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Submission responding to AER *Equity beta issues paper*

APA Group (APA) appreciates the opportunity to comment on the *Equity beta issues paper* (Issues Paper) issued by the Australian Energy Regulator (AER) during its consultations on the rate of return guidelines required by rules 6.5.2(m) and 6A.6.2(m) of the National Electricity Rules, and by rule 87(13) of the National Gas Rules.

Our views on the Issues Paper are set out in the submission attached to this letter.

APA is also contributing to the AER's rate of return guidelines process through its membership of the Australian Pipeline Industry Association (APIA). In making this submission in its own right, APA takes the opportunity to give emphasis to a number matters from its perspective as a major energy infrastructure investor which operates some 13,000 kilometres of gas transmission pipelines and associated gas storage facilities, and two transmission interconnectors serving the national electricity market.

APA has a keen interest in ensuring that the national electricity and gas regulatory regimes deliver new infrastructure investment in the long term interests of energy users while, at the same time, safeguarding the interests of investors in that infrastructure.

APA would be pleased to discuss with the AER any issue arising from its comments on the Issues Paper. Please contact Dr John Williams on (08) 6189 4594 or at john.williams@apa.com.au.

Yours faithfully



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APA Group

**Submission on the Australian Energy
Regulator's Equity Beta Issues Paper**

28 October 2013



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Executive summary

APA has concerns with the conceptual and empirical analyses which support the proposals of the *Equity beta issues paper* (Issues Paper) recently released by the AER.

Conceptual analysis and comparator set selection

- Substantial variation in the empirical estimates for beta indicates that regulated Australian electricity network and gas pipeline service providers with traded shares do not face comparable levels of systematic risk; comparable levels of systematic risk cannot, then, justify a benchmark entity constructed from those service providers.
- The AER's benchmark is not efficient, and does not have a degree of risk similar to that of the service provider in respect of the provision of regulated services; there is no reason to expect that a beta calculated using data for that benchmark will lead to an estimate of the rate of return on equity which contributes to achievement of the allowed rate of return objective.
- Beta estimation may have to proceed using a smaller sample at the expense of statistical reliability: relaxing the criteria for comparability may not increase reliability; lengthening the period over which data are captured carries the risk of introducing data which are unlikely to be representative of financial markets in the future; and augmenting an Australian sample with data for international comparators may increase sample size but, if the data for those comparators are from different populations, the meaning of the beta estimate and its reliability are unclear.

Empirical estimation of beta

- A now inappropriate benchmark, constructed from Australian electricity network and gas pipeline service providers, has guided the choice of data for the empirical estimates of beta made by Professor Henry in 2009, by the ERA, and by SFG for the Energy Networks Association; it is to be used again, by Professor Henry, in making updated beta estimates for the AER.
- There is no reason to expect that beta estimates made by Professor Henry in 2009, by the ERA, and by SFG, can lead to estimates of the rate of return on equity which contribute to the achievement of the allowed rate of return objective; there is no reason to expect that a range for beta of 0.4 to 0.7, and a point estimate of 0.7, can lead to a rate of return which achieves the allowed rate of return objective.



- The choice of arbitrary starting points during the weeks or months for which historical returns are calculated for use in beta estimation results in a lack of precision in the estimates made by Professor Henry and the ERA.
- There is no reason to expect that the estimates of beta for any of the portfolios formed by Professor Henry, and by the ERA, are estimates for the benchmark efficient entity of the NER and the NGR; the portfolio estimates cannot therefore inform choice of a range or a point estimate of beta which might be proposed in rate of return guidelines.
- Data from potential international comparators, and the use of betas estimated for those comparators in the way the AER proposes, can provide little that is informative on the beta that is needed to estimate a rate of return on equity which meets the requirements of the NER or the NGR.
- Regulated Australian water networks are not relevant comparators for the purpose of the estimation of betas for electricity network and gas pipeline service providers.

Selecting the range and point estimate

- Even if concerns about the proposed construction of the benchmark efficient entity are overlooked, there is little in the conceptual and empirical analyses of the Issues Paper which supports a proposed range for beta of 0.4 to 0.7, and little to support the proposed point estimate of 0.7.
- No consideration is given to whether the proposed point estimate for beta can, when used with the AER's foundation model, lead to an estimate of the rate of return on equity which contributes to the achievement of the allowed rate of return objective.

APA concludes

- If the CAPM is used, it should be used with other financial models, other estimation methods, and other data and evidence, in a comparative analysis undertaken with the explicit purpose of establishing a rate of return on equity which contributes to the achievement of the allowed rate of return objective.
- This comparative analysis would be no more than what is required in accordance with rules 6.5.2 and 6A.6.2 of the NER, and in accordance with rule 87 of the NGR.



1 Overview

The *Equity beta issues paper* (Issues Paper) further develops an important aspect of the proposed scheme of rate of return determination set out in the *Draft rate of return guideline* (Draft Guideline), and the accompanying *Explanatory Statement* (Explanatory Statement), which the Australian Energy Regulator (AER) issued at the end of August.

The Issues Paper explains how the AER proposes to address determination of the equity beta of the Sharpe-Lintner Capital Asset Pricing Model (CAPM) for use in estimating the rate of return on equity.

On 11 October 2013, APA Group (APA) made a submission to the AER on the Draft Guideline and the Explanatory Statement.

In our 11 October submission, we set out our view that the CAPM has strengths which support its use in estimating the rate of return on equity. However, we thought that those strengths were not sufficient to support use of that model as a foundation model. The CAPM cannot explain equity returns with precision, and the estimates made of the parameters of the model are imprecise. There is no reason to expect that rate of return estimates made using the CAPM can contribute to achieving the allowed rate of return objective. Nevertheless, the CAPM could be used, as part of a comparative analysis, with other financial models, other estimation methods, and other data and evidence. This comparative analysis would be no more than what is required under rules 6.5.2 and 6A.6.2 of the National Electricity Rules (NER), and under rule 87 of the National Gas Rules (NGR).

We continue to hold these views, and they shape our thinking about the proposals which the AER advances in the Issues Paper.

If the CAPM is used, either as a foundation model or as part of a comparative analysis, to estimate the rate of return on equity, APA has concerns about the proposals of the Issues Paper for a range for beta of 0.4 to 0.7, and about a point estimate of 0.7.

Our concerns are with the conceptual and empirical analyses that support this range and point estimate. They are set out in this submission.



2 Conceptual analysis and comparator set selection

The conceptual analysis of section 2 of the Issues Paper leads to the conclusion that regulated Australian electricity network and gas pipeline service providers (including both transmission and distribution service providers) face comparable levels of systematic risk. This, the Issues Paper argues, justifies a single benchmark efficient entity, and use of a beta estimated for that benchmark.

APA has the following concerns about the conceptual analysis, and about the conclusions which the AER has drawn from it.

2.1 CAPM, the equity beta and systematic risk

The AER's Explanatory Statement advised that the risks which are relevant for establishing the benchmark efficient entity and which are, in turn, relevant to the allowed rate of return for that benchmark, are those risks for which an investor in an Australian energy network business would require compensation.

If investors hold diversified portfolios (an assumption open to question), the only risks for which they require compensation through the market prices of financial assets are the risks which they cannot eliminate through diversification. These risks – referred to collectively as systematic risk – are the only risks that determine returns on equity.

The AER is proposing to adopt the CAPM as the foundation model for estimation of the rate of return on equity. Underlying the CAPM is an assumption that investors hold fully diversified portfolios. When the CAPM is used to estimate the rate of return on equity, the risk premium of the model, the product of an equity beta and the market risk premium, is a measure of systematic risk.

If we assume that the market risk premium is determined by economy-wide factors, and is not firm-specific, then the equity beta is a measure of systematic risk.

2.2 Beta estimates

Section 4 of the Issues Paper advises that empirical estimates are the main form of evidence which the AER has used to determine the equity beta of the benchmark efficient entity, and that recent relevant empirical evidence supports a beta estimate in the range 0.4 to 0.7.



The recent empirical estimates for beta to which the Issues Paper refers are:

- the estimates made by Professor Henry for the AER's 2009 review of the WACC parameters for electricity network service providers;
- estimates made by the Western Australian Economic Regulation Authority (ERA) in 2011, 2012 and 2013; and
- estimates made by the Energy Networks Association's consultant, SFG Consulting (SFG), which were submitted to the AER during consultation on the rate of return guideline.

These estimates were made, in each case, using a number of different estimation methods. Those methods were reported as producing similar results and, in Table 1 below, we summarise only the ordinary least squares (OLS) estimates (which have been relevered for gearing of 60%).

We also include in Table 1 a further set of beta estimates, made by CEG for transmission pipeline service provider DBP, and submitted to the ERA during consultation on the Western Australian regulator's rate of return guidelines.

Table 1: Recent OLS beta estimates

	AGK	ENV	APA	GAS	DUE	HDF	SPN	SKI	AAN
Henry, 2009									
Weekly returns	1.24	0.30	0.76	0.38	0.36	1.01	0.28	0.79	1.26
Monthly returns	0.62	0.39	0.74	0.28	0.41	0.85	0.37	1.11	1.07
ERA, March 2012									
Weekly returns	1.30	0.33	0.78	0.42	0.38	1.16	0.32	0.34	1.29
Monthly returns	0.95	0.40	0.91	0.51	0.48	0.72	0.51	0.64	1.16
SFG, June 2013									
Four weekly returns	0.32	0.65	0.57	0.29	0.59	0.81	0.26	0.39	0.53
ERA, August 2013									
Companies in 2011 data set:									
2011 study		0.37	0.60		0.30	1.19	0.27	0.52	
2013 study		0.37	0.61		0.23	1.20	0.12	0.54	
Data to April 2013		0.37	0.61		0.23	1.20	0.05	0.54	
CEG, September 2013									
Replication, ERA data to April 2013		0.39	0.63		0.32	1.23	0.54	0.27	

The names of the companies represented by the company codes in the heading of Table 1 are listed in Table 2.



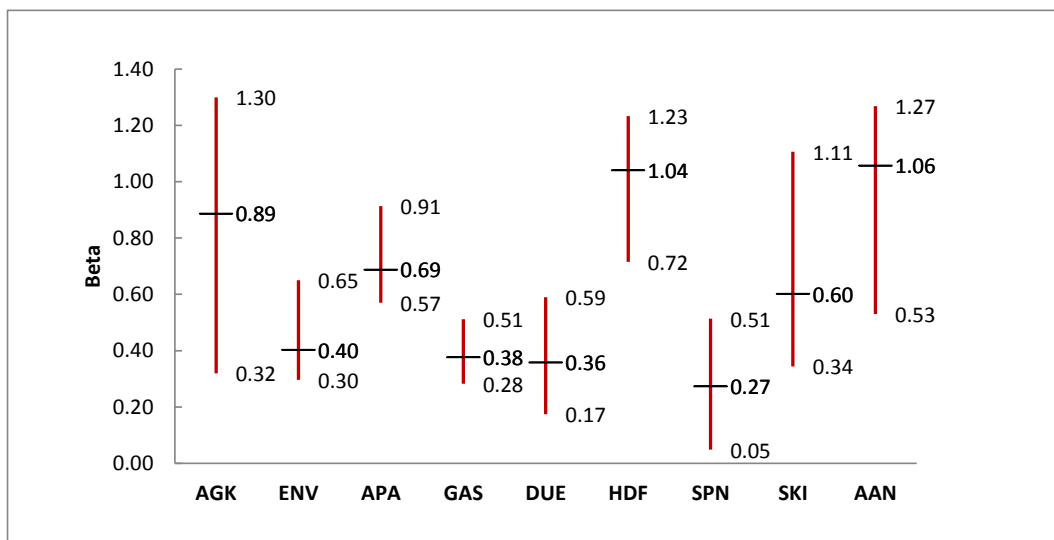
Table 2: Company codes

Code	Company	Code	Company
AGK	AGL Energy Limited	HDF	Hastings Diversified Utility Fund
ENV	Envestra Limited	SPN	SP AusNet
APA	APA Group	SKI	Spark Infrastructure Group
GAS	GasNet Australia	AAN	Alinta Limited
DUE	Duet Group		

The range of the betas, and the mean of the range, for each of the companies represented in Table 1, are plotted in Figure 1.

We note that the ranges shown in Figure 1 are the ranges for the beta estimates from the recent empirical studies. They are not confidence intervals around the mean values shown in the figure.

Figure 1: Recent OLS beta estimates: ranges and means



The beta estimates in Table 1 and Figure 1 show considerable variability and should be treated carefully. We cannot exclude the possibility that at least a part of the variability is associated with the estimation of betas from relatively small samples of “noisy” returns data. There are also potentially important differences between the companies for which the estimates have been made. AGL Energy is retailer rather than a regulated service provider, a substantial proportion of APA’s revenue is (as the Issues Paper notes) from the provision of unregulated services; and Alinta has experienced financial difficulties and no longer exists as a company with traded shares.



Nevertheless, the substantial variation in the betas of Table 1, which is represented graphically in Figure 1, indicates that Australian electricity network and gas pipeline service providers do not have similar betas and, in consequence, do not face comparable levels of systematic risk.

Comparable levels of systematic risk cannot, then, justify construction of a benchmark entity from data for regulated Australian electricity network and gas pipeline service providers with traded shares as the Issues Paper proposes. The data do not indicate that the Australian service providers have comparable levels of systematic risk. There is, then, no reason to expect that a benchmark constructed from those data would have systematic risk similar to the systematic risk of a service provider in respect of its provision of regulated services. There is no reason to expect that a beta for such benchmark, and an estimate of the rate of return on equity determined using that beta, would contribute to achievement of the allowed rate of return objective.

APA sees the proposal of the Issues Paper (and the earlier proposal of the Draft Guideline) to “benchmark” the benchmark efficient entity by reference to systematic risk as being flawed.

Systematic risk is a “black box” which is difficult to open. The components of systematic risk cannot be identified and measured, and used to show that entities within a given set either have comparable levels of systematic risk, or do not have comparable levels of that risk. This is clear from the work of the AER’s expert advisors.

Frontier Economics made a comprehensive assessment of the risks which might be relevant to regulated energy networks in Australia.¹ However, as Frontier Economics itself noted, even if those risks could be quantified, this would provide no concrete information on how they contribute toward the systematic risks that are actually priced by investors.²

Referring to the list of risks identified by Frontier Economics, McKenzie and Partington advised that some of those risks were likely to affect the returns required by investors. However, in their view, there was a fundamental difficulty: there was no reliable way to determine the nature of the relationship between any risk factor in the list and the covariation of the returns to a particular financial

¹ Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia: A report prepared for the AER*, July 2013

² Ibid., page 51.



asset with returns on the market portfolio. That is, there was no reliable way to link the risks which had been identified by Frontier Economics with beta.³

The risk premium of the CAPM provides a measure of systematic risk, but that does not help. The risk premium cannot be dissected in the way the AER proposes in its conceptual analysis. To find entities with similar equity betas, to suppose those entities are the benchmark entity (efficiency has been lost as we noted in our 11 October submission), and to estimate the equity beta for that benchmark, exposes beta estimation to the fallacy of circular reasoning.

The empirical evidence indicates that there are differences in the risk premiums of the regulated Australian electricity network and gas pipeline service providers, and that these differences require further investigation if data from any of them are to be used in constructing the benchmark efficient entity. If the risk premiums are to be further dissected, it is not via a consideration of systematic risk and loose reasoning that certain factors contribute, or do not contribute, to that risk. It is not along the lines of identification of demand risk and competition risk, and arguments without sound theoretical or conceptual basis that these risks do not lead to material differences in exposure to systematic risk. It is via rigorous and quantitative analysis using the decomposition of beta into its sensitivity to news about cash flows, and to the discount rate which investors apply to those cash flows.⁴ We are not aware of any work of this type which has been done for Australian electricity network and gas pipeline service providers which might show similarities in the determinants of beta, and therefore similarities in systematic risk.

APA continues to be of the view expressed in its 11 October submission, that the Draft Guideline and the Explanatory Statement conflate two quite distinct and separate classes of risk. These are:

- the risks to which the benchmark efficient entity is exposed, and which are to be in degree similar to the risks which apply to the service provider in respect of the provision of regulated services; and
- the risks for which investors might be compensated through the market determined prices of financial assets.

³ Michael McKenzie and Graham Partington, *Risk, Asset Pricing Models and WACC: Report to the AER*, on behalf of the Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited, 27 June 2013, page 17.

⁴ See, for example, John Y Campbell and Jianping Mei (1993), "Where Do Betas Come From? Asset Price Dynamics and the Sources of Systematic Risk", *Review of Financial Studies*, 6(3), pages 567-592; and John Y Campbell, Christopher Polk and Tuomo Vuolteenaho (2010), "Growth or Glamour? Fundamental and Systematic Risk in Stock Returns", *Review of Financial Studies*, 23(1), pages 305-344.



The risks in the first of these classes – risks broadly defined – must be identified and used to establish the benchmark efficient entity before the risks for which investors might be compensated – the risks in the second class – are assessed.

In our earlier submission, we were of the view that, by not giving adequate attention to the requirements of the NER and the NGR for efficiency and degree of risk similar to that of the service provider in respect of the provision of reference services, the Draft Guideline failed to provide the proper basis for establishing the benchmark efficient entity required by the NER and the NGR. There was, then, no reason to expect that a rate of return determined by applying the guideline would achieve the allowed rate of return objective. This was a major deficiency in the AER's proposals. That deficiency remains embedded in the proposals of the Issues Paper. If it is not addressed, the AER's rate of return guidelines will not provide methods which can lead to a rate of return that achieves the allowed rate of return objective.

2.3 Comparator set selection

There is, in APA's view, no basis for proceeding, as the Issues Paper proposes, by simply calculating the equity betas of those regulated Australian electricity network and gas pipeline service providers with traded shares. The data available indicate that proceeding in this way will not lead to an estimate of the rate of return on equity which contributes to the allowed rate of return objective.

Beta estimation may have to proceed using a smaller sample at the expense of statistical reliability.

In our 11 October submission on the Draft Guideline, we advised that the availability of data was a potentially significant issue. Difficulties in obtaining the required data could not justify the use of other data – for example data pertaining to businesses in different industry sectors, using different technologies and serving different markets – just because those other data were current and because they came from a source which could be regarded as credible. Any data used must be relevant to rate of return determination in accordance with the specific requirements of the NER and the NGR.

The Issues Paper suggests three strategies for dealing with the problem of limited data. They are:

- expanding the set of comparator firms by relaxing the criteria for comparability;



- expanding the set of comparator firms by including comparators from outside Australia; and
- lengthening the period over which the data are gathered.

We briefly examine each of these three strategies in the following paragraphs.

2.3.1 Relaxing the criteria for comparability

Relaxing the criteria for comparability might, as the Issues Paper suggests, increase the number of firms for which data could be obtained for beta estimation.

However, the criteria for comparability must be those of the NER and the NGR. The comparators must:

- be efficient; and
- have a degree of risk similar to that which applies to the service provider in respect of the provision of regulated services.

We do not see much scope for relaxing the criterion that any potential comparator be efficient.

There may be some opportunity to take a more flexible approach to risk of the service provider, especially as the requirement of both the NER and the NGR is for a similar – and not the same – degree of risk. Introducing such flexibility would, however, need to be done carefully to ensure that the essential requirement of the criterion continued to be satisfied.

Relaxing the criteria for comparability solely in pursuit of statistical reliability would not make sense to us. The sample size could be increased by using the share price and dividend data for a large number of firms. This may, or may not, increase the reliability of the statistical estimates. However, it would not lead to a beta estimate, and to an estimate of the rate of return on equity, which would necessarily contribute to the allowed rate of return objective.

2.3.2 International comparators

The Issues Paper proposes, but rejects, the use of data for international comparators – comparator firms operating in markets outside Australia.

The AER's reasons for rejecting the use of international comparators are that they are exposed to different systematic risks to the potential Australian



comparators, and that it is not possible to correctly adjust for the different risk environments across countries. The differences in systematic risk, the AER notes, arise from differences in:

- businesses regulation;
- economic management;
- stage of the business cycle;
- geography; and
- climate.

These are, in APA's view, all possible reasons for thinking that data from international comparators should not be used in beta estimation. However, whether they are relevant is a matter of conjecture. Systematic risk is, as we indicated above in our discussion of the proposed construction of the benchmark efficient entity, a "black box" which is difficult to open. A list of risk factors, including those noted in the preceding paragraph of this submission, cannot be used to show that the international comparators either have comparable levels of systematic risk to Australian service providers, or do not have comparable levels of that risk.

We do not see data from international comparators as necessarily being relevant to construction of the benchmark efficient entity, or to estimation of the parameters of financial models to which regard might be had in rate of return determination. They may have a role to play in certain specific circumstances, but not in beta estimation. Augmenting an Australian sample with data for international comparators may increase the size of the sample to be used in estimation, but if the data for those comparators are from a different population, the meaning of the resulting estimate and its reliability are quite unclear.

2.3.3 Lengthening the period

Lengthening the period over which data are captured offers an immediate opportunity to increase sample size. However, as the Issues Paper advises, there is a risk that any extended period might span data pertaining to events which are unlikely to be representative of financial markets in the future.

Removing these "unrepresentative events" might not, the Issues Paper notes, be straightforward.

APA agrees. As we indicated in our 11 October submission, there is evidence that equity betas are time varying, and that this time variability may be driven by a



number of macroeconomic factors which are thought to have a role in explaining returns but which are not specified in the CAPM. Removing unrepresentative events may simply be a way of accommodating a simple partial equilibrium model – the CAPM – which is inadequate to the task of estimating rates of return.

2.4 Conceptual analysis and comparator set selection

In the proposals of the Draft Guideline and the Explanatory Statement, the AER dealt with the critical issue of establishing the benchmark efficient entity without thorough examination of whether the benchmark was efficient, or whether it had risk which is of similar degree as that which applies to the service provider in respect of the provision of regulated services.

The issue of whether the benchmark had degree of risk similar to the service provider was obscured by the adoption of a conceptual definition of the benchmark, and by conflation of the risks of regulated service provision with the risks for which investors might be compensated through the market determined prices of financial assets.

The Issues Paper attempts to build on these inadequate foundations.

Conceptual analysis does not, and cannot, support the conclusion that regulated Australian electricity network and gas pipeline service providers face comparable levels of systematic risk. Nor is that conclusion supported by recent empirical evidence. The evidence advanced in the Issues Paper indicates that there are differences between the betas of the service providers which call for further investigation before the data for any on them might be used in constructing the benchmark efficient entity.



3 Empirical estimation of beta

The Issues Paper advises that, once established, the benchmark – the Australian electricity network and gas pipeline service providers with traded shares – is to guide choice of the data to be used to generate empirical estimates of beta using a range of econometric techniques.

Indeed, this benchmark has already guided the choice of the data used by:

- Professor Henry to estimate beta for the AER's 2009 review of the WACC parameters for electricity network service providers;
- the ERA in its studies to estimate beta in 2011, 2012 and 2013; and
- SFG, the Energy Networks Association's consultant, when making the estimates of beta which were submitted to the AER earlier in its process of consultation on the rate of return guideline.

Although the AER has concluded that the beta estimates from each of these studies provides support for a proposed range of 0.4 to 0.7, and for a proposed point estimate of 0.7, Professor Henry has been engaged to prepare updated estimates. The Issues Paper advises that Professor Henry has been instructed to use the data for the benchmark – the set of nine Australian electricity network and gas pipeline service providers which, in 2009, had traded shares – in making his updated estimates of beta.

In the following paragraphs, we set out our concerns with the empirical analyses which support the Issues Paper's proposed range and point estimate for beta.

3.1 The beta estimates do not facilitate determination of the allowed rate of return

As APA indicated in its 11 October submission, identification of the benchmark efficient entity is the key to determination of the allowed rate of return. If the benchmark is not properly identified, there is no reason to expect that a rate of return determined using data for the benchmark will achieve the allowed rate of return objective.

The focus, in the Issues Paper, on risks for which investors must be compensated, and not on the risks of the service provider in respect of its provision of regulated services has, we think, led the AER to a benchmark – Australian electricity networks and gas pipeline service providers with traded



shares – which is not in accordance with the requirements of the NER or the NGR.

The AER's benchmark is not efficient, and does not have a degree of risk similar to that which applies to the service provider in respect of the provision of regulated services.

This now inappropriate benchmark (it may have been appropriate before the November 2012 rule changes) has guided the choice of data for the empirical estimates of beta made by Professor Henry in 2009; by the ERA in 2011, 2012 and 2013; and by SFG for the Energy networks Association. It is to be used again, by Professor Henry, in making updated estimates of beta for the AER.

There is, then, no reason to expect that the results of the studies by Professor Henry in 2009, by the ERA, and by SFG, lead to an estimate of beta which can be used to estimate a rate of return on equity which contributes to the achievement of the allowed rate of return objective. There is no reason to expect that a range for beta of 0.4 to 0.7, and a point estimate of 0.7, can lead to a rate of return which achieves the allowed rate of return objective.

A new study by Professor Henry, who has been instructed to use the inappropriate benchmark, will not produce, except by chance, beta estimates which lead to estimates of rates of return on equity which contribute to the achievement of the allowed rate of return objective.

3.2 Concerns about the empirical estimates themselves

APA has not undertaken a detailed review of the econometric techniques which might be used to estimate beta. Nor has it applied those techniques to the returns data available for the Australian electricity network and gas pipeline service providers with traded shares which are to constitute the benchmark entity.

We are, however, cognisant of the concerns of others about the technical issues of estimation, and about the application of alternative estimation methods.

In particular, we are aware of work undertaken by economic advisors CEG for DBP, which DBP reported in its submission on the ERA's draft rate of return guidelines. CEG observed a lack of precision in the estimates of beta made by Professor Henry and the ERA, which arose solely by the choice of arbitrary starting points during the weeks or months for which historical returns were calculated for use in beta estimation. We believe this imprecision is an issue for the beta estimates now being proposed in the Issues Paper and we have supported its further investigation by CEG.



3.2.1 Initial concerns

In the course of earlier work by CEG, DBP observed that changing the starting point from which weekly or monthly historical returns were calculated resulted in estimates of beta different from those previously reported by Professor Henry and by the ERA. There was, DBP reasoned, nothing in the theory of the CAPM which favoured the use of weekly over monthly returns in the estimation of beta, and nothing to suggest that that a particular day of the week or month is a more suitable starting point.

CEG was asked to investigate further and the results of its investigation are summarised in Figure 2.⁵

Figure 2: Australian OLS beta estimates made using different sampling intervals

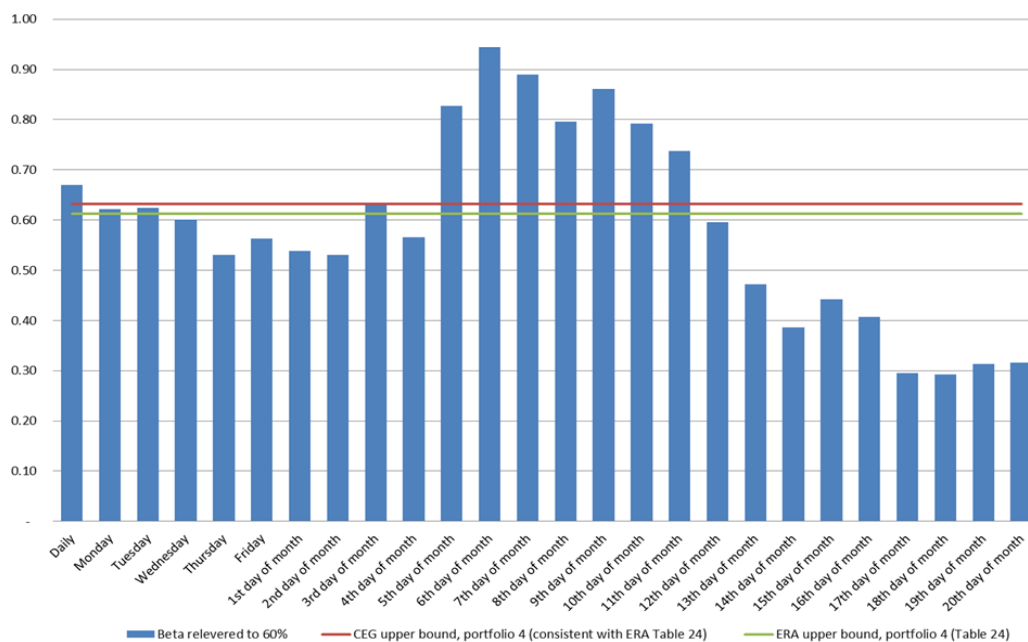


Figure 2 shows a wide range for the estimates of beta depending on the day chosen as the starting point for historical returns calculation.

DBP noted in its submission on the ERA’s draft rate of return guideline that the analysis supporting Figure 2 clearly showed that the confidence interval which had been provided with the ERA’s beta estimates gave a false sense of

⁵ Figure 2 was copied from CEG, *Regression estimates of equity beta*, September 2013, which is available at <http://www.erawa.com.au/access/gas-access/guidelines/>



precision. Only about 2.5% of estimates made should lie above the upper limit of a 95% confidence interval. CEG found that some 42% of beta estimates formed on different days fell outside the confidence interval for the ERA's beta estimates. Estimates of beta, made using historical returns data calculated using different starting points, appear to show very substantial variation for no reason other than the essentially arbitrary choice of starting point. The ERA's beta estimates, which have been made using historical returns data calculated from a particular starting day, lack precision and do not provide strong support for the AER's proposed range of 0.4 to 0.7. The work by CEG indicates a substantially higher upper limit for that range.

We note that in its work for the Energy Networks Association, SFG identified the problem, and addressed it:

First, we use all available daily share price information for analysis over our estimation period. We compute total returns over a four-weekly period for each stock, but repeat our analysis 20 times using different start points within this four-weekly period. This provides the benefit of using a returns window of approximately one month, but also means that we do not ignore any stock and market returns information. The beta estimates for each firm can vary markedly, depending upon the start point during the month that returns are calculated. In other words, the beta estimate for a given firm will be quite different depending upon whether the returns are estimated from the first Monday of the month or the third Wednesday of the month.⁶

SFG did not, however, consider whether the businesses for which it computed returns over four weekly periods, and for which it made estimates of beta, could constitute the benchmark efficient entity of the NER and the NGR.

3.3 Portfolio estimates

APA is well aware that returns on of portfolios of shares, rather than the returns on the shares of the individual companies comprising those portfolios have been used extensively in testing the validity of the CAPM. A portfolio of financial assets is, itself, a financial asset, and the use of portfolios reduces the effect "noise" in the returns on the financial assets of the individual firms, improving the precision of model testing.

In addition to reporting betas for the individual firms, both Professor Henry and the ERA report betas for a number of portfolios which combine the individual

⁶ SFG, *Regression based estimates of risk parameters for the benchmark firm*, 24 June 2013, page 5.



Australian electricity network and gas pipeline service providers for which share price and dividend data are available for the purpose of beta estimation.

In estimating the rate of return on equity of the benchmark efficient entity of rules 6.5.2(c) and 6A.6.2(c) of the NER, and of rule 87(3) of the NGR, we are not testing the validity of the CAPM. We are accepting the validity of the model and applying it to obtain an estimate of a rate of return on equity. For that purpose, we require an estimate of beta. That beta might be estimated using returns data for a portfolio to reduce the effect of noise but, before that could properly be done, each of the individual firms in the portfolio would have to satisfy the criteria for the benchmark firm of the NER and the NGR. Each firm would have to be efficient, and each would have to have degree of risk similar to that which applies to the service provider in respect of the provision of regulated services.

As we have indicated earlier in this submission, the Australian electricity network and gas pipeline service providers with traded shares have not been shown to be efficient, and they have not been shown to have degree of risk similar to that which applies to the service provider in respect of the provision of regulated services. There is, then, no reason to expect that the estimates of beta for any of the portfolios formed by Professor Henry, and by the ERA, are estimates for the benchmark efficient entity of the NER and the NGR. They cannot inform choice of a range or a point estimate of beta which might be proposed in rate of return guidelines.



4 Beta comparisons

The AER proposes to use the betas for international energy networks, and for entities in the Australian water sector, as cross checks for its estimates of beta for the benchmark efficient entity. The assessment of beta will also take into account the theoretical implications of an alternative model, the Black CAPM.

As discussed in the paragraphs which follow, APA sees only a limited role (if any) for international comparators, and no role at all for comparisons with betas for entities in the Australian water sector.

4.1 International comparators

Beta estimation is to facilitate the application of the CAPM in estimation of the rate of return on equity for the purpose of determining the allowed rates of return required by the NER and the NGR.

Both the NER and the NGR are clear: the estimate of the rate of return on equity is to contribute to achievement of the allowed rate of return objective. That is, the estimate of the rate of return on equity is to contribute to determination of an efficient financing cost of the benchmark efficient entity.

As APA has indicated, in its 11 October submission on the Draft Guideline, and in the preceding sections of this submission, establishing a benchmark which is both efficient and which has degree of risk similar to the service provider in respect of its provision of reference services, is not a straightforward task. It cannot, in APA's view, proceed from considerations of systematic risk and its measurement by beta.

In these circumstances, both the use of data from potential international comparators, and the use of betas estimated for those comparators in the way the AER proposes in the Issues Paper, can provide little that is properly informative on the beta that is needed to estimate a rate of return on equity which meets the requirements of the NER or the NGR.

Simply "looking at the data", as the AER proposes, without making an assessment of whether its use might assist in satisfying the requirements of the NER and the NGR, is inadequate.

We do not, as yet, have a well specified process for determining an Australian benchmark which meets the requirements of the rules. We see the task of



ensuring that potential international comparators might reasonably be expected to provide information relevant to the benchmark provider as adding complexity which has not yet been addressed.

APA sees international comparators as providing neither primary data for beta estimation, nor evidence which is particularly useful in establishing whether Australian equity betas are those of the benchmark entity.

4.2 Water sector comparators

Appendix A to the Issues Paper advises that it is possible to use the equity betas from regulated Australian water networks to cross check beta estimates for the benchmark efficient (energy) entity because the water networks have similar levels of systematic risk. Evidence for this, the Issues Paper states, is provided in reports prepared by Frontier Economics for the AER, and earlier, for the Australian Competition and Consumer Commission.

The report which Frontier Economics prepared for the AER does not seem, to us, to provide much in the way of supporting evidence. Frontier Economics concludes:

As explained in Chapter 4, there are no listed water companies in Australia. Therefore, any such evidence must necessarily be obtained by reference to overseas companies (e.g. from the UK or the US).⁷

APA is of the view that the regulated Australian water networks are not relevant comparators for the purpose of the estimation of betas for electricity network and gas pipeline service providers. Our reasons for this view are:

- there is no evidence to indicate that the water sector entities have levels of systematic risk which are similar to those of regulated Australian electricity network and gas pipeline service providers; listing risk factors and attempting to argue similarity does not, for the reasons we have advanced earlier in this submission, allow any conclusion about comparable systematic risks;
- the water networks provide no direct evidence which might inform energy sector betas because none of the networks in question has traded shares the prices of which might be used in beta estimation;
- to the extent that betas proposed for regulated Australian water networks have been based on beta estimates for Australian electricity network and gas

⁷ Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia: A report prepared for the AER*, July 2013, page 111.



pipeline service providers, their use in informing the estimation of betas for the energy sector service providers would be circular; and

- to the extent that betas proposed for regulated Australian water networks have been based on beta estimates for international water sector comparators, they have the limitations of international comparators noted above; in addition they are based on evidence from a different industry, using different technology, to serve different markets in different institutional (including regulatory) environments.



5 Selecting the range and point estimate

In the final section of the Issues paper, the AER explains how it has selected its proposed range for beta (0.4 to 0.7), and how it has selected the proposed point estimate (0.7) from within that range.

APA's concerns about range selection, and selection of the point estimate, are set out in the paragraphs which follow. They arise largely from the issues with comparator selection and beta estimation which we raised earlier in this submission.

5.1 Selection of the range

Section 6.1 of the Issues Paper indicates that the AER's selection of the range for beta has proceeded as follows:

- conceptual analysis, supported by Professor McKenzie and Associate Professor Partington, supports a low value of the equity beta for the benchmark efficient entity, and a value below 1.0;
- empirical evidence, obtained using data for Australian electricity network and gas pipeline service providers, supports a range for the equity beta for the benchmark efficient entity of 0.4 to 0.7;
- the empirical evidence is consistent and robust; it is robust to the use of different econometric techniques, different comparator sets and different time periods;
- estimates made, by Professor Henry, for the AER's 2009 review of WACC parameters for electricity network service providers indicated a range for the equity beta of the benchmark efficient entity of 0.4 to 0.7; recent studies, using data over longer time periods provide estimates with lower standard errors, increasing confidence in this range;
- considerable differences between the international comparators and the benchmark efficient entity, in respect of which adjustment is difficult, preclude the use of estimates from those comparators in estimating beta; nevertheless, the beta estimates for international comparators are not incompatible with the range 0.4 to 0.7; and
- the Black CAPM cannot be estimated with precision and, although its use would remove one of the objectionable assumptions underlying the CAPM, another unrealistic assumption would replace it; the Black CAPM does not



provide theoretical reasons for departing from the range for beta established using the empirical evidence.

As we discussed in section 2.3 of this submission, the type of conceptual analysis which the AER has carried out, and which it reports in section 2 of the Issues Paper, is inadequate: it cannot support a low value for beta, or a value below 1.0.

The support for a beta below 1.0 from Professor McKenzie and Associate Professor Partington appears to be from an earlier report they prepared for the AER. In that earlier report they advised that a close examination of the components of systematic risk for a regulated energy network clearly suggests that the equity beta for a regulated energy network is below 1.0.⁸ We see the current views of McKenzie and Partington, which we noted in section 2.3 as qualifying their earlier position: the components of systematic risk may suggest an equity beta below 1.0, but there is no reliable way of linking those components to beta.

Conceptual analysis does not lead far, and recourse must be had to empirical evidence. As Table 1 and Figure 1 show, the recent empirical evidence to which the AER refers indicates betas in the range 0.05 to 1.3. It does not support a range 0.4 to 0.7, and it does not support the AER's conceptual analysis.

Furthermore, Table 1 and Figure 1 cast doubt on the claim that the empirical evidence is consistent and robust. The work undertaken by CEG and reported in section 3 of this submission clearly indicates that the beta estimates (other than those made by SFG) are not robust to a change in the starting points of weekly and monthly historical returns series.

The AER has shown that recent studies, using longer data series of returns for portfolios of firms, report beta estimates with lower standard errors. As we indicated in section 3.3 of this submission, we have concerns about the appropriateness of using portfolios when the individual firms comprising the portfolios are dissimilar and cannot be taken, collectively, to be the benchmark efficient entity.

We note that any increase in confidence in the range as result of the lower standard errors from the longer series, dissipates when we examine the

⁸ Michael McKenzie and Graham Partington, *Report to the AER: Estimation of the Equity Beta (Conceptual and Econometric Issues) For a Gas Regulatory Process in 2012*, on behalf of the Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited, 27 June 2013, page 23.



estimates for the individual firms. Table 3 shows that the standard errors of the beta estimates for the individual firms are lower in only two out of the six cases for which the longer data series are available.

Table 3: Comparison of standard errors in Henry 209 and ERA (2013) – OLS estimates for individual firms

Firm and data series	Standard error
Investra Limited	
Henry (2002-2008)	0.0526
ERA (2002-2013)	0.0728
APA Group	
Henry (2002-2008)	0.1011
ERA (2002-2013)	0.0838
Duet Group	
Henry (2002-2008)	0.0676
ERA (2002-2013)	0.0964
Hastings Diversified Utility Fund	
Henry (2002-2008)	0.1750
ERA (2002-2013)	0.3088
SP AusNet	
Henry (2002-2008)	0.1260
ERA (2002-2013)	0.1613
Spark Infrastructure	
Henry (2002-2008)	0.3020
ERA (2002-2013)	0.1819

Source: APA calculations from Henry (2009) and ERA (2013) data

The beta estimates for international comparators are, as the Issues Paper advises, not incompatible with the range 0.4 to 0.7. However, they are also not incompatible with the range 0.05 to 1.3 which we observe in the empirical evidence to which the AER refers. In our view, because the benchmark efficient entity has not been properly established, the range of beta estimates is wide.

Reference to the Black CAPM as a theoretical proposition does little to assist in determining a range for beta. There is, as we indicated in our 11 October submission on the Draft Guideline, no reason for not properly estimating the Black CAPM and using the result to inform an estimate of the rate of return on equity.

In our view, the way in which the Black CAPM is to be used in establishing the range for beta (and in establishing a point estimate) belies the assertions of the Draft Guideline and the Explanatory Statement the AER is not intending to apply the SL CAPM “mechanically”, and that it is intending to use the Black CAPM and



other evidence to inform the estimation of beta and the MRP for the foundation model.

Even if we overlook the concerns which we have about the proposed construction of the benchmark efficient entity, we find little in the conceptual and empirical analyses of the Issues Paper which supports a proposed range for beta of 0.4 to 0.7.

5.2 Selection of the point estimate

Having explained how the range for beta has been selected, the Issues Paper then explains how the AER has selected a point estimate in that range. The selection of 0.7, the upper limit of the proposed range, as the point estimate for beta appears to have been as follows:

- with greater confidence in the range 0.4 to 0.7, the previous beta estimate of 0.8 is no longer appropriate;
- use of the longer data series available in 2013 increases reliability by reducing the standard errors around the point estimates; the equity beta estimates from the longer data series are more reliable;
- the empirical estimates maintain consistency over a period (2008 to 2013) which encompasses the GFC and its aftermath, suggesting beta stability across the business cycle;
- the pattern of beta estimates from international comparators is not consistent, but recent point estimates are between 0.5 and 0.9 (although some estimates exceed 1.0); and
- the theory of the Black CAPM, which indicates that the CAPM may underestimate returns on equity for firms with betas below 1.0, suggests an estimate at the higher end of the range

Again, overlooking the concerns which we have about the proposed construction of the benchmark efficient entity, there is no reason for having greater confidence in the range 0.4 to 0.7: the empirical evidence does not immediately support that range, and the use of longer data series does not add to confidence. The equity beta estimates from the longer data series are not necessarily more reliable.

We note that the suggested stability of beta across the business cycle is not consistent with the findings of other research (to which we referred earlier in this submission and in our 11 October submission on the Draft Guideline). This is an issue which would require further investigation before a beta estimate could be set in rate of return guidelines.



As we noted above, the beta estimates for international comparators are not incompatible with the range 0.4 to 0.7, but nor are they incompatible with a range 0.05 to 1.3. The international estimates themselves do not inform the setting of a point estimate, and the Issues Paper does not assist with explaining how they might do so.

Similarly, reference to the Black CAPM as a theoretical proposition does little to assist in determining a range for beta, and does not assist the selection of a point estimate from within that range.

5.3 Range and point estimate

APA finds in the Issues Paper little to support the selection of the proposed range for beta, and little to support the proposed point estimate.

No consideration is given to whether the proposed range, 0.4 to 0.7, and whether the proposed point estimate, 0.7, can, when used with the AER's foundation model, provide estimates of the rate of return on equity which contribute to the achievement of the allowed rate of return objective of the NER and the NGR.



6 Multiple models, methods, and sources of data and evidence cannot be avoided

The AER proposes to use a foundation model – the CAPM – to estimate rates of return on equity for the purpose of determining the allowed rates of return of the regulatory regimes of the NER and the NGR.

In its 11 October submission on the AER's Draft Guideline and Explanatory Statement, APA indicated its concerns that:

- the proposals of the Draft Guideline and the Explanatory Statement did not adequately deal with the critical issue of establishing the benchmark efficient entity and, in consequence, there was no reason to expect that a rate of return determined by applying the AER's rate of return guideline would achieve the allowed rate of return objective; and
- the CAPM has strengths which support its use in estimating the rate of return on equity but those strengths are not sufficient to support its use as a foundation model; the CAPM cannot explain equity returns with precision, estimates made of the parameters of the model are imprecise leading to imprecise estimates of the rate of return on equity, and there is no reason to expect that rate of return estimates made using the model can contribute to achieving the allowed rate of return objective.

Although we supported, and continue to support, use of the CAPM in estimation of rates of return on equity (but not as a foundation model), the approach to beta estimation set out in the Issues Paper has strongly reinforced our earlier concerns about the AER's proposed rate of return guideline.

The empirical evidence which the AER advances in support of a range and point estimate for beta confirms our view that the critical issue of establishing the benchmark efficient entity has not been adequately dealt with in the Draft Guideline. The evidence indicates that the regulated Australian electricity network and gas pipelines service providers with traded shares cannot be taken as the benchmark of rules 6.5.2(c) and 6A.6.2(c) of the NER, and of rule 87(3) of the NGR. These businesses do not have the comparable levels of systematic risk which might justify their use in constructing a benchmark which has a degree of risk similar to that of the service provider in respect of the provision of regulated services.



At a conceptual level, the CAPM is not a very satisfactory model for explaining equity returns. Nevertheless, it provides an important insight into the nature of the relationship between risk and return, and is relatively easily applied. For these reasons the CAPM is widely used. However, issues which arise in the context of the proposals of the AER's Issues Paper – the period over which data are available, the use of portfolios in estimation, lack of robustness indicated by the variation in estimates made using different starting points for historical returns calculation, small sample sizes and the attendant issues of statistical reliability, and variation in beta over the business cycle – all point to imprecision in the rate of return estimates it produces.

If the CAPM cannot explain investor returns with precision, and estimates made of the model parameters are also imprecise, then there is no reason to expect that rate of return on equity estimates made using the model can contribute to achieving the allowed rate of return objective.

If it is to be used, the CAPM should be used with other financial models, other estimation methods, and other data and evidence, in a comparative analysis undertaken with the explicit purpose of establishing a rate of return on equity which contributes to achievement of the allowed rate of return objective. Such a comparative analysis would recognize and take into account the limitations of:

- particular financial models, including the CAPM;
- specific estimation methods to be used with those models;
- the data to be used in estimation; and
- the estimates, including the estimates of beta, made using those models, methods and data.

This comparative analysis would be no more than what is required under rules 6.5.2 and 6A.6.2 of the National Electricity Rules (NER), and under rule 87 of the National Gas Rules (NGR).