity Beta's Actually Used by Regulators at 60% Gearing
Electricity Distribution			
NSW Distributors (3 businesses)	IPART, 2004	0.78-1.11	1.01 [†]
ActewAGL	ICRC, 2004	0.90	0.90
Aurora (Tas)	OTTER, 2003	0.95	0.95
Queensland Distributors (2 businesses)	QCA, 2004	0.90	0.90
Victorian Distributors* (5 businesses)	Vic. ESC, 2000	1.00	1.00
ETSA Utilities*	ESCOSA, 1999	0.83-1.20	1.13 [^]
Electricity Transmission			
Statement of Regulatory Principles [‡]	ACCC, 2004	Not listed	1.00
Transend	ACCC, 2003	1.00	1.00
Murrylink*	ACCC, 2003	1.00	1.00
ElectraNet*	ACCC, 2002	1.00	1.00
SPI PowerNet*	ACCC, 2002	1.00	1.00
Powerlink	ACCC, 2001	1.00	1.00
TransGrid	ACCC, 1999	Not listed	1.17
Gas Distribution			
ActewAGL	ICRC, 2004	Not listed	1.02 [†]
Victorian Distributors (3 businesses)*	Vic. ESC, 2002	1.00	1.00
Envestra*/Allgas	QCA, 2001	0.97	0.97
AGL*	IPART, 2000	0.90-1.10	1.05 [†]
Albury Gas Company	IPART, 1999	0.90-1.10	0.95 [†]
AlintaGas*	OFFGAR, 2000	1.08	1.08
Great Southern Networks	IPART, 1999	0.96-1.10	1.0 [†]
Gas Transmission			
Dampier-Bunbury*	OFFGAR, 2004	Not listed	1.2 [#]
Moomba to Sydney*	ACCC, 2003	1.0	1.0
GasNet*	ACCC, 2002	0.98	0.98
Moomba to Adelaide*	ACCC, 2001	1.16	1.16

Source, ESCOSA, Final Determination, April 2005, Table 10.3, page, 143;

* *represents decisions for 100% privately owned businesses as marked in ESCOSA's Draft Determination. We note that ActewAGL is 50% Government owned and 50% privately owned by AGL;*

[†] *NERA calculation of the point estimates based on the final pre-tax WACC (real) decision see Appendix A for methodology.*

[#] *OFFGAR, Further Final Decision on the Proposed Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 30 December 2003.*

[^] *Calculated on the basis described in section 3.2.*

98. ESCOSA's representation of the ranges considered rather than the implemented decisions has the potential to be misleading and, in the case of ETSA, is factually

incorrect. The ranges provided do not represent the values of the equity beta actually provided by the relevant regulator; rather, they represent the range within which the regulator thought the equity beta most probably lay. The equity betas actually adopted by the regulator are given in the last column and naturally fall around the middle of the range provided.

99. This raises the question of whether it is appropriate to interpret the range of regulatory precedent to include the range of values for equity beta *considered* by other regulators or whether the interpretation of regulatory precedent should be restricted to the values actually *adopted* by other regulators. Even if one believed that the range of values *considered* by other regulators was relevant, it is essential to distinguish between this and the values actually *adopted* in order to give a reasonable and not potentially misleading representation of the actual decisions. ESCOSA's table 10.3 fails to do this.
100. In any event, the most informative description of regulatory precedent relates to the values actually *adopted* by regulators and that the values *considered* by regulators are of little or no use in describing regulatory precedent. This view is based on the following:
- d. First, in competing with other regulated businesses for equity finance ETSA must compete against the actual value of equity beta adopted by other regulators – not against values considered by other regulators.
 - e. Second, it is uninformative to report regulatory precedent as including values for the equity beta considered but then rejected by other regulators.
 - f. Third, the basis upon which the upper and lower ends of the ranges are determined is not described in the relevant regulatory decisions and can be expected to differ decision by decision. This makes it impossible to understand what the reported upper and lower bounds actually mean.²⁸
 - g. Finally, the reporting of ranges considered can lead to anomalous results. For example, imagine that all regulators set the equity beta equal to 1.0 (which is very close to actual practice) but that one of those regulators also reported a 'possible range' of, say, 0.5 to 1.5. It would be misleading to describe this as the 'range' of regulatory precedent on a number of grounds. In particular, it would give the appearance of considerable variation amongst regulators when, in reality, there is no variation. It could also result in the 'range' of regulatory precedent being based on a single decision, ie, a single decision would define both the lower and upper bounds of 'regulatory precedent'.

²⁸ For example, one regulator may set the lower bound of the range equal to a value which it is 99% certain that the true equity beta will not fall below. Another regulator may set the bottom of the range equal to the value which it is 80% sure that the true equity beta does not fall.

101. For these reasons, regulatory precedent should focus on the actual values of equity beta adopted by regulators. When this is done the range of regulatory precedent is described in the below table.

Table 6
Range of Regulatory Decisions

Comparator Regulated Companies	Number of Companies	Range
All Australian energy companies*	33	0.90 to 1.20
All fully privatised energy companies	19	0.97 to 1.20
All fully privatised electricity companies	9	1.00 to 1.13

* Excludes the QCA's 2001 Electricity Distribution decision as discussed above.

102. Judged relative to any of these constructions, ESCOSA's decision falls well below the range of regulatory precedent – with the bottom end of the range for fully privatised businesses being 21% higher than ESCOSA's decision $((0.97/0.8)-1=0.21)$ and 25% higher when measured against other fully privatised electricity distribution/transmission businesses $((1.0/0.8)-1=0.25)$ as ESCOSA acknowledges as appropriate.²⁹

3.6.4 Private versus state owned companies

103. While there is a legal requirement³⁰ to have regard to information in relation to private firms, there are also reasons of principle why this should be the case. In particular, ETSA competes for funds against privatised businesses in the equity market but does not compete against Government owned businesses that derive their equity from the State rather than the equity market. Consequently, decisions by regulators of Government owned businesses do not represent 'alternative rates of return' available on the private equity market.
104. It is also important to recognise that regulatory decisions for government owned businesses take place in materially different circumstances in terms of the incentives on both the regulator and the shareholder. For state owned businesses, the Government is both the users (voters) representative and the single shareholder. The Government can, on behalf of voters, use its compulsory tax raising powers to finance investment that 'keeps the lights on' even if the regulated return is set too low. In this scenario, instead of paying for infrastructure wholly through prices, the shareholders in the Government owned business decided that "users" should pay for some of that infrastructure through higher taxes (or less on other Government

²⁹ Final Determination, Page 142.

³⁰ Clause 7.2k(ii) of the EPO, Clause 6 of Schedule 10 of the EPO and Clause 3.3 of Schedule 6.1 of the NEC.

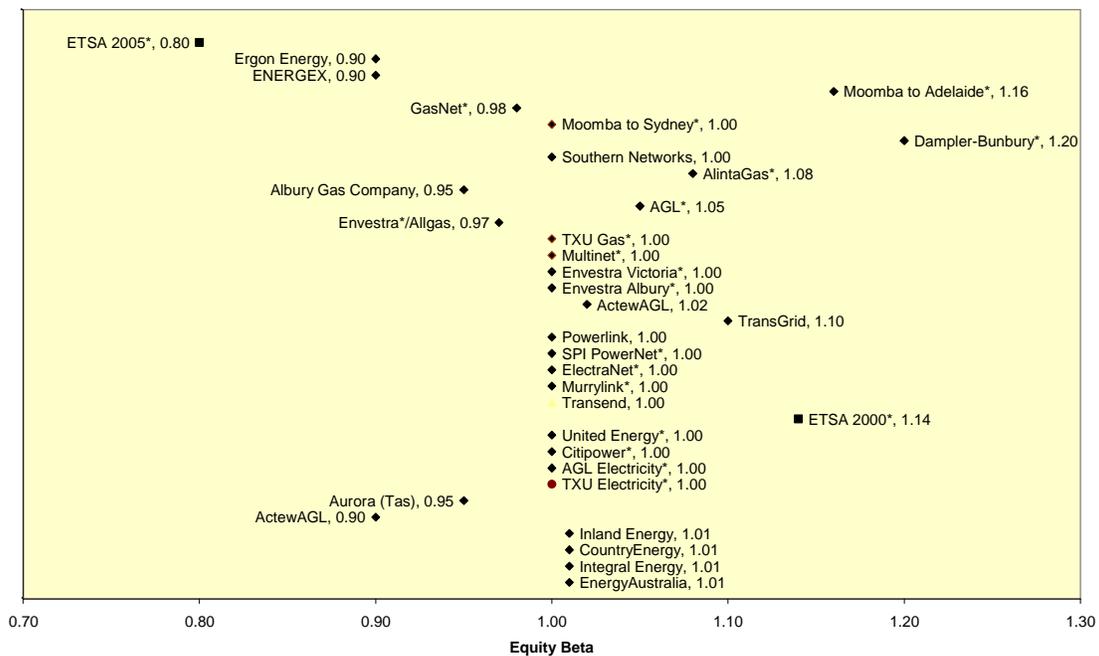
services) than would otherwise be the case. By contrast, a privately owned business has no such taxation power and cannot attract funds for investment unless it can offer a competitive return.

105. This has a number of consequences. First, regulators of Government owned businesses face a much reduced risk that setting the equity beta too low will result in the business being unable to finance necessary investment. A reduction in the cost of setting a low equity beta can reasonably be expected to increase the willingness of regulators to do so. Second, there is less likely to be a robust regulatory process within which the regulator's decisions are properly tested. This is especially likely to be the case if there is strong political pressure from users, or even the shareholder, to keep prices to consumers/voters low. It may also be the case that the political 'fall out' as a result of a Government owned businesses taking a Government appointed regulatory body to court would prevent such a course of action being taken. This may explain the lack of an appeal against the QCA's 2001 decision that involved an unambiguous 'adding up' error in its calculation of the equity beta.

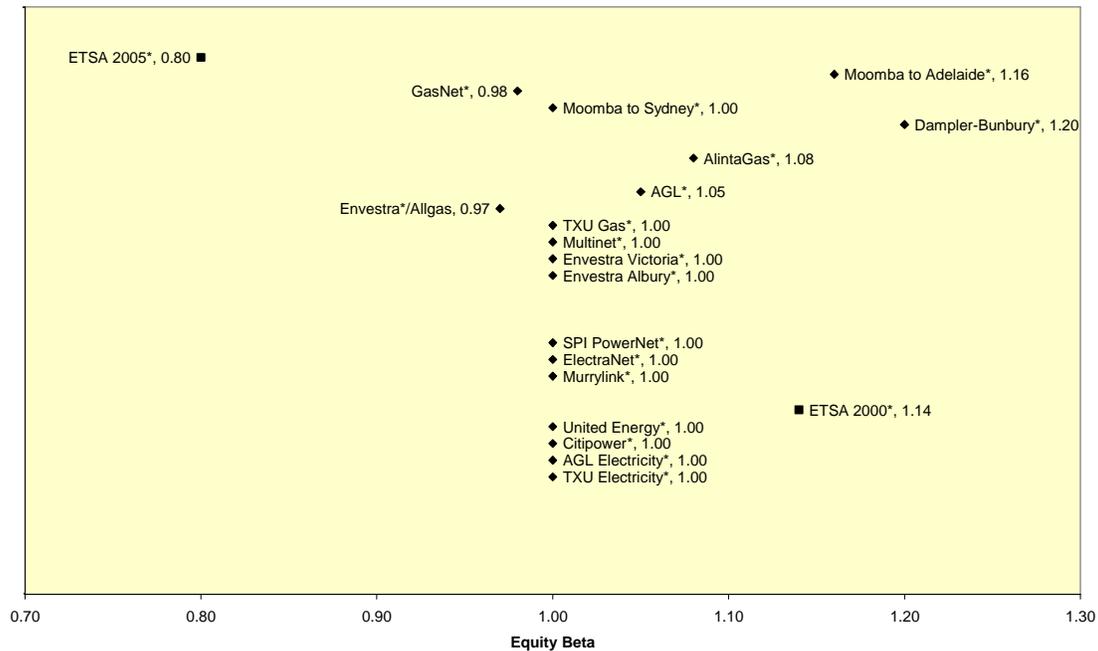
3.6.5 Understanding the spread of decisions

106. It is also important to reflect on the fact that reporting a 'range' based solely on the highest and lowest regulatory decisions does not adequately deal with the weight of regulatory precedent that falls within this range. We describe all Australian energy regulatory decisions in the following two graphs (excluding the QCA 2001 decision in the first graph).

**Graph 1
Regulatory Precedent: All Companies**



Graph 2
Regulatory Precedent: Fully Privatised Companies



107. Both of the above graphs illustrate that an equity beta of 0.8 for ETSA is not only well below the lowest equity beta adopted by any other regulator, it is also a very significant departure from the average (mean or median)³¹ equity beta provided by other regulators. The mean value of the equity beta provided in other decisions for fully privatised businesses is 1.03 while the median is 1.0. For all decisions the mean is 1.01 while the median is 1.0.
108. In this context it should be noted that to describe the QCA as having adopted an equity beta of 0.9, without a proper understanding of the QCA's reasons for its decision, this might be misleading. The ACG advised the QCA that:

“...there are a number of unique factors to the Queensland regulatory regime that would suggest that the systematic risk of the Queensland electricity distributors is less than their interstate counterparts. As such, we consider an equity beta of 0.90 for a gearing level of 60% when deriving the revenue caps for the Queensland DNSPs can be justified.”³²

³¹ The mean is equal to the sum of the equity betas for each company divided by the number of companies. The median is the equity beta that attaches to the company where there are as many companies with equity beta's above (or equal) to that company as there are below (or equal) to that company.

³² See ACG report *Queensland Distribution Network Service Providers – Cost of Capital Study*, December 2004, page ix.

109. And the QCA has concluded:

*“On balance, the Authority has decided to accept ACG’s recommendation and will adopt an equity beta of 0.90 for the purposes of this Draft Determination.”*³³

110. The ACG report which the QCA accepted stated that the average Australian electricity distributor had an equity beta of 1.0 (60% gearing). It can therefore be reasonably argued that little or no weight should be given to the value of 0.9 in terms of its precedent value for ETSA and rather the QCA’s (draft) decision should relevantly be recorded as 1.0 for equity beta for all average Australian electricity distributors, especially one in a state to the south of Queensland.

3.6.6 Conclusions

111. Regulatory precedent for fully privatised regulated businesses provides an important indication of current market conditions in equity markets, both because ETSA competes with these firms for equity funds and because equity betas adopted by regulators reflect their assessment of the risks attached to regulated investments at the time of the decision.

112. ESCOSA’s table 10.3 does not adequately represent regulatory precedent because it:

- a. reports ranges considered by regulators rather than actual values adopted by regulators; and
- b. incorrectly reports the range considered by the SA Government at the time of ETSA’s privatisation.

113. Properly constructed the maximum unadjusted range of regulatory precedent for equity beta is between 0.90 and 1.20. The most appropriate range of regulatory precedent is that which includes only fully privatised companies, ie, 0.97 to 1.20. An equity beta of 0.80, as proposed by ESCOSA, falls well below these ranges. It falls even further below the average (mean) of all regulatory decisions, which is 1.01.

114. Given this, ESCOSA’s failure to explain how its decision is consistent with Australian regulatory decisions is striking.

³³ Page 103, QCA Draft Determination, Regulation of Electricity Distribution, 2004

3.7 Other Regulators' Reasons for Decisions

115. Other regulators have considered substantially similar data on historical proxy betas to that considered by ESCOSA. If anything, many of those decisions have been made on the basis of historical proxy betas below those now available to ESCOSA. (In particular, decisions made before mid 2004 have not been privy to the recent upward trend in historical proxy betas illustrated in ESCOSA's Figure 10.2.)
116. Nonetheless, those regulators have all chosen to place little weight on that data and, as set out in table 5, all have set equity betas well above the 0.80 proposed by ESCOSA. This has been consistent with the ACG's advice to regulators wherever that advice has been made publicly available. This section examines the reasons given by those regulators and by ACG. There are essentially two reasons that motivate regulators to place little weight on recent historical proxy betas:
- a. the data has low levels of statistical precision and may be unduly influenced by 'one off' events, such as the dot-com 'bubble and burst'; and
 - b. the costs of insufficient investment if the equity beta is set too low warrant choosing a value for equity beta that is supportable.
117. This section examines each regulator's reasons for their decision where they touch on these issues.
118. We also examine US regulatory precedent in this area as it can shed considerable light on the problems associated with historical proxy betas. Unlike almost any other equity market, the US market for equities analysis is deep enough for regulators to directly measure investors' required rate of return. Moreover, in the period 2001 to 2004, ie, the period when historical proxy betas 'fell through the floor', the methodology used by US regulators showed hardly any change in investors' required rates of return.

3.7.1 Australian Competition and Consumer Commission

3.7.1.1 *Statistical precision of market data*

119. To date the ACCC has conducted the most extensive examination of available market data on equity betas of any Australian regulator.
120. In 2002 to 2004 the ACCC embarked on the following studies of equity beta market data all of which stressed the lack of statistical precision of the available data:

- a. in 2002 it commissioned the ACG to examine recent historical proxy betas for regulated gas transmission businesses;³⁴
 - b. in 2003 it released a discussion paper examining, amongst other things, recent historical betas as part of its review of the Draft Regulatory Principles for the regulation of electricity transmission businesses;³⁵
 - c. sought submissions from transmission network service providers (TNSPs) and other interested parties on the weight that should be given to historical proxy betas; and
 - d. in 2004 released its position on the appropriate equity beta in its *Statement of Principles for the Regulation of Electricity Transmission Revenues*;³⁶
121. In 2002, ACG provided the ACCC with a report on recent historical proxy betas for regulated gas transmission businesses which estimated an average historical proxy equity beta of 0.7. ACG cautioned against exclusive reliance on market evidence due to:³⁷
- “...a concern about the statistical precision of those beta estimates and a concern about a possible bias in the betas derived for foreign firms, coupled with a concern about the substantial reduction in the estimate of the cost of capital for regulated gas transmission entities that the use of this empirical information would imply.”***
122. The concern about the reliability of historical market data also appears to be held by the ACCC’s other economic experts as it states in its discussion paper:³⁸
- “According to Davis [the ACCC’s economic expert], the size of the comparator firms trading in the Australian market does not seem sufficient to currently justify its use as the sole input for beta estimation.”***
123. Partly in response to these concerns the ACCC’s discussion paper proposed an approach whereby the equity beta would only be lowered from its typically assumed

³⁴ The ACG, *Empirical Evidence on Proxy Beta Values for Regulated Gas Transmission Activities: A report for the ACCC*, July 2002.

³⁵ ACCC, *Discussion Paper Review of the Draft Statement of Principles for the Regulation of Transmission Revenues*, 2003

³⁶ ACCC, *Statement of Regulatory Principles for the Regulation of Electricity Transmission Revenue*, December 2004.

³⁷ Letter from Jeff Balchin (a Director at ACG) to Mr Russel Phillips (Branch Head – Gas Group, ACCC) dated 16 January 2003.

³⁸ ACCC, *Discussion Paper Review of the Draft Statement of Principles for the Regulation of Transmission Revenues*, 2003, page 78.

value of one if the upper confidence interval (either 95 or 99 per cent) suggests a substantial reduction.³⁹

124. The ACCC's initial internal findings concluded that a 95% confidence interval, observed raw historical data suggests an equity beta of less than one, assuming a 60 per cent gearing level.⁴⁰ Note that the ACCC took no account of the effect of one-off events or statistical outliers.
125. Based on this data the ACCC's preferred position was:⁴¹

“... to move towards benchmarking an equity beta from current market evidence and incorporating an upper confidence interval.”

126. The ACCC sought submission from interested parties on the weight that should be given to historical proxy betas. In response to this invitation the ACCC received a number of submissions from TNSPs and their consultants, including from NERA.⁴²
127. The NERA paper highlighted a number of problems with the ACCC's statistical methodology that if corrected would showed that the market data supports an equity beta of more than 1.0 at the 95% confidence level.⁴³
128. The ACCC's final decision accepted NERA's advice⁴⁴ and concluded that despite historical proxy betas – which were derived without any adjustment to account for the “dot-com bubble” - from recent periods having average values less than 1:⁴⁵

“...current statistical methods for estimating the equity beta from market data tend to produce varying confidence interval (and sample average) estimates. The ACCC also notes that the time period of the market data is not long enough to satisfy the ACCC that market derived equity betas would not systematically under-compensate the TNSPs. That is, the current decline in the measures of market derived equity betas may reflect a short term deviation from normal trend.”

³⁹ Ibid.

⁴⁰ op. cit., page 79.

⁴¹ op. cit., page 81.

⁴² NERA, *Evaluation of the ACCC's proposed approach to statistical estimation of equity betas for TNSPs: A report for TransGrid*, November 2003.

⁴³ op. cit., page 8.

⁴⁴ The ACCC state in its decision background paper on the *Statement of Regulatory Principles for the Regulation of Electricity Transmission Revenue*

“The ACCC acknowledged that this assumption was simplistic and maybe it would be more accurate to consider the confidence intervals for individual equity betas.” (page 105)

129. Accordingly, the ACCC concluded that:⁴⁶

“In recognition of these shortcomings, the ACCC proposes to continue with exercising judgement in its application of empirical evidence from the market. The ACCC will also monitor the market evidence on equity betas. In the near term, the ACCC proposes to adopt an equity beta estimate of 1.0.”

3.7.1.2 Asymmetric cost of setting the equity beta

130. The ACCC has discussed the need for caution in setting the equity beta too low on a number of occasions. This is implicit in the ACCC’s proposal that, if it were to rely on historical data, the equity beta would be set at the upper bound (95% or 99%) of values suggested by that data. The ACCC also recognises that maintaining a stable regulatory regime requires a cautious approach be implemented if a reduction in equity beta is being considered:⁴⁷

“To the extent that sample market data indicate a substantial reduction from the typically assumed β of one, the Commission is conscious that a transitional/cautious approach may be required such that the Commission take a conservative view to adopting a market based proxy β .”

131. The ACCC has also cited, although not explicitly agreed with, the Productivity Commission’s view that the asymmetric costs of regulation requires the need to err on the side of avoiding under investment.⁴⁸

132. The Productivity Commission’s views were set out in its review of access regulation where it states that:⁴⁹

“the Commission accepts that there is a potential asymmetry in effects:

- ***Over-compensation may sometimes result in inefficiencies in the timing of new investment in essential infrastructure (with flow-ons to investment in related markets), and occasionally lead to inefficient investment to by-pass parts of a network. However, it will never preclude socially worthwhile investments from proceeding.***

⁴⁵ ACCC, *Statement of Principles for the Regulation of Transmission Revenues – Background paper, Decision, December 2004*, page 108.

⁴⁶ Ibid.

⁴⁷ ACCC, *Discussion Paper Review of the Draft Statement of Principles for the Regulation of Transmission Revenues*, 2003, page 78.

⁴⁸ ACCC, *Tasmanian Transmission Network Revenue Cap 2004-2008/09 – Final Determination*, December 2003, page 45.

⁴⁹ Productivity Commission, *Review of the National Access Regime: Inquiry Report No. 17*, 28 September 2001, page 83.

- *On the other hand, if the truncation of balancing upside profits is expected to be substantial, major investments of considerable benefit to the community could be forgone, again with flow-on effects for investment in related markets.*

In the Commission's view, the latter is likely to be a worse outcome. Accordingly, it concurs with the argument that access regulators should be circumspect in their attempts to remove monopoly rents perceived to attach to successful infrastructure projects."

133. Furthermore, the need for regulatory conservatism was stressed by the ACCC's economic consultants ACG, which recommended that:⁵⁰

"Accordingly, while it inevitably is a matter for the Commission to decide how it exercises its discretion, it is recommended in the near term, it adopt a conservative approach, and not assume a proxy equity beta that is too far from the range of previous, relevant regulatory decisions. As noted above, these decisions typically have assumed a proxy beta (for the regulatory standard gearing assumption) of around 1."

3.7.2 Essential Services Commission of Victoria

3.7.2.1 Statistical precision of market data

134. In setting an equity beta of 1.0, the Essential Services Commission of Victoria (ESC), in its most recent energy decision, considered recent market data.⁵¹

135. Using a sample of listed regulated energy infrastructure companies, but without taking any account of the statistical outliers or the dot-com bubble, the ESC estimated that the average historic proxy equity beta for gas distribution companies may be less than one. However, the ESC noted that sole reliance on recent estimates of historical proxy betas would imply adopting an equity beta substantially lower than that used in other regulatory decisions. The ESC concluded that this would not be appropriate and set a value for the equity beta at 1.0 primarily because:⁵²

"The Commission remains concerned with the limited amount of Australian capital market evidence that is currently available"

⁵⁰ ACG, *Empirical Evidence on Proxy Beta Values for Regulated Gas Transmission Activities – Final Report*, July 2002, page 43.

⁵¹ ESC, *Review of Gas Access Arrangements – Final Determination*, October 2002, page 138.

⁵² op. cit., page 356.

3.7.2.2 *Asymmetric cost of setting the equity beta*

136. In reaching its decision to adopt an equity beta of 1 the ESC explicitly recognised the inherent risks in setting the equity beta too low:⁵³

“... the Commission considered it appropriate to adopt a conservative approach, and not adopt the value that it would have adopted had it placed sole weight on the latest empirical information (which would have implied a proxy beta of 0.7).”

3.7.3 Independent Pricing and Regulatory Tribunal of NSW

3.7.3.1 *Statistical precision of market data*

137. In setting an equity beta of 1.01, the Independent Pricing and Regulatory Tribunal of NSW (IPART) use of market data is limited. In a recent decision IPART indicated that while there was merit in examining historical proxy betas from a pool of comparable companies it noted the following disadvantages:⁵⁴

- *there are no directly comparable companies traded in Australia*
- *the pool of ‘somewhat’ comparable Australian companies would be quite small, and*
- *using the latest estimates instead of historical averages may deliver distorted figures due to the impact of short and medium term volatility.*

138. IPART also acknowledges that:⁵⁵

“The difficulty that arises with the use of financial market data is that neither the beta, nor the exact capital structure of the regulatory asset base is known.”

139. Due to these perceived problems with market data on equity betas, IPART did not attempt to set the equity beta by reference to market data. Rather, IPART used recent raw market data to justify its decision to lower the top of its feasible range for equity beta from its previous electricity distribution decision from 1.14 to 1.11.

3.7.3.2 *Asymmetric cost of setting the equity beta*

140. IPART does not directly discuss the relative costs of setting rates of return that are too low compared to setting rates that are too high. However, it is worth noting that

⁵³ ESC, *Review of Gas Access Arrangements – Final Determination*, October 2002, page 347.

⁵⁴ IPART, *NSW Electricity Distribution Pricing 2004/05 to 2008/09: Draft Report*, January 2004, page 245.

⁵⁵ IPART, *NSW Electricity Distribution Pricing 2004/05 to 2008/09: Final Report*, June 2004, page 230.

in setting a pre-tax WACC of 7.00%, IPART effectively set an equity beta of 1.01 which is in the top half of its feasible range.

141. Furthermore, while some stakeholders argued that current market data supported a lower equity beta IPART concluded:⁵⁶

“... that there was no compelling evidence to suggest that a lower asset beta was more appropriate.”

3.7.4 Queensland Competition Authority

142. In the two most recent Draft Determinations the Queensland Competition Authority (QCA) has accepted the advice of its regulatory consultants ACG on the appropriate value for the equity beta.⁵⁷

3.7.4.1 Statistical precision of market data

143. One of the themes of recent publicly available ACG reports is that market data on equity betas, especially those observed for infrastructure companies, has been contaminated by the “dot-com bubble” that occurred between 1998 and 2001.
144. It generally accepted that the dot-com bubble was an extraordinary period during which observed historical equity betas for infrastructure companies were temporarily depressed.
145. ACG has accepted that the dot-com bubble has depressed the observed raw equity betas of utility stocks and states:⁵⁸

“Current beta estimates for Australian and US utility firms over a 4-5 year period include observations from the unusual market periods discussed above. In particular, the current 60-month beta estimates include the period after November 2000, and so include much of the period of the dot-com ‘bubble’. Given the discussion above, we consider there to be a sound basis for questioning whether the estimates of betas that include data between the period commencing in about mid 1998 and the end of 2001 would deliver an unbiased estimate of the expected (future) beta for these stocks.

and:⁵⁹

⁵⁶ op. cit., page 60.

⁵⁷ QCA, *Dalrymple Bay Coal Terminal – Draft Access Undertaking*, October 2004. QCA, *Regulation of Electricity Distribution – Draft Determination*, December 2004.

⁵⁸ ACG, *Queensland Distribution Network Service Providers – Cost of Capital Study*, December 2004, page 44.

⁵⁹ ACG, *Dalrymple Bay Coal Terminal: Analysis of Proxy Betas*, September 2004, page 6

“However, our analysis indicates that the dot-com bubble had a depressing effect on currently estimated asset betas, and that these can be expected to be higher in future.”

146. In both these reports to the QCA, ACG suggested that the appropriated equity beta for the regulated business was above the raw equity betas observed in its sample.

3.7.4.2 Asymmetric cost of setting the equity beta

147. The QCA does not discuss the asymmetric cost of setting rates of return that are too low relative to setting rates that are too high.

3.7.5 ACT and Tasmanian Regulators

148. Neither the Independent Competition and Regulatory Commission of the ACT (ICRC) nor the Office of the Tasmanian Energy Regulator (OTTER) relied on market data in their recent regulatory decisions.

3.8 Asymmetric Costs of Regulatory Error

149. The costs of under investing in essential infrastructure, such as ETSA’s distribution network, can be very high if it results in service unavailability or ‘lights off’ to some customers. The Productivity Commission has recently argued that regulators should err on the side of caution in setting rate of return as the costs of setting returns too low far outweigh the costs of setting them too high.

“The possible disincentives for investment in essential infrastructure services are the main concern. In essence, third party access over the longer term is only possible if there is investment to make these services available on a continuing basis. Such investment may be threatened if inappropriate provision of access, or regulated terms and conditions of access, lead to insufficient returns for facility owners. While the denial or monopoly pricing of access also impose costs on the community (see above), they do not threaten the continued availability of the essential services concerned. Thus, over the longer term, the costs of inappropriate intervention in this area are likely to be greater than the costs of not intervening when action is warranted. The substantial information and other difficulties that confront regulators in establishing access terms and conditions, make this asymmetry in the benefits and costs of access regulation even more important in a policy context.”⁶⁰

150. An example of the costs of underinvestment in electricity distribution is provided by recent experience in Queensland where severe reductions in service standards led the state Government to commission the “Somerville report”⁶¹. That report found that:

“While the Panel accepts that it would not be economically prudent to “gold plate” the networks, it is clear that there needs to be sufficient expenditure to maintain them adequately and to develop them to meet new customer demands. For the reasons explained in this Summary report, the Panel believes that the networks have not had sufficient expenditure outlaid on them to adequately maintain them and to meet increased demand from growth.” (Page 8 of summary report.)

151. The panel found that, in the case of (the state Government owned) Energex:

“...it is the Panel’s view that this position has been reached because there has been too much focus over a considerable period on producing an improved

⁶⁰ Productivity Commission, Review of the National Access Regime, Position Paper, page xviii – xix.

⁶¹ Report of the Independent Panel, Electricity Distribution and Service Delivery for the 21st Century, Queensland July 2004.

financial result. While expenditure has certainly been reduced, the Panel believes that this has been at the expense of the condition of the network. It is now operating at a utilisation of about 76%, whereas the prudent industry level is around 60% to 65%. The assets are stressed and this impacts on reliability.” (Page 8 of summary report.)

152. The Panel also found that the regulatory environment was partly to blame for this outcome as it did not provide sufficient incentives to invest.

“The Panel has doubts about whether the current regulatory regime provides appropriate incentives to deliver reliable supply to Queensland customers. The Panel recommends that the Government and the QCA consider alternative arrangements for increasing ENERGEX and Ergon Energy’s investment certainty during a regulatory period.” (Page 29 of summary report.)”

153. While not specifically discussed in the report, it would be consistent with the CAPM approach and the economic theory underlying the NEC, that the QCA’s decision to set the lowest equity beta of any Australian regulator (0.71) was an important factor in reducing the businesses’ incentives to invest. Since the Somerville report the QCA has increased the equity beta in its draft report to 0.90. The Queensland state Government has responded to the Somerville report thus:

“The Government has told the Boards and Senior Management of ENERGEX and Ergon Energy that the Government is determined to see all 44 recommendations implemented as soon as possible.”⁶²

154. It is important to note that, because ETSA is fully privatised, political directions are not an available tool to deal with insufficient incentives to invest.

3.8.1 Choosing from within a range for equity beta

155. Providing equity investors with the minimum compensation for risk will not ensure that sufficient investment occurs. This level of compensation only ensures that the business is ***indifferent between investing and not investing***. In order for there to be a positive incentive to invest (rather than indifference) the regulator must set the rate of return above the minimum rate of return necessary to compensate for the risks of that investment.
156. If the equity beta is set too high a company may undertake greater than optimal levels of investment in order to benefit from the higher regulated cost of capital.

⁶² http://www.thepremier.qld.gov.au/announcements/2004/Electricity_Industry_issues/Electricity_fact_sheet/?printView=true

However, as recognised by the Productivity Commission, the potential costs of over investment are dwarfed by the potential costs of service unavailability as a result of under investment.

157. In this regard it is relevant to note that during the current regulatory period ETSA has slightly underspent on its capital relative to benchmark expenditure allowed in the EPO – this was despite having an equity beta during that regulatory period of 1.13 (at 60% gearing)⁶³. If ETSA’s true equity beta is 0.8 or lower, as proposed by ESCOSA for the next regulatory period, one would have expected to see investment significantly exceeding benchmarks in the current regulatory period when its equity beta was equivalent to 1.13 (at 60% gearing) not *vice versa*. At the very least, this suggests that the WACC set in the first regulatory period was not so high as to elicit significant over investment by ETSA.
158. Even if ‘over investment’ did occur in the future it would be wrong to treat 100% of this as an economic loss. Over investment can only properly be defined as investment where the benefits to customers did not exceed the costs. Investment in the network is never a complete waste as it almost always improves the robustness of the network and improves the service standards received by customers. For very large ranges, the net cost of each dollar of ‘over investment’ may only be a few cents when account is taken of the benefits to customers. It is only when a network is very substantially ‘gold plated’ (ie, when service interruptions and quality is already very low) that additional capital expenditure provides little additional benefits to customers.
159. The above considerations suggest that, when considering where to set the equity beta within a range, it is in the long-term interests of consumers for regulators to err in choosing a value towards the upper end of the relevant range. It is not the case that, having established a range, that any point within that range is equally defensible. This basic proposition has been accepted both explicitly and implicitly by a number of regulators.
160. Most notably, the ACCC has previously suggested that it may be appropriate to set the regulatory equity beta at the top of a range defined by a 95% confidence interval.⁶⁴ That is, the ACCC has argued that it may be appropriate to set the regulatory equity beta such that there is only a 5% probability that its true value is above the value set by the regulator. (When NERA corrected some elements of the ACCC’s statistical approach it was shown that this would generally involve setting

⁶³ And other elements of the WACC were also higher than is currently proposed by ESCOSA.

⁶⁴ ACCC, *Discussion Paper Review of the Draft Statement of Principles for the Regulation of Transmission Revenues*, 2003, page 78.

the equity beta well above 1.0. Following this advice the ACCC released a decision confirming its intention to continue to set the regulatory equity beta at 1.0.⁶⁵)

161. Were ESCOSA to follow a 95% confidence interval approach it would, based on the most recent weekly historical proxy betas reported in table 10.2 of its report, set the regulatory equity beta at greater than 1.3⁶⁶ – even before any adjustment is made for ETSA’s higher level of risk than the group of comparators used to derive those historical proxy betas.
162. The ACCC’s counterpart in US energy regulation (the Federal Energy Regulatory Commission, FERC) has also explicitly acknowledged the need to choose from the top of the potential range for a businesses cost of capital. In recent years transmission investment in the United States has failed to keep pace with either generation or demand growth. Underinvestment in transmission assets is acknowledged by the FERC in its annual State of the Markets Report, which states that:⁶⁷

“While participants made large investments in power generation, annual growth in generation capacity was 2 percent from 1998 to 2001, transmission investment in circuit miles grew less than 0.5 percent annually. This trend continued during the assessment period [Assessment period is from 1 January 2002 to 30 June 2003]”

163. Another study by consultants representing investor-owned utilities estimated that the period of underinvestment has been significantly longer. From 1982 to 1992, peak summer demand for power grew at a compound rate of 2.8%, while the transmission grid’s carrying capacity, measured as the number of miles of wires times the capacity of each wire, grew by only 1.9%. This gap between investment and demand increased in the 1992 to 2002 period as demand grew by 2.7% p.a. while capacity increased by just 0.6% p.a.⁶⁸

⁶⁵ ACCC, *Statement of Principles for the Regulation of Transmission Revenues – Background paper, Decision*, December 2004, page 108.

⁶⁶ Table 10.2 and the text immediately below states that the most recent weekly historical data sets an average historical proxy beta of 0.82 with a 95% confidence interval of 0.47. 0.82 plus 0.47 is 1.29. However, this is likely to be a material underestimate of the true 95% confidence interval because, while not disclosed by ESCOSA, it is likely that this confidence interval is for the true population mean and not the confidence interval that would apply to a single businesses (such as ETSA) within that population. In order to be 95% sure that you were setting a single businesses equity beta above its true equity beta an even wider confidence interval would be required.

⁶⁷ Staff report by the Office of Market Oversight and Investigations (FERC), *State of the Markets Report: Assessment of Energy Markets for the Period January 1, 2002 through June 30, 2003*, January 2004, page 72.

⁶⁸ Eric Hirst, *U.S. Transmission Capacity: Present Status and Future Prospects*: A report for Edison Electric Institute and Office of Electricity Transmission and Distribution, U.S. Department of Energy, August 2004, page 13.

164. While not necessarily the primary cause, this state of underinvestment in transmission is accepted as a contributing factor to the network collapse that resulted in a large portion of the Midwest and Northeast of America experiencing an electric power blackout on 14 August 2003. (With the potential for similar disasters not limited to this area of the US network.)⁶⁹ The outage affected an area with an estimated 50 million people and had an estimated cost of between \$4 billion to \$10 billion.⁷⁰

165. In response to the lack of investment, the FERC has accepted a:⁷¹

“...proposed 100 basis point ladder attributed to new transmission investment. This incentive is, we stated, an appropriate first step to encourage vital capital investment in the enlargement, improvement, maintenance and operation of facilities for the transmission of electric energy in interstate commerce.”

166. In other words, in response to a perceived lack of investment in the electricity transmission grid, and following a major disaster with that grid, the FERC has provided an increase of 1% (100 basis points) in the return to equity investors in new transmission assets.

167. This is equivalent to an increase in equity beta of around 0.16.⁷² That is, were Australian regulators to provide a similar additional incentive they would have to increase the equity beta from around 1.0 to around 1.16. This contrasts with ESCOSA’s decision to reduce the equity beta from 1.13⁷³ to 0.8 in its final decision.

3.8.2 Conclusion

168. ESCOSA’s decision to set an equity beta that is below the range of regulatory precedent (see section 3.6) and at the lower end of a risk adjusted range based on historical proxy betas (see sections 3.4 and 3.5 above) is inconsistent with a proper recognition of the asymmetric risks of under investment. It is also inconsistent with the long term interests of end users.

⁶⁹ For example, see ICF Consulting’s “Transmission Grid Frailty? Blackout Potential not Limited to the Northeast”, 8 September, 2003.

⁷⁰ See “The Economic Impacts of the August 2003 Blackout”, Electric Consumer Research Council (ELCON), February 2, 2004.

⁷¹ 109 FERC ¶61,147 Order Accepting Partial Settlement Subject to Conditions, 3 November 2004, paragraph 206.

⁷² Assuming an MRP of 6% as per ESCOSA’s final decision.

⁷³ Risk adjusted at a 60% gearing ratio.

3.9 Regulatory Stability

169. In order to entice investment in fully privatised regulated businesses, investors must be given an expectation that they will recoup their investment over the life of the asset. Given average asset lives in electricity distribution of around 40 years, this means that investors must be able to forecast out regulatory decisions over 40 years or so with a reasonable level of predictability. For this reason, the stability of a regulatory regime is vital to fostering the necessary conditions for investment.
170. Instability in the regulatory regime and, in particular, large negative price shocks for regulated businesses, can lead to underinvestment by regulated businesses. For this reason it is a generally accepted proposition that regulatory stability is a key goal of regulators. Two of many pertinent quotes from regulators are provided below:

“I recognise the potential impact on the cost and availability of capital of the uncertainties that are created by regulation. Ofwat is committed to delivering transparent, rational regulation, as predictable as changing circumstance allows. We are trying to be transparent in our approach to financing the industry. Our aim is to avoid sudden shocks for companies or investors, whilst we shall remain rigorous in pursuing the interests of customers both now and for the future.”⁷⁴ (Speech by the Director of UK Water Regulator Ofwat)

“And finally, the fifth component of a healthy competitive policy is understanding and respecting the need for regulatory stability and rationalization of the regulatory structure.” (Speech by the Chairman of the US Federal Communications Commission.)⁷⁵

171. Consistent with the above quotes, regulatory stability is only one of many regulatory objectives. If circumstances change then some aspects of the regulatory regime may have to be changed to adapt to those new circumstances. This is reflected in the Director of Ofwat’s statement that *Ofwat is committed to deliver transparent, rational regulation, as predictable as changing circumstance allows.*
172. In order for ESCOSA’s decision on equity beta to pass the benchmark set for Ofwat it would be necessary for circumstances to have changed sufficiently to justify a 29% reduction in compensation for the risks faced by equity investors and to justify a material deviation from the precedent set by other Australian regulators.

⁷⁴ <http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/iea19june01>

⁷⁵ Remarks by Michael K. Powell, Chairman Federal Communications Commission Keynote Address at SUPERCOMM 2001 Atlanta, GA June 6, 2001

173. There are many cases where regulatory instability has contributed to worse outcomes for consumers. Two recent case studies are provided in Appendix B, being the QCA's draft decision to dramatically lower the Dalrymple Bay Coal Terminal (DBCT) equity beta such that investment in expansion of that terminal has been jeopardized (and has been roundly criticised by both Commonwealth and State Governments). The other case study relates to UK rail services where regulatory instability has been largely blamed for a series of poor service outcomes (including train derailment resulting in customer fatalities).

3.9.1 Conclusions

174. ESCOSA fails to discuss the desirability of regulatory stability – and the consequences of not providing it. In particular, ESCOSA fails to refer to the potential costs associated with imposing a 29% reduction in equity beta.
175. ESCOSA's departure from regulatory precedent, and the absence of any change in circumstances to justify it, is inconsistent with fostering a stable regulatory framework.

3.10 The Q-factor

176. In its Final Determination, ESCOSA has, for the first time, argued that variations in revenues due to variations in energy distributed are relevant for determining CAPM (systematic) risk. The following three sentences provide the full extent of ESCOSA's analysis in the Final Determination:

“A further issue that the Commission has had regard to is the likely impact of the Q-factor in setting annual prices for ETSA Utilities. The introduction of the Q-factor stabilises ETSA Utilities’ revenues due to fluctuations in sales (beyond the ±0.5% band). The introduction of the Q-factor has the impact of reducing volatility in ETSA Utilities’ annual returns and consequently ETSA Utilities systematic (non-diversifiable) risk.” (Page 142.)

177. The above statement holds a key position in ESCOSA's Final Determination coming, as it does, in Section 10.8.3 'Final Determination on Equity Beta'. However, there are at least four reasons why ESCOSA's assertion that the Q-factor reduces CAPM (systematic) risk should be given no weight.
178. First, even if the Q-factor does reduce variability in profits this need not reduce CAPM (systematic) risk. CAPM risk is only reduced if the reduced variation in revenues was originally correlated with the return on the stock market. Showing this would require ESCOSA to show that electricity 'sales' are positively correlated with the return on the stock market. Indeed, if electricity sales are negatively correlated with the return on the market then eliminating this source of variation in profits will actually *increase* systemic risks – as it will remove a source of negative risk.
179. ESCOSA provides no empirical or theoretical support for why electricity sales would be positively correlated with the return on the stock market. Had it attempted this, it would have been forced to concede that a critical driver of energy sales is fluctuations in weather patterns which have nothing to do with the return on the stock market. Had ESCOSA tested this proposition empirically it would likely have come to the same conclusion that we did, namely, that electricity sales have a statistically insignificant relationship with the return on the stock market.⁷⁶
180. Second, relative to its peers in the electricity sector ETSA still has unambiguously more variability of revenues. Most regulated electricity businesses in the NEM are subject to a revenue cap – which means that there is no variation in revenues as a result of variations in sales during the regulatory period. ESCOSA's statement that

⁷⁶ NERA has used six years of data to regress the proportional deviation in monthly electricity consumption in the NEM from a seasonally adjusted trend against the monthly return on the stock market (proxied by the S&P ASX 200 Accumulation Index). The result is a statistically insignificant relationship. We have also used weekly data from the last year and have found a similarly statistically insignificant relationship.

the Q-factor reduces ETSA's revenue volatility *should not* be misinterpreted as implying that it reduces ETSA's revenue volatility below that of its peers – it does not.

181. Third, the Q-factor is only one side of the coin as far as revenue stability is concerned. The other side of the coin is instability in sales. ESCOSA makes no mention of the volatility in ETSA's underlying level of energy sales relative to other regulated businesses. As we discuss in appendix C, South Australia would appear to have the greatest volatility in sales relative to forecasts of any NEM jurisdiction.
182. Fourth, the Q-factor in the Draft Decision actually left ETSA's revenues more exposed to variations in energy sales than any other regulated Australian energy business.⁷⁷ However, in the Draft Decision ESCOSA did not think this source of revenue volatility was material enough to mention – let alone to prevent it reducing the equity beta by 30%. Only in the Final Decision, when the Q-factor is altered such that ETSA faces a more 'normal' sensitivity of revenues to energy sales, does ESCOSA mention the Q-factor as relevant to its decision making.
183. For these four reasons, it is our opinion that ESCOSA has failed to make either a conceptual or an empirical case in support of the view that introduction of the Q-factor reduces *CAPM risks*. Our own opinion is that there is no strong argument, conceptual or empirical, for this case. There is no argument, strong, weak or otherwise, that the Q-factor justifies ETSA receiving a lower return than its peers.

⁷⁷ That is, revenues would vary by more than 85% of the variation in energy sales from forecast. With the possible exception of Western Power in Western Australia, this almost certainly reflected the greatest sensitivity of revenues to energy sales of any regulated energy infrastructure business.

I declare that I am the author of this report.

A handwritten signature in black ink, appearing to read 'T. Hird', written in a cursive style.

Tom Hird (PhD),

Associate Director

NERA Economic Consulting

APPENDIX A: POINT ESTIMATES FOR WACC PARAMETER VALUES

A.1. The economic regulators of New South Wales and the ACT perform the following two steps when determining the cost of capital for regulated business:

Step 1 - Establish a feasible range for the cost of capital using the Capital Asset Pricing Model (CAPM), by establishing ranges for certain CAPM parameters including the value of the equity beta.

Step 2 - Within this feasible range the regulator determines the rate of return on capital that is used to determine revenues/prices during the regulatory period.

A.2. It is therefore possible to work back from the rate of return determined by the regulator to establish a point estimate for the equity beta within the stated range.

A.3. The Independent Pricing and Regulatory Tribunal (IPART) of NSW and the Independent Competition and Regulatory Commission (ICRC) of the ACT established an equity beta range in the following five decisions:

- a. Great Southern Energy Gas Networks in September 1999, IPART determined an equity beta of between 0.9 – 1.1 and a rate of return of 7.75%;⁷⁸
- b. Albury Gas Company in December 1999, IPART determined an equity beta of between 0.9 – 1.1 and a rate of return of 7.75%;
- c. AGL Gas Networks in July 2000, IPART determined an equity beta of between 0.9 – 1.1 and a rate of return of 7.75%;
- d. NSW electricity distributors in June 2004, IPART determined an equity beta of between 0.9 – 1.1 and a rate of return of 7.00%; and
- e. ActewAGL natural gas system in October 2004, the ICRC determined an equity beta range of between 0.9 – 1.09 and a rate of return of 7.00%.

A.4. To determine the equity beta that is implied by the determined rate of return we applied the following steps:

- a. determine where within the range of feasible rates of return was the regulator's final determination;
- b. set all CAPM parameters, except the equity beta, to the same relative position within their ranges;⁷⁹ and

⁷⁸ IPART and the ICRC use a real pre-tax weighted average cost of capital to determine regulatory revenues/prices.

c. adjusted the equity beta to ensure that the determined rate of return is achieved.

A.5. These steps are discussed in greater detail below.

Step 1 – calculating where rate of return is within the feasible range

A.6. Table A.1 below sets out the where within the feasible range the regulator determined the rate of return for regulated businesses.

Table A.7
Feasible Range and the Regulator's Determination

Determination	Feasible Range	Determined Rate	Decile within the feasible range
ActewAGL- Gas (2004)	6.35% - 7.40%	7.0%	61.9
NSW electricity distributors (2004)	6.1% - 7.5%	7.0%	64.3
AGL Gas* (2000)	5.4% - 8.2%	7.75%	83.9
Albury Gas Company (1999)	5.1% - 8.6%	7.75%	75.7
Great Southern Networks (1999)	5.9% - 8.4%	7.75%	74.0

AGL is a privately owned firm.

A.7. A decile of 50 represents the mid point within the feasible range so the ICRC's decision to set a 7.0% rate of return is in the top 38.1% (ie, 1 – 61.9%) of the feasible range of 6.35% - 7.40%.

A.8. Importantly for regulatory practice both IPART and ICRC display a significant degree of regulatory caution as they consistently set rates of return within the top half of the feasible range. In our opinion this represents good regulatory practice and implicitly acknowledge the asymmetric costs of setting regulatory rates of return slightly too higher compared to setting rates slightly too low.

Step 2 – Setting other parameter values

A.9. Table A.2 sets out the point estimates for CAPM parameters that are consistent with the regulators final decision on the rate of return.

⁷⁹ That is if the final rate of return was in the mid point of its feasible range, all the CAPM parameters, except the equity beta, were also set to the mid point of their range.

Table A.8
Point Estimates for CAPM Parameters

Determination	Feasible Range	Decile within the feasible range	Point Estimates
ActewAGL- Gas (2004)			
<i>Debt premium</i>	1.25% - 1.43%	61.9	1.36%
<i>Imputation credits</i>	0.3 - 0.5		0.38
NSW electricity distributors (2004)			
<i>Market risk premium</i>	5% - 6%	64.3	5.64%
<i>Debt premium</i>	1.025% - 1.225%		1.15%
AGL Gas* (2000)			
<i>Market risk premium</i>	5% - 6%		5.84%
<i>Debt premium</i>	0.9 - 1.1	83.9	1.07%
<i>Imputation credits</i>	0.3 - 0.5		0.33
Albury Gas Company (1999)			
<i>Market risk premium</i>	5% - 6%		5.76%
<i>Debt premium</i>	0.9 - 1.1	75.7	1.05%
<i>Imputation credits</i>	0.3 - 0.5		0.35
Great Southern Networks (1999)			
<i>Risk free rate (nominal)</i>	5.18% - 5.67%		5.54%
<i>Risk free rate (real)</i>	3.43% - 3.46%	74.0	3.45%
<i>Market risk premium</i>	5% - 6%		5.74%
<i>Imputation credits</i>	0.3 - 0.5		0.35

AGL is a privately owned firm.

A.10. For all other CAPM parameters the regulator provided a point estimate rather than a range.

Step 3 – Solving for the equity beta

A.11. Table A.3 sets out the equity beta necessary to reach the regulators' final decision on the rate of return.

Table A.9
Equity Beta Consistent with the Final Determination

Determination	Equity Beta Feasible Range	Determined Rate
ActewAGL- Gas (2004)	0.9 - 1.09	1.02
NSW electricity distributors (2004)	0.78 - 1.10	1.01
AGL Gas* (2000)	0.9 - 1.1	1.05
Albury Gas Company (1999)	0.9 - 1.1	1.05
Great Southern Networks (1999)	0.9 - 1.1	1.00

AGL is a privately owned firm.

APPENDIX B: REGULATORY INSTABILITY CASE STUDIES

B.1 Dalrymple Bay Coal Terminal: a case study

- B.1. Under investment in Australian infrastructure due to unpredictable regulatory decisions is currently attracting national attention with the Prime Minister and the Treasurer both criticising the QCA's regulation of Dalrymple Bay Coal Terminal (DBCT). (The case study of DBCT is also relevant to the following section which examines the benefits of exercising caution in setting regulatory rates of return too low).
- B.2. In its Draft Determination on DBCT's cost of capital, the QCA set equity beta at 0.66. Other than the QCA's 2001 electricity distribution equity beta of 0.71 (amended to 0.9 in its most recent Draft Determination) this is the only regulatory decision to set a lower equity beta than ESCOSA has proposed for ETSA.
- B.3. DBCT is leased by a fully private company, Prime Infrastructure, which bought the lease from the Queensland state government in 2002. DBCT is located at the Port of Hay Point, south of Mackay in Queensland, and has a net operating capacity of 56 million tonnes per annum. The terminal is linked to the Bowen Basin coalfields by an electrified rail system operated by Queensland Rail. DBCT exports approximately 6% of the world's seaborne coal trade making it Queensland's largest export coal terminal and one of the largest coal export terminals in the world.
- B.4. DBCT's coal handling charges are regulated by the Queensland Competition Authority (QCA). DBCT's charges are published in its Access Undertaking, which must be approved by the QCA. In October 2004, the QCA released a Draft Determination on DBCT's Access Undertaking.⁸⁰ The main feature of the ruling for present purposes was that DBCT's charges must reduce by 26%, from \$2.08 a tonne to \$1.53.⁸¹ The main factor behind this decision was the QCA's belief that the equity beta should be set at 0.66.
- B.5. Prime Infrastructure's 2005 profits are expected to be reduced by \$21 million as a result of the ruling.⁸² Analysts JP Morgan, Citigroup Smith Barney and Wilson HTM have all issued reports critical of the "unexpectedly harsh" ruling. An October 2004 report to clients from Wilson HTM said:⁸³

⁸⁰ *Draft Determination, Dalrymple Bay Coal Terminal Draft Access Undertaking*, Queensland Competition Authority, October 2004

⁸¹ "Port Ruling Raises Fears – Analysts believe draft is flawed", The Courier-Mail, 1 November 2004

⁸² "Port Ruling Raises Fears – Analysts believe draft is flawed", The Courier-Mail, 1 November 2004

⁸³ "Port ruling raises fears - Analysts believe draft is flawed", The Courier Mail, 1 November 2004

"We believe the Draft Determination is flawed in many respects and essentially cuts off further investment to DBCT by equity markets. Prime would now be better off investing its capital in other infrastructure investments rather than expanding the coal terminal for the benefit of Bowen Basin coal mines."

- B.6. Prior to the draft ruling, Prime Infrastructure had planned to invest in a major expansion of the capacity of the terminal to 91 million tonnes per annum. However, Prime has not committed contractually to the expansion, and since the QCA ruling, their public statements on the issue have been equivocal. For example, Prime's managing director has suggested that the company would be likely to favour other investment options over DBCT as a result of the QCA ruling.⁸⁴ Although Prime has begun design and engineering work for the expansion,⁸⁵ it has also stated that the commencement of the work is subject to obtaining satisfactory prices from the QCA.⁸⁶
- B.7. If the expansion does not proceed, the cost of the QCA's decision is likely to be very large. Considering that a tonne of coal is worth between \$70 and \$170 (depending on the grade),⁸⁷ lost sales could be valued at between \$2.2 billion and \$5.3 billion per annum.⁸⁸ These losses are borne in the first instance by Australian coal exporters, however, the secondary effect is a reduction in national economic growth, and in the government tax take. The cost thus ultimately impacts on taxpayers.
- B.8. The Federal Government is concerned by the potential failure to expand capacity at DBCT. The Treasurer has described Dalrymple Bay as the nation's worst industrial bottleneck,⁸⁹ and has called on the QCA to give Prime Infrastructure a "good rate of return" to ensure the expansion of the facility. In relation to the same matter, the Treasurer has also stated that "you have got to align the interests of the port operator with increasing volume and higher returns" and that the "regulatory arrangements governing Dalrymple Bay have not encouraged investments."⁹⁰

⁸⁴ "Idle ships point to lost opportunities", Grant Thorne, Rio Tinto Coal Australia, Australian Financial Review, 16 December 2004

⁸⁵ "Australia's Prime Starts Designing Coal Terminal Expansion", Asia Pulse, 25 November 2004

⁸⁶ "Australian treasurer pushes for 'good rate of return' for Dalrymple Bay", Platts International Coal Report, 7 March 2005

⁸⁷ "Idle ships point to lost opportunities", Grant Thorne, Rio Tinto Coal Australia, Australian Financial Review, 16 December 2004

⁸⁸ These figures result from multiplying the proposed capacity expansion at DBCT (31 million tonnes pa) by the two per-tonne coal prices given. This assumes that the capacity expansion is fully utilised.

⁸⁹ "Politicians stoke row over coal bottleneck", The Courier-Mail, 19 February 2005

⁹⁰ Treasurer Peter Costello, Press Conference, Treasury Place, Melbourne, 1 March 2005

- B.9. These concerns have led to the Prime Minister's recent establishment of a taskforce to investigate physical and regulatory bottlenecks in infrastructure that may be impeding exports – which the Prime Minister and Treasurer have specifically linked to the perceived regulatory failure by the QCA.⁹¹ The taskforce has been asked to report by no later than 20th May 2005.
- B.2 UK rail: a case study
- B.10. The UK rail network was privatised in the mid to late 1990s. The existing state-owned railways operator, British Rail, was broken up into train operating companies, infrastructure, train leasing and rail maintenance groups, which were then privatised. As Alistair Darling, the UK transport secretary, said in January 2004: "there are too many organisations, some with overlapping responsibilities."⁹²
- B.11. The perceived structural problems have invited repeated restructuring of the sector. For example, the third reform of railway administration in four years was announced in July 2004, resulting in the abolition of the Strategic Rail Authority, only four years after it was established. The uncertainty resulting from this frequent Government intervention has made private investors wary of investing in the industry. As a result, the sector is generally acknowledged to lack sufficient private funds.⁹³
- B.12. The lack of private investment in the rail sector has resulted in, on the one hand, increased demands on public finances (and taxpayers), and on the other hand, under-funding leading to poor performance. The UK rail sector's poor performance is demonstrated by escalating costs, overcrowding, delays, and a number of high-profile accidents.⁹⁴ For example, in May 2002 a commuter train was derailed by faulty points at Potters Bar, near London. Seven people were killed, and more than 70 were injured.

⁹¹ Media Release, "Exports and Infrastructure", The Prime Minister, 18 March 2005

⁹² Mr Darling, as reported in "Rail review ambitions curbed by complexity", Financial Times, 2 July 2004. In 2004 these organisations included the Railways Directorate, the Department of Transport, the Strategic Rail Authority, the Rail Regulator, Network Rail, the Health and Safety Executive, private train companies, rolling-stock providers and maintenance operators.

⁹³ For example, in 2004 Dr Andrew Trill, the Freight Transport Association's head of rail freight commented, with respect to this reform: "Rail freight operators and their customers need reliability and these radical changes will only result in yet another prolonged period of uncertainty at a time when confidence and stability are most needed to encourage investment in a successful and private rail freight industry "Rail users hit back at shake-up plan", Lloyd's List, 5 April 2004.

⁹⁴ See, Final Regulatory Impact Assessment accompanying the *Railways Act 2005*, 8 April 2005 for discussion of these costs.

APPENDIX C: VOLATILITY OF ENERGY SALES RELATIVE TO FORECASTS

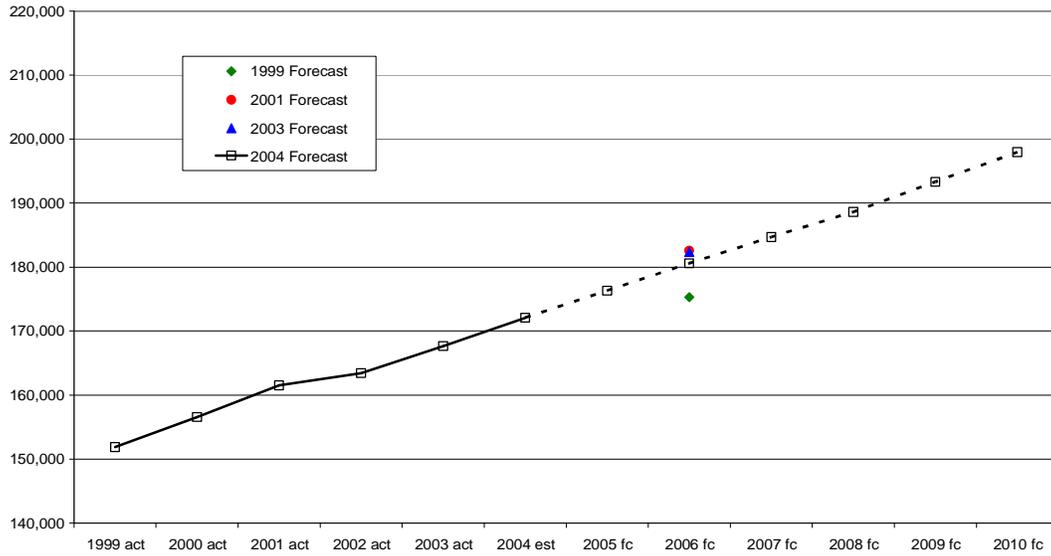
- C.1. The nature of the regulatory regime is only one side of the coin as far as revenue volatility is concerned. The other side of the coin is the underlying volatility of energy throughput. That is, revenue volatility associated with incorrect regulatory forecasts of energy consumption depends on both: a) the nature of the regulatory regime; and b) the probability that forecasts will be wrong (ie, the difficulty of accurately forecasting energy consumption).
- C.2. It is therefore worth examining the volatility in South Australian electricity consumption relative to the rest of the NEM. The following two figures use 1999 as a common base year and graph energy used⁹⁵ in South Australia and in the NEM using a solid line. They also graph the most recent (2004) forecast by NEMMCO⁹⁶ of future consumption using a dotted line. Also illustrated in the graph are NEMMCO's estimates of consumption in 2006 made by NEMMCO⁹⁷ in previous years (2003, 2001 and 1999).

⁹⁵ 'Actual sent out energy' is equal to energy consumption plus energy dissipated in the electricity networks. We use this and energy consumption interchangeably.

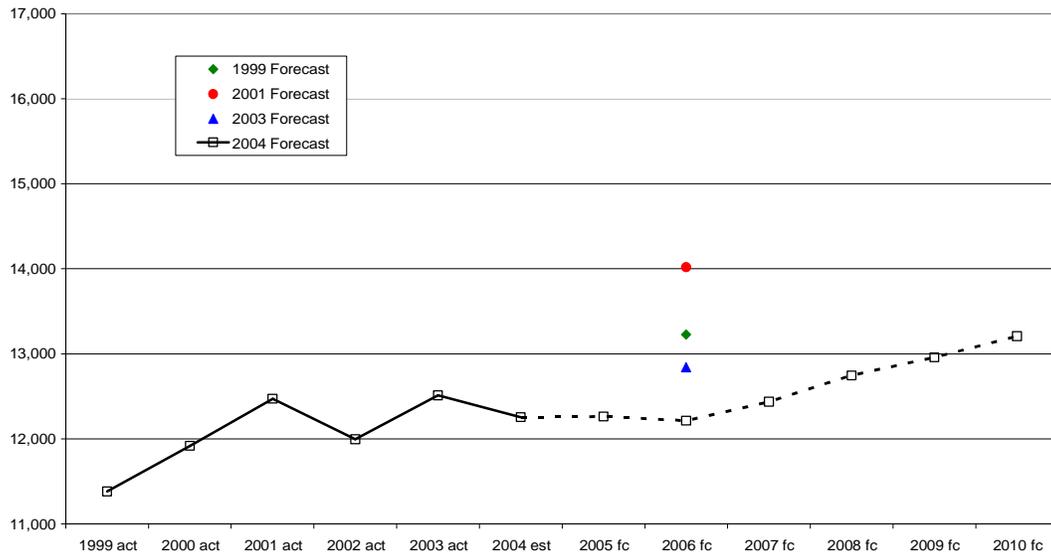
⁹⁶ From the 2004 NEMMCO Statement of Opportunities.

⁹⁷ NEMMCO is the National Electricity Market Management Company which is responsible for managing the NEM including dispatching generators and running the wholesale electricity market. NEMMCO produces the Statement of Opportunities each year in an attempt to inform the market on the most likely developments – including in relation to electricity demand requirements. NEMMCO forecasts of electricity demand are the 'benchmark' forecasts for the industry.

Graph 3
Energy Sent Out: NEM excl. Tasmania
from NEMMCO's Statement of Opportunities
(GWh)

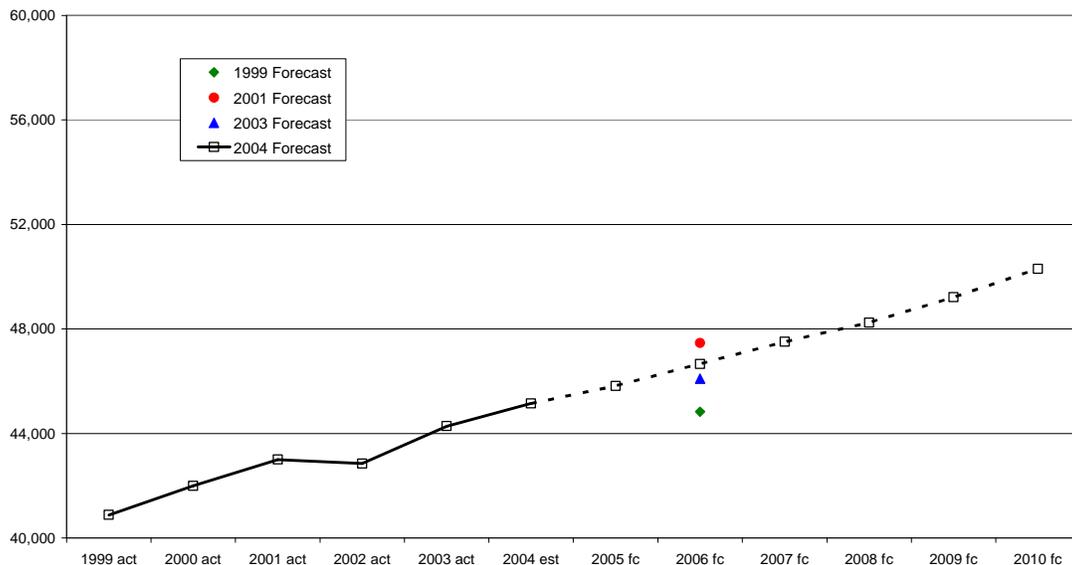


Graph 4
Energy Sent Out: South Australia
from NEMMCO's Statement of Opportunities
(GWh)



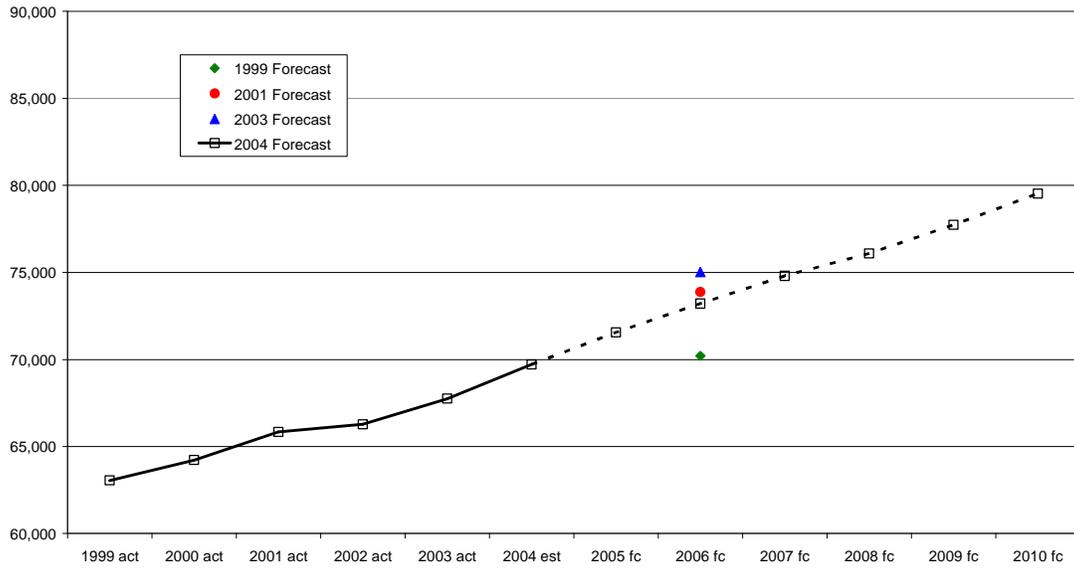
- C.3. These two graphs can be used to make two rather striking points. First, the proportional variation in South Australian actual energy consumption⁹⁸ is considerably larger than for the NEM as a whole. More importantly, due to a range of factors including weather extremes and price variation, NEMMCO has had much more difficulty in accurately estimating South Australian energy consumption than it has estimating NEM wide energy consumption. In 2001, 2003 and 2004 NEMMCO has had almost exactly the same forecast of 2006 for NEM wide energy consumption (and it had only a slightly lower forecast in 1999). By contrast, NEMMCO's forecasts for South Australia have varied significantly. In 1999 NEMMCO forecast slightly over 13,000 GWh of sent out energy for South Australia. However, NEMMCO dramatically increased this in 2001 to slightly more than 14,000 GWh only to reduce it below 13,000 GWh in 2003 and further reduce it in 2004. As illustrated below, the same differences are also in existence if you compare South Australia with each other NEM state one at a time.
- C.4. This highlights the fact that, to the extent that deviations in forecasts are likely to add to risk for electricity distributors, ETSA is likely to have the largest probability of those forecasts being materially wrong.

Graph B.1
Energy Sent Out: Victoria
from NEMMCO's Statement of Opportunities
(GWh)



⁹⁸ Using sent out energy, which is before losses, as a proxy for this.

Graph B.2
Energy Sent Out: New South Wales
from NEMMCO's Statement of Opportunities
(GWh)



Graph B.3
Energy Sent Out: Queensland
from NEMMCO's Statement of Opportunities
(GWh)

