Submission to the Economic Regulation Authority

ERA Draft Decision: Estimation of beta for Western Power's fifth Access Arrangement

29 November 2022

Synergy submission to the Economic Regulation Authority (ERA)

Synergy welcomes the opportunity to make this submission to the ERA in relation to its Draft Decision (**AA5 draft decision**) for Western Power's (**WP**'s) fifth access arrangement (**AA5**) proposal for the period 2022/23 to 2026/27.

As an electricity generator and retailer to one million customers, Synergy is the largest user of WP's electricity network. WP's AA5 proposal comes at a time where affordability and cost of living is a key customer issue. This submission presents Synergy's comments to assist the ERA to derive a statistically unbiased estimate for WP's equity beta over the AA5 period.

Recommendation

Synergy considers any introduction of statistical bias to the equity beta estimate would not be in the long-term interests of consumers and would not satisfy the Electricity Networks Access Code (**ENAC**) objective.[1] Hence, in Synergy's view, under ENAC section 4.28 the ERA must not approve an access arrangement that contains a statistically biased equity beta estimate.

Accordingly, Synergy recommends the ERA:

- Not include consideration of any international firms as comparators in a capital asset pricing model (**CAPM**) framework designed to estimate the equity beta of an Australian benchmark energy firm, as doing so would result in a statistically biased equity beta estimate of 0.7
- Adopt the statistically unbiased equity beta estimate of 0.55 for the benchmark firm, as derived from the ERA's analysis of the Australian sample data.

This change in approach would see the equity beta being reduced from 0.7 to 0.55, resulting in a lower weighted average cost of capital (**WACC**) and lower network charges than would otherwise be the case for AA5.

Background

Synergy notes the ERA's AA5 decision making process is occurring in parallel to a separate process, specified under the National Gas Law, which requires the ERA to produce a gas rate of return instrument setting out how the ERA and regulated gas network entities will calculate the rate of return for a four-year period. The current gas rate of return instrument is due to be replaced by 18 December 2022.

Synergy notes the ERA's comments in section 5 of attachment 5 of its AA5 draft decision,[2] i.e., that the outcomes of the ERA's review of the 2018 Rate of Return Guidelines are likely to have a strong influence on the ERA's AA5 WACC decision.

The focus of this AA5 submission is on the estimate for WP's equity beta over the AA5 period. Synergy is concerned the ERA's draft decision is proposing an equity beta estimation method specified in the draft gas rate of return instrument – specifically, to incorporate international comparators using a domestic CAPM for each country - that produces an upwardly biased equity beta estimate for an Australian benchmark firm.

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[1] Refer ENAC section 2.1.

[2] ERA Draft decision on proposed revisions to the access arrangement for the Western Power Network 2022/23 – 2026/27 Attachment 5: Return on regulated asset base, pages 8-9.

Equity beta - ERA draft gas rate of return and AA5 draft decision

In its 2022 Explanatory Statement for the 2022 Draft Gas Rate of Return Instrument, the ERA has indicated an aspect of its draft decision is to:

> "Use a domestic CAPM for each country to estimate the equity beta. The use of an international CAPM would introduce complexity without substantial benefits as it relies on stronger assumptions than the domestic CAPM." (p. 169)

Synergy understands that the ERA's proposed approach for its draft decision was to conduct a CAPM at benchmark leverage for each of the following countries: Australia, the United States (**US**), Canada, the United Kingdom (**UK**) and New Zealand (**NZ**). The results of the five separate CAPM analyses are reproduced in the following table.

Estimator	AUS	US	Canada	UK	NZ	Mean of all countries
Panel A: 5 year estimates						
OLS	0.48	1.08	0.95	0.95	0.64	**0.82**
LAD	0.63	0.76	0.86	0.82	0.58	**0.73**
Mean All Methods	**0.56**	**0.92**	**0.90**	**0.88**	**0.61**	**0.78**
Panel B: 10 year estimates						
OLS	0.50	0.96	0.96	0.93	0.59	**0.79**
LAD	0.58	0.74	0.88	0.80	0.51	**0.70**
Mean All Methods	**0.54**	**0.85**	**0.92**	**0.86**	**0.55**	**0.75**

Source: ERA (2022) Explanatory statement for the 2022 draft gas rate of return instrument

The ERA derived equity beta estimates for each country and reported an average equity beta across the countries of 0.77. Depending on the analysis period and whether an ordinary least squares or least absolute deviation estimator was used, the ERA's equity beta estimates ranged between 0.48 to 1.08 for the international data. In contrast, the Australian sample ranged between 0.48 and 0.63. The ERA considered 0.7 to be the best equity beta estimate for the Australian benchmark firm, which is the same equity beta estimate determined by the ERA for the 2018 Rate of Return Guideline.[3]

International sample bias

The equity beta estimate for an Australian benchmark firm is an empirical question, which should be informed through analysis of an unbiased sample. Synergy is concerned the ERA's AA5 draft decision to compare domestic CAPM estimates between countries to influence an estimate of the equity beta for an Australian benchmark firm results in an 'apples with oranges' comparison which introduces significant upward statistical bias to the equity beta estimate.

Synergy considers the statistical bias associated with using international firms as comparators in a CAPM framework are well recognised, and there are complex issues involved with employing the methods that have been proposed to manage sample size expansion into international datasets.[4] The primary challenge that must be overcome in any such analysis is that multijurisdictional CAPM estimates are incommensurable due to currency differences, bond rates differences, differences

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[3] See the ERA's Explanatory Statement for the 2022 Draft Gas Rate of Return Instrument, p. 175

[4] See the Australian Energy Regulator's Draft Rate of Return Instrument Explanatory Statement, June 2022, which refers to "… complex issues with using international energy firms as comparators…" and states that "…more work is needed in this area." (p. 182)

between each market's risk premium and expected market returns, and differences in risk profile between domestic and international firms. For example, a CAPM which regresses excess returns over a US Treasury rate for a Federal Energy Regulatory Commission regulated, vertically integrated entity against the S&P 500 index, measured in US dollars, applies very different environmental assumptions, data and units of measurement (in the case of currencies) to a CAPM which regresses excess returns over an Australian Commonwealth Government bond rate for an Australian Energy Regulator (**AER**) regulated, disaggregated entity against the All-Ordinaries index, measured in Australian dollars (**AUD**).

As far as Synergy is aware, the only adjustment the ERA has made to the international data that accounts for environmental differences between the markets of the countries included in its analysis is to perform a procedure to un-lever and re-lever the gearing levels of the comparator firms to reflect the assumed gearing of the Australian benchmark firm.

Synergy's view is that any assumption that equity betas derived from separate, multi-jurisdictional CAPM analysis can be applied on a like-for-like basis to the estimation of an Australian benchmark equity beta is fundamentally problematic and should not be considered an accepted financial model under ENAC section 6.66(b). Independent experts in the field are aware of the biases inherent in such analyses and have strongly advised regulators against the approach. For example, the statement provided by Dr Boyle in the AER's concurrent evidence session 1, held on 10 February 2022,[5] highlighted problems with the use of domestic and foreign comparators when estimating an equity beta for an Australian benchmark firm. To quote Dr Boyle directly:

> *"It is much better to have an accurate, as in unbiased, estimate, even if it is imprecisely estimated, for the purposes that the AER are going to put it to because they need a single number. You don't need a range, you need an actual number. And so, it is important that that single number contain as little bias as possible. It may not be very precisely estimated, but that is better than having a precisely estimated, heavily biased number."* (p. 57)

Attachment A to this submission details one of the sources of statistical bias affecting the comparison of multi-jurisdictional equity betas. The attachment contains time series data for both the Australian All-Ordinaries and the S&P 500 indices for the period 14/09/2017 to 13/10/2022, with the S&P index converted to AUD at the exchange rate of the day. The beta of the US equity market on the Australian equity market is estimated at 1.2, i.e., the volatility of unhedged AUD returns on the US equity market has been much higher than the volatility of Australian equity market returns over the past 5 years. Recall that an equity beta is a measurement of price change volatility relative to a benchmark: the fact that the beta of the US equity market on the Australian equity market is not equal to 1 indicates that the two market benchmarks are fundamentally different.[6]

Synergy also considered whether the world CAPM and the international CAPM offered better methodologies to determine beta values. Synergy agrees with the ERA's draft decision not to adopt the international CAPM methodology. However, in Synergy's view, the ERA's rejection of the use of the international CAPM does not support the use of a domestic CAPM for each country to inform an estimate of the equity beta of an Australian benchmark firm.

Synergy notes the ERA refers to Partington & Satchel (2020) in developing its 2022 Draft Gas Rate of Return Instrument.[7] However, Synergy views the Partington & Satchel advice as being unsupportive

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[5] AER - Concurrent evidence session 1 - Proofed transcript - February 2022, p. 57.

[6] Further evidence of the significant differences between the Australian and international is provided in the section below entitled 'statistical evidence of sample bias'.

[7] See footnote 572 in the ERA's Explanatory Statement for the 2022 Draft Gas Rate of Return Instrument

of the approach the ERA has outlined in its 2022 Draft Gas Rate of Return Instrument and AA5 draft decision. For example, Partington & Satchel state:[8]

> *"An alternative which seems to have been proposed in various reports is to simply take the betas for energy companies directly from models of other markets, particularly the US market based on a US CAPM. There is no financial or mathematical logic to this, and it does risk cherry picking by stakeholders."* (p. 29)

More generally, Partington & Satchel expressed *"… substantial reservations about expanding the comparator set by using overseas comparators …"* (p. 33), explicitly recommending *against* using international betas to estimate a domestic Australian equity beta, stating:

> *"Whichever approach one takes, there is no logically justifiable way of taking unadjusted international betas and using them as a domestic Australian betas* [sic]*."* (p. 33)

Synergy notes that the AER's 2022 Draft Rate of Return Instrument arrives at an equity beta estimate of 0.6 informed by the existing Australian comparator set of 9 firms, with international energy firms explicitly excluded from the analysis. This is consistent with Partington & Satchel's recommendation. In its 2022 Draft Rate of Return Instrument Explanatory Statement, the AER details why it decided against the use of data from international energy firms, as follows:[9]

> *"Having considered the latest submissions and other relevant evidence before us, our view remains that there are likely considerable complexities around developing an approach involving using international firms as comparators. In particular, international firms likely have different characteristics and operating and market environments to the regulated 'pure play' Australian energy network businesses and, as a result, may not be directly comparable to those we regulate."* (p. 19)

Moreover, the AER states:[10]

> *"We examined international energy firms and domestic infrastructure firms to see if we could use their beta estimates to inform our decision. We observe that these firms are different to the benchmark Australian regulated energy network business both in the scope of their activities and their corresponding risk profile. We also observe significant divergence in the statistical estimates for these firms. It is not clear that there is a readily available method to quantify or adjust for these differences. As such, at this time we consider that our existing comparator set is likely to produce a better estimate than an estimate that draws on international energy firms or domestic infrastructure firms."* (p. 164)

Statistical evidence of sample bias using the ERA's sample data

Synergy considers the AER's view is supported by evidence, which Synergy provides in Attachments B, C and D of this submission, showing statistically significant differences between the means of the ERA's Australian and international sample data.

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[8] Partington, G. and Satchel, S., Report to the AER: Alternative Asset Pricing Models, June 2020

[9] AER, Draft Rate of Return Instrument Explanatory Statement, June 2022

[10] AER, Draft Rate of Return Instrument Explanatory Statement, June 2022

In combination, Attachments B, C and D make available to the ERA R code to conduct Welch's t-tests on the data contained in Tables 12, 13 and 22 of the ERA's Explanatory Statement for the 2022 Draft Gas Rate of Return Instrument. The R code applies two sample Welch t-tests to the Australian data and each of the international samples, the null hypothesis being that the true difference in means between the international and Australian samples is greater than zero. To provide full transparency, Synergy has provided the data and the R code to the ERA so that the ERA can run the statistical tests directly, rather than relying on Synergy's reporting of the analysis.

The summary results of the Welch's t-tests are provided in the tables of Attachment B. The null hypothesis was able to be rejected for the US / Australia two sample Welch's t-tests and the Canada / Australia two sample Welch's t-tests at a 5% level of confidence in 6 out of 8 instances and at a 10% level of confidence in all instances. The p-values for the UK / Australia two sample Welch's t-tests ranged from 0.084 to 0.209, noting that the sample sizes were very small (n=4 for Australia and n=2 for the UK). Welch's t-tests were unable to be conducted for the NZ / Australia market comparison due to there being only a single observation for NZ.

The key 'take away' of the Welch's t-tests is that there is strong statistical evidence that the population mean of the equity betas of the Australian energy firms is significantly lower than that of the US and Canadian energy firms. In other words, the Australian market environment for energy firms is significantly different to the US and Canadian market environments for energy firms. While there is less evidence that the population mean of the equity betas of Australian energy firms is lower than that of UK energy firms, in Synergy's view this is likely due to the small sample sizes which makes hypothesis testing difficult in this case.