Consumer Reference Group Submission on ERA 2022 Gas Rate of Return Instrument Review Discussion Paper of December 2021

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ACRONYMS

CRG	Consumer Reference Group
AER	Australian Energy Regulator
CAPM	Capital Asset Pricing Model
CMEWA	Chamber of Minerals and Energy Western Australia
EICSI	Energy Infrastructure Credit Spread Index
ESCOSA	Essential Services Commission of South Australia
ERA	Economic Regulation Authority
IPART	Independent Pricing and Regulatory Tribunal
NGO	National Gas Objective
Ofgem	Office of Gas and Electricity Markets
Ofwat	Office for Water Services in the United Kingdom
QCA	Queensland Competition Authority
RAB	Regulatory Asset Base
WACC	Weighted Average Cost of Capital

1 SUMMARY

1.1 SCOPE OF SUBMISSION

The Economic Regulation Authority (ERA) is currently undertaking a review to help determine the rate of return it will allow for the gas pipelines it regulates in Western Australia for the five-year period starting in January 2023.

As part of the consultation process for the review, the ERA has established a Consumer Reference Group (CRG) to provide direct and ongoing feedback to the ERA on rate of return issues that represents broad consumer perspectives.

The ERA has published a paper setting out the engagement process and also a technical discussion paper on the 2022 gas instrument review. This submission has been prepared by the CRG in response to the ERA's technical discussion paper. The CRG is interested in feedback on its views as presented in this paper. The views are preliminary at this stage.

The key elements of the submission are set out below. Table 1 at the end of the summary provides a more concise presentation.

1.2 REGULATORY FRAMEWORK

1.2.1 The national gas objective and economic efficiency

In setting an appropriate allowed rate of return the National Gas Law requires the ERA to have regard to the national gas objective and various revenue and pricing principles.

The national gas objective is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers with respect to price, quality, safety, reliability and security of supply of natural gas.

The revenue and pricing principles refer to various principles to ensure the various aspects of economic efficiency are taken into account.

The CRG recognises the overarching status and importance of the national gas objective and reference to economic efficiency and the long term interests of consumers. However, it is concerned that, the regulated monopoly entities will in effect be accorded a degree of regulatory protection for their assets that is not feasible for the sunk assets of major consumers and that such treatment will not be appropriately recognised in the allowance for risk in the regulated rate of return. If the allowance for risk in the regulated rate of return represents higher compensation for risk than is appropriate from an economic efficiency perspective then this will mean higher prices for all consumers contrary to their long term interests.

The CRG requests the ERA to make more explicit how the regulatory arrangements as a whole may impact on the rate of return. This is discussed further below,

1.2.2 Methodology

Definition and assumptions

In setting an allowed rate of return, the ERA and other Australian regulators make use of a widely accepted methodology that defines the rate of return and its key parameters.

The starting point is what is known as the weighted average cost of capital (WACC) which simply means weighting the relevant return on equity and cost of debt by their respective shares in the total capital of the firm. In stylised terms this means:

(1) WACC = return on equity × share of equity in total value of firm + cost of debt × share of debt in total value of firm.

To arrive at an appropriate rate of return in the form of the WACC, the regulator has to decide on the various components on the right hand side of equation 1. The ERA approach is to specify parameters that reflect efficient financing costs of a benchmark entity with similar risk to the regulated entity,

A brief explanation of the components is as follows:

The capital structure i.e. the shares of equity and debt (often referred to as gearing) is derived by reference to a benchmark sample of firms with similar capital intensity and operating and risk characteristics.

The required cost (rate of return) for debt is relatively straightforward to estimate because there are observable competitive market-based costs of debt that can be used as a proxy for the "true" cost of debt to the regulated entity.

The cost of debt (required return on), is proxied by identifying the cost of debt for a private entity with a benchmark credit rating. It comprises a risk free rate of return, a debt risk premium reflecting the risk of the benchmark entity and relevant debt hedging and issuing costs.

In contrast to the cost of debt there are no readily observable proxies for the expected return on equity. As a result, the expected return on equity has to be estimated with the help of models. The main model used by Australian regulators, including the ERA, to estimate the cost of equity, is the widely accepted Sharpe-Lintner Capital Asset Pricing Model (CAPM).

The derivation of the CAPM is based on modern portfolio theory in the field of finance which is a theory of how risk-averse investors can construct portfolios to maximise expected return based on a given level of market risk. A fundamental insight from modern portfolio theory is that a distinction can be made between diversifiable (unique) risk and non-diversifiable (systematic) risk and that by selecting an appropriate diversified portfolio of stocks investors can diversify away unique risk so that the only risk that is priced in the CAPM is non-diversifiable systematic risk which is reflected in a single 'beta' parameter.

The CAPM is a relative pricing model and measures the risk of a security or firm relative to the risk of the market portfolio as a whole. Securities whose value is more sensitive to economic fluctuations than the market portfolio are riskier and so investors require an expected return higher than the expected return to the market portfolio to hold them (and vice versa for less sensitive securities).

The CAPM can be defined as follows:

(2) Expected return on equity = risk free rate + beta × market risk premium

Thus, the CAPM requires only three parameters to be implemented: a risk free rate; a market risk premium that reflects the risk relating to the market for investments as a whole relative to the risk free rate; and a beta parameter that reflects the sensitivity of the benchmark entity's returns relative to the return for the market as a whole.

Note that beta is the only parameter specific to the equity component of the business entity under consideration; the other two parameters, the risk-free rate and expected market risk premium, relate to the market for investments as a whole. The product of the beta parameter and market risk premium measures the value or cost of the firm specific risk that is priced in the CAPM.

It is important to be aware of the assumptions on which the CAPM is based, to help understand how to interpret the beta parameter. This is particularly the case where the existence and form of economic regulation may affect the applicability of certain assumptions or the nature and extent of risk reflected in the beta parameter.

The assumptions fall into two categories: structural assumptions and behavioural assumptions. The structural assumptions include: efficient investment markets; an undefined one period investment horizon; and identical views of investors about expected returns and the variability of returns. The behavioural assumptions are that: investors are risk averse and expect the highest possible return for a given risk level; and make their decisions based solely on consideration of the expected mean return and variance of returns with the variance of returns being the only relevant measure of risk.

In specifying the parameters of the WACC, the ERA makes use of the concept of a benchmark efficient entity. *The ERA defines the benchmark efficient entity as a pure-play network service provider operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in respect of the provision of gas network services*. The term 'pure play' refers to the benchmark being involved in the provision of substantially similar services as the regulated entity. The term 'without parental ownership' refers to removing the influence of 'parental ownership' that may affect risk and that is not a characteristic for many other firms forming the benchmark.

Once an appropriate allowed rate of return is determined, the regulator sets prices or revenues such that the expected present value of revenues over the regulatory period just equals the expected present value of costs. This is known as the NPV=0 condition. This condition essentially means that the regulated firm will expect to receive revenues such that it earns the allowed rate of return but will not expect to earn excess profits from any pricing power it has.

CRG view

The CRG recognises that the WACC as used by the ERA and other Australian regulators is a relevant default or starting point methodology for setting an allowed rate of return. However, there is a need to consider the extent to which the regulatory arrangements themselves impact on the assumptions of the WACC methodology and the implications for the WACC parameters. The CRG considers that the ERA needs to give explicit consideration to this perspective in establishing its approach to setting an allowed rate of return.

As noted, one aspect that the CRG considers needing explicit attention by the ERA relates to the extent to which the regulatory arrangements in effect guarantee revenue that is calibrated to recover allowable costs and an allowable return. The issue is the extent to which such an approach would mean a material impact on the allowed WACC relative to a situation where there was no such guarantee of revenue.

Consumers are concerned that the regulated monopoly entities will in effect be accorded a degree of regulatory protection for their assets that is not feasible for the sunk assets of major consumers and question whether this different treatment is properly recognised in the risk allowance in the regulated rate of return. Although small consumers may not have substantial sunk costs, they have the same interest as large consumers in being assured that the allowed rate of return does not compensate for risks that do not exist or over compensate for risks that are in effect ameliorated by the regulatory arrangements. It is also important to recognise that if there is over compensation for risk this would mean higher prices and be contrary to achieving economic efficiency in the use of the asset by consumers i.e. contrary to achieving allocative efficiency.

In summary, the main issue for the long term interests of consumers in general, given the NGO as defined, is in ensuring that the allowed rate of return does not entail excess profits and does not provide more compensation for risk than is necessary to ensure efficient investment occurs.

Another example is the reference in the discussion paper to 'effective incentives' and 'incentive regulation' in a few places. However, there is no discussion of aspects of incentive regulation that may affect allowances for capital and operating expenditure and the impact on risk and incentives for economic efficiency. For example, are the regulated firms provided with allowances for forecast capital and operating expenditure but allowed to retain all or part of the difference between forecast and actual outcomes?

The CRG considers that the ERA needs to make more explicit how the regulatory arrangements as a whole may impact on the rate of return parameters and the extent to which this is likely to apply for the life of major sunk assets.

The CRG understands that there is evidence that the market value of listed energy firms has exceeded the value of the regulatory asset base for listed network energy businesses and that this may indicate investors are able to receive rates of return that are higher than is required to ensure efficient investment occurs. This can be examined by reference to RAB multiples which are the market value of a network relative to the RAB for that network. The CRG suggests that the ERA should consider using RAB multiples as a cross check in the determination of an allowed rate of return for the 2022 determination.

The CRG also considers that there is a need for the ERA to provide a rationale as to why parental ownership characteristics should be precluded as this treatment could mean a higher than efficient allowed rate of return and higher than efficient prices for consumers in the long term.

In terms of allocative efficiency there is also an issue of how the structure of prices best promotes efficient use of infrastructure particularly when there is excess capacity. This is not

directly a matter for the allowed rate of return but it is relevant for achieving allocative efficiency and it would be helpful to know how it is being addressed for completeness.

1.3 DISCUSSION PAPER QUESTIONS

The ERA has posed 20 questions for comment in its discussion paper. A brief explanation of the ERA approach and CRG views in relation to the questions is provided below.

1.3.1 Term of Return Parameters

1. Do you agree with the use of a five-year term of estimates of the rate of return? If not, please explain why and your alternative approach?

ERA approach

In setting an allowed rate of return it is necessary to decide on the time horizon to which the return applies. In order to ensure the NPV=0 condition is met over the five-year regulatory period, the ERA has specified that the return time horizon should be the same as the regulatory period i.e. rates of return should relate to five years.

CRG view

The CRG agrees that the ERA approach of adopting a term for the rate of return that matches the term of the regulatory period is the most appropriate approach for achieving the national gas objective.

1.3.2 Averaging Time Frame

2. Do you agree with the standardised averaging period process? If not, please explain why and your alternative approach.

ERA approach

There are certain parameters in the allowed rate of return that need to be based on recent financial market observations. These parameters are: the risk free rate used in calculating the allowed return on equity, a base rate and debt risk premium used in calculating the return on debt; and a forecast of expected inflation. In addition, during the access arrangement process, the gas network service providers must propose averaging periods within a nomination window for determining suitable averages for the foregoing parameters.

A period of 20 days is considered appropriate as a default position for reflecting prevailing market conditions. The ERA also proposes to continue to allow gas network service providers to nominate the averaging periods, subject to the specified number of days for the averaging and timing constraints to remove the scope for favourable treatment. The averaging periods for these market rates are also to remain confidential until the period has passed and will then be disclosed in the final decision.

CRG view

The CRG supports the standardised averaging period process but suggests it would be helpful if the ERA could explain more why the approach of annual updating of the debt risk premium differs from the 5 year fixed term for the market return parameters.

1.3.3 Gearing

3. Do you support the use of a gearing level of 55 per cent for the 2022 gas instrument? If not, please explain why and your alternative approach.

ERA approach

Gearing is the share of a business's assets financed by debt, defined as the ratio of debt to the sum of debt plus equity.

The ERA determines an appropriate gearing ratio by reference to average gearing levels for a benchmark sample of listed Australian energy networks. The values of debt and equity are based on market-based estimates rather than obtained from financial statements.

The 2018 gas instrument applied a gearing level of 55 per cent, which was fixed over the period of the instrument. After reviewing recent evidence, the ERA's working view is to continue to use a gearing level of 55 per cent.

CRG view

The CRG agrees with the ERA's working view based on an understanding: that a gearing level of 55 per cent is broadly similar for regulated network energy and similar businesses; that the capital structure of network energy business is relatively stable and that there is minimal impact on the overall rate of return if gearing changes are within a plus or minus 5 percentage points or more of the benchmark.

However, the CRG understands that at least one regulated pipeline has gearing level of 70% and that this may be representative of standard financing for gas pipelines. The CRG considers that it would be useful to check the actual gearing levels of the firms the ERA regulates and determine the reasons for higher gearing, show the impact on the allowed rate of return and tariffs and consider whether higher gearing better meets the economic efficiency criteria and the long term interests of consumers. The review might also provide information that the market assesses the risk of the regulated entities differently to the ERA assessment.

1.3.4 Hybrid Securities

4. When determining gearing do you support the ERA adjusting debt and equity to recognise hybrid securities and what is a suitable method for allocating hybrid securities between debt and equity? If not, please explain why and your alternative approach.

ERA approach

A complication in selecting an appropriate average is the extent to which firms issue hybrid securities that have characteristics of both debt and equity.

The ERA's current approach to estimating gearing uses publicly available information to remove all hybrid securities that have equity characteristics from debt. The ERA is considering the treatment of new hybrid securities and has suggested two approaches: remove from the debt estimates the hybrid securities that have predominately equity characteristics; or take a simple approach of a 50/50 allocation between debt and equity.

CRG view

The CRG understands there is no simple, clear method for determining the equity and debt composition of hybrid securities. It is also not clear at this stage of the materiality of allowing for hybrid securities or using different simple methods for treating hybrid securities.

It is also noted that re-classification of all of a hybrid security as equity rather than a component of the security is an extreme position and that a 50/50 allocation would likely be a more accurate disaggregation in the absence of other information.

The CRG suggests that it would be helpful if the ERA could present some examples of the likely impacts of the two alternatives it is considering on the rate of return.

1.3.5 Hybrid Trailing Average

5. Do you support the use of a hybrid trailing average approach for the cost of debt estimation? If not, please explain why and provide details of your alternative approach, including transitionary arrangements.

ERA approach

The ERA approach to estimating the return on debt is designed to achieve various aspects of efficient financing.

The return on debt estimated by the ERA for the 2018 gas rate of return estimate is defined as follows:

(3) Return on debt = Risk free rate + Debt risk premium + Debt raising costs + Hedging costs

The first two components of the return on debt are estimated with the hybrid trailing average approach which:

- adopts the 5-year bank bill swap rate, set on a daily basis averaged over a 20-day period just prior to the regulatory period comprising a risk free rate and the margin between the risk free rate and the bank bill swap rate; and

- uses a 10-year trailing average for the debt risk premium, which is updated annually so that each year a new year's debt risk premium is estimated and included in the trailing average and the oldest estimate in the 10-year series is removed.

The bank bill swap rate is the rate at which financial institutions borrow from and lend to each other. The bank bill swap rate contains a risk free component plus a margin representing the difference between the swap rate and the risk free rate (the spread of the swap). The use of the swap rate also simplifies the calculation of the debt risk premium.

It Is assumed that the benchmark entity uses derivative instruments to lock in five-year bank bill swap rates set at the start of the regulatory period so that the NPV=0 condition can be met for the base rate component of the trailing average. The NPV=0 condition is met for the debt risk premium component because it reflects the term for which the benchmark efficient entity borrows.

The term 'hybrid' in the hybrid trailing average refers to the fact that it combines a trailing average of the debt risk premium in combination with an on-the-day measure of the bank bill swap rate measured as a 20-day average of the bank bill swap rate just prior to the regulatory period.

The hybrid trailing average recognises, that in practice, typically not all debt is refinanced on a single day while also recognising the role of current risk free interest rates in the period immediately before the regulatory decision for the particular regulatory period in providing efficient investment signals and satisfying the NPV=0 condition.

The ERA working view is to maintain the approach it adopted for its trailing average return on debt as used in its 2018 gas instrument plus a margin for administrative and hedging costs as this approach is considered to measure the efficient financing costs of the benchmark entity, is implementable, satisfies the NPV=0 condition and promotes regulatory certainty.

CRG view

The CRG agrees that the hybrid trailing average approach is the best method for estimating the risk free rate and debt risk premium components of the return on debt with respect to promoting the long term interests of consumers.

However, the CRG notes that the Australian Energy Regulator (AER) has provided recent evidence that that average term that regulated network energy businesses borrow at has been around 7.5 years rather than 10 years and this has meant a lower debt risk premium than assuming a 10 year tenor.

The CRG considers that the ERA should investigate the AER findings as well as their index of actual debt costs and its scope for use as a check on the ERA approach.

1.3.6 Benchmark Credit Rating

6 Do you support the use of a benchmark credit rating of BBB+ for the 2022 gas instrument? If not, please explain why and your alternative approach.

ERA approach

The credit rating is defined as the forward-looking opinion provided by a ratings agency of an entity's credit risk. Credit ratings are used to determine the debt risk premium in the allowed return on debt.

The 2018 gas instrument used a benchmark credit rating of BBB+ based on the median credit rating of a sample of comparator businesses with other regulators' decisions used as a cross check. The credit rating was used to determine a debt risk premium for a sample of 10 year bonds with that credit rating.

The ERA's working view is that the benchmark entity is a 'pure-play' gas network business operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in the provision of the reference services. The ERA considers that there should be no elevation of the credit rating from the benchmark sample due to parental ownership.

The ERA's working view is that the BBB+ credit rating should be maintained for the 2022 gas instrument.

CRG view

The CRG considers that there is strong support for at least a BBB+ credit rating. This is considered to be well supported by the degree of protection of profits afforded by the regulatory arrangements.

However, the CRG notes that where foreign parental ownership provided a higher credit rating, the cost of debt would likely be lower, without support of Australian taxpayers, and this would seem to be of benefit to consumers over the longer term. This raises the issue of the justification for selecting a benchmark that precludes the recognition of foreign parental ownership. There is a concern that precluding the impact of foreign ownership would in effect be contrary to recognition of efficient financing arrangements and this is likely to become more important if foreign ownership of regulated infrastructure businesses operating in Australia increases.

The CRG requests the ERA to investigate why the benchmark precludes the recognition of foreign parental ownership.

1.3.7 Revised Bond Yield Approach

7. Do you support the use of the revised bond yield approach for estimating the debt risk premium? If not, please explain why and your alternative approach.

ERA approach

The debt risk premium is the return above the risk free rate that lenders require to compensate them for the risk of providing debt funding to a benchmark business.

The revised bond yield approach constructs a sample of bonds with the same credit rating as that of the benchmark efficient entity and expressed in Australian dollar equivalent terms. The sample is specified to have a time to maturity of two years or longer and bond yields are averaged over a period of 20 trading days and yield curves estimated so that the 10 year yields can be obtained.

From this sample, the debt risk premium is estimated for each bond from its observed yields by subtracting the 10-year interest swap rate from the 10-year estimate of the cost of debt as indicated by the estimated yield curves. The ERA then uses the debt risk premium in the 10-year hybrid trailing average estimate.

CRG view

The CRG recognises the advantages of the ERA approach in obtaining direct market based estimates of bond yields. It is noted that the approach requires considerable statistical expertise to implement but that the ERA has provided helpful templates and guidelines for implementation.

However, a matter not covered in the ERA discussion paper relates to AER work on developing an Energy Infrastructure Credit Spread Index (EICSI). This index provides a rolling 12-month historical average of all new debt instruments issued by privately owned energy networks and has been refined by the AER to essentially include debt that has the purpose of financing the

regulatory asset base (RAB). The EICSI is constructed from debt issued directly by the business on the primary market for debt. It differs from the information used to construct the current AER efficient benchmark which makes use of third party yield curves and the ERA approach which used secondary market information. There may be material differences between the primary and secondary debt markets. In addition, the third party yield curves also include debt in other industries.

The primary metric, for the EICSI, is the spread over the swap rate which allows comparison of the AER benchmark return on debt against the networks' actual average cost of debt. The dataset also provides detail on the average debt term and credit rating. The AER reports that on average the EICSI, with debt weighted by tenor, so that longer term debt has more weight, has been 18 basis points lower than the AER benchmark since January 2014. The AER also notes that the average debt term has been reducing reflecting active management and a preference for a shorter term.

The issue is whether the current approaches of the AER and ERA overstate an appropriate benchmark return on debt because if this were the case than it would be in consumers' long term interests for there to be an appropriate adjustment to the benchmark. The point is that regulated energy networks may be able to outperform the benchmark on average by raising debt at a lower rate than what the AER third-party credit curve or ERA method would indicate.

If the EICSI provides a more accurate measure of the average actual cost of debt for regulated energy network businesses it would also offer a simpler approach than the current approach of determining a credit rating and risk premium because both would be embodied in the one step (although there may be a need to change the term in the trailing average measure).

The CRG would like the ERA to consider whether the EICSI could be used as cross check on its estimates to help provide assurance that the ERA estimates of the return on debt are robust and provide the best value for the long term interests of consumers.

1.3.8 Risk Free Asset

8. When estimating the return on equity do you support the use of Commonwealth Government bonds as the risk free asset? If not, please explain why and your alternative approach.

ERA approach

When applying the CAPM there is a need to estimate the risk free rate, the market risk premium and the equity beta.

The risk free rate is the rate of return an investor receives from holding an asset with a guaranteed payment stream (that is, where there is no risk of default). It is widely accepted that the best estimate of the risk free rate for Australia is the yield on Commonwealth Government Securities.

The ERA's working view for 2022 is to maintain its use of a five-year Commonwealth Government bond for the risk free rate for the return on equity and the rate at the start of the regulatory access period will be fixed for the duration of the regulatory period.

CRG view

With a five-year regulatory cycle, prices are reset every five years and the relevant return on equity is the return on equity at the start of each regulatory period. The risk free rate and expected market risk premium at the time should reflect prevailing conditions expected over the five-year time frame. Thus the observed nominal Commonwealth Government Security for a five-year security is relevant even if it is very low but provided it is positive.

The CRG notes that service providers may propose an uplift to the risk free rate based on longer term historical figures. However, such an approach would not reflect prevailing conditions for risk free assets and would therefore not be justified.

The CRG supports the ERA's working view for 2022 to maintain its use of a five-year Commonwealth Government bond for the risk free rate for the return on equity.

1.3.9 Market Risk Premium – Post-1958

9. When estimating the historical market risk premium do you support the use of sampling periods post-1958? If not, please explain why and your alternative approach.

ERA approach

The market risk premium is the expected rate of return in excess of the risk free rate that investors require to invest in a fully-diversified portfolio. The market risk is risk that cannot be diversified away by investors and affects the market as a whole. Market risk is also referred to as systematic or non-diversifiable risk.

The 2018 gas instrument applied a market risk premium of 6.0 per cent, which was fixed over the period of the instrument. The market risk premium was based on estimates of the historic market risk premium, the dividend growth model and conditioning variables. Returns to the market were measured by reference to the Australian all ordinaries accumulation index which includes capital gain and dividend components.

The historic market risk premium was calculated as annual average estimates for six overlapping averaging periods with the longest covering the period 1883-2017. A simple average of the lowest arithmetic and highest geometric averages was used to estimate the historic market risk premium.

The dividend growth model calculates the return on equity that makes forecast dividends consistent with the market valuation of the Australian share market. The dividend growth model is sensitive to the assumptions and input values used in its application in determining the return on equity, there is no clear agreement on the best form of the dividend growth model or its input assumptions and it is likely to be upwardly biased due to the sensitivity of the model to low interest rates.

The conditioning variables were: default (corporate bond) spreads over the risk free rate, the five-year interest rate swap spread, dividend yields and the ASX 200 stock market volatility index.

In arriving at an estimate of the market risk premium for the 2018 gas instrument, the ERA placed more reliance on the historic market risk premium and used the conditioning variables to determine a final point estimate.

The ERA's working view for the 2022 gas instrument is that a market risk premium of 6.0 per cent should be maintained.

The ERA is considering simplifying its existing market risk premium approach reflecting data quality concerns and the representativeness of long-dated historical returns. A long time frame reduces standard statistical errors but is more likely to contain a bias reflecting circumstances and behaviour that are no longer relevant. The ERA has also noted a number of data problems in the pre-1958 data.

CRG view

The CRG considers that it is reasonable to question the relevance of data from 1883 to 1958 given measurement issues and the likelihood of a higher risk environment in that period when financial markets and the economy and institutions were less developed. Also importantly the objective should be to obtain the best estimate of the market risk premium that is relevant at the start of the regulatory period for the regulatory period. This consideration suggests more weight should be given to recent estimates where they are considered to better inform investor expectations over the forthcoming regulatory period.

1.3.10 Market Risk Premium – Post-2000

10. When estimating the historical market premium do you support expanding the sampling periods to include a new period of 2000 to current? If not, please explain why and your alternative approach.

ERA approach

The ERA is giving further consideration to the introduction of an additional period from 2000 that reflects the introduction of the Goods and Services Tax.

CRG view

The CRG considers that it would be helpful for the ERA to provide further explanation as to why the introduction of the Goods and Services Tax in 2000 would likely have a material impact on the market risk premium.

1.3.11 Market Risk Premium – Brailsford, Handley and Maheswaran

11. When estimating the historical market premium do you support the approach to only consider the Brailsford, Handley and Maheswaran (BHM) dataset? If not, please explain why and your alternative approach.

ERA approach

The ERA's working view for the 2022 gas instrument is to simplify its method using the preferred original Brailsford, Handley and Maheswaran (BHM) data set. With a preferred approach of only using post-1958 data the other data set would in any case be redundant.

CRG view

The CRG supports the ERA approach of only considering the BHM dataset, if the post-1958 period proposal is adopted.

1.3.12 Market Risk Premium – Average of Arithmetic and Geometric Means

12. When estimating the historical market premium do you support the approach to calculate the historic market risk premium through the average of the arithmetic and geometric means? If not, please explain why and your alternative approach.

ERA approach

The expected market risk premium is currently expressed as an annualised return although the theory on which the CAPM is based does not define the period except to assume it is a one period model.

There are two averaging methods which can be used to derive an annualised return — the arithmetic and geometric average. The arithmetic average is just a simple average. The geometric average is calculated as the average of a set of products of the terms i.e. it is the nth root product of n numbers and it takes into account the effects of compounding.

The difference between the two measures can be seen by considering a simple example where there are two periods with a return of +25% in the first period and -20% in the second period. The arithmetic average would be (+25-20)/2 = 2.5%. The geometric average would be (1+25/100)x(1-20/100) – 1 = 0%.

An arithmetic average will tend to overstate returns, whereas a geometric average will tend to understate them. The upward bias for the arithmetic average arises because of the variability of returns whereas the downward bias for the geometric average arises because it is based on continuous compounding of returns.

The averaging of the two methods is meant to reduce bias. However, the nature of the bias is different for the two approaches so that simple averaging does not necessarily eliminate the biases.

The ERA's working view for the 2022 gas instrument is to retain the use of arithmetic and geometric means when calculating the historical market risk premium and continue to take the average of the lowest arithmetic and highest geometric means. However, the ERA is considering a further simplification of using a simple average of the two approaches.

CRG view

The CRG considers that the ERA needs to give consideration as to which of the two methods is more appropriate from a conceptual perspective. The issue is whether whether the continuous compounding embodied in the geometric average is more representative of investor behaviour than the effect of volatility inherent in the arithmetic average.

With a regulatory period of five years, the term of the return being specified as five years and the roll forward of the RAB each year with the five-year rate continuing to apply with the roll forward process, the CRG considers that a geometric average measured over a five year period may be more appropriate than an arithmetic average that assumes annual returns for each year are relevant.

If the averaging of arithmetic and geometric means is retained the CRG supports the proposed simple averaging process for the reasons noted by the ERA and not the current practice of taking the average of the lowest arithmetic and highest geometric means.

1.3.13 Market Risk Premium – Relationship with the Risk Free rate

13. When estimating the market risk premium do you support the current approach of estimating and considering the market risk premium and the risk free rate independently from one another? If not, please explain why and your alternative approach. Specifically, the ERA is interested in:

- **The empirical relationship (magnitude and direction) between the ex-ante market risk premium and the ex-ante risk free rate in Australia and the conceptual logic underpinning such a relationship.**
- **Whether the relationship is sufficiently stable and persistent (that is, not volatile and transitory) on an ex ante basis.**
- **Ways in which the relationship can be implemented to estimate the market risk premium in a manner suitable for regulatory purposes.**

ERA approach

Since the development of economic regulation in Australia in the late 1990s typically the risk free rate and market risk premium have been estimated independently from one another. However, there are views that there is an inverse relationship for these variables and that in periods of very low interest rates the ex-ante market risk premium is likely to be higher than for periods where interest rates have been higher. In contrast to the independence approach, the total market return method (or the Wright method) implies a one-for-one negative relationship between the market risk premium and the risk free rate.

The ERA's working view is to maintain the position adopted in the 2018 gas instrument which means that it would not make use of the Wright method.

CRG view

The CRG supports the ERA position that there is no clear, usable relationship between the risk free rate and the market risk premium.

1.3.14 Equity Beta – Expanding the Sample for Estimating Beta

14. Do you support the continued use of domestic energy networks to estimate equity beta? If not, please explain why and your alternative approach.

15. Do you support the use of a sample of domestic and international comparators to estimate equity beta? If not, please explain why and your alternative approach.

16. If an international sample is to be used for estimating equity beta, which jurisdictions and companies could be considered as part of the sample?

17. If an international sample is to be used for estimating equity beta, how should these international estimates be incorporated into the equity beta estimation method?

ERA approach

The equity beta is the amount of risk that an investor faces and the market risk premium is the price of that risk.

The product of the equity beta and the market risk premium represents the margin that needs to be added to the risk free rate to compensate investors for the non-diversifiable risk of the particular equity investment.

The equity beta depends on the type of business that the firm is in which in turn affects the sensitivity of returns to market conditions and the degree of financial leverage or gearing because *ceteris paribus* higher gearing increases the variance in equity returns.

Statistical techniques can be used to measure the equity beta which represents the risk of the particular investment relative to the market as a whole. An equity beta of 1 means the quantum of the risk of the specific investment is the same as for the market as a whole with lower (higher) risk indicated by betas less (higher) than 1.0.

The 2018 gas instrument applied an equity beta of 0.7, which was fixed over the period of the instrument. The equity beta was estimated using similar methods used by the ACCC and AER but over a much shorter period for the ERA, being five years of weekly data for a sample of four listed companies: APA Group, DUET Group, Ausnet Services and Spark Infrastructure. The four companies were chosen based on the criteria for a benchmark efficient firm.

The ERA notes that the sample of listed firms is reducing with DUET having been delisted and Spark Infrastructure and AusNet likely to be taken over and delisted in 2022. The ERA is considering expanding the sample to include international energy companies.

The ERA considers that its domestic energy sample provides a range of equity beta estimates from 0.5 to 0.6. When international comparators are examined, for the United States, Canada, United Kingdom, and New Zealand this provides a range of estimates is from 0.6 to 1.1. The average beta estimate across all countries is 0.76.

The ERA's working view for the 2022 gas instrument is to use an equity beta of 0.7, based on all the information it has considered.

The ERA has made the following key points about the sample for estimating the equity beta:

- maintaining the Australian energy sample of four firms in the near term could be justified;
- expanding the sample to include betas from other domestic infrastructure companies is not appropriate as apparently they were not considered to be sufficiently comparable;
- examining both domestic and international listed energy networks may be useful when estimating the equity beta for Australian energy networks;

- international listed energy network firms should have the following characteristics:
    - countries with similar regulatory, legal and institutional arrangements to those in Australia;
    - countries with well-developed capital markets;
    - with these criteria the United Kingdom, Canada, New Zealand and the United States are considered comparable.
- if international comparators are used the ERA proposes to:
    - use a domestic CAPM for each country rather than an international CAPM (which would be too complex);
    - include only firms where the majority of the observations are present in the estimation window;
    - adjust the equity betas in other markets to account for differences in gearing.

CRG view

Factors that affect systematic risk

Essentially the relevant sample for estimation of beta should have characteristics that mean there is likely to be similar sensitivity of returns for firms in the sample relative to the market as a whole. The sample needs to include firms with operating characteristics and economic circumstances that are likely to mean similar fundamental factors affecting systematic risk.

The CRG considers that the selection of firms operating in the same or a similar industry is an appropriate starting point for forming a benchmark sample to estimate an appropriate equity beta. However, it also considers that one particularly important fundamental factor is the extent to which regulation provides revenue and cost recovery protection relative to unregulated firms or firms where only part of their operations are regulated with similar regulatory arrangements. It also notes that with strong revenue and cost recovery protection arrangements firms in other regulated industries could provide relevant observations.

Continued use of domestic energy networks

The CRG supports restricting the sample at this stage to domestic energy networks as this sample is most relevant in terms of comparable fundamental determinants of relevant risk and it is not necessary at this stage to expand the sample although that may need to be done in the regulatory period from 2028.

However, the CRG would like the ERA to give consideration to estimating beta over a longer period as this would likely provide more statistically reliable estimates given the evidence suggesting stability of the beta estimates over longer periods and the advantages that longer term estimates have in reducing the impact of one-off events.

The CRG also considers that the ERA needs to give more recognition of the impact of regulation and the share of regulated revenues on beta estimates as there seems to be reasonable evidence the regulatory arrangements in Australia for network energy businesses provide considerable regulatory protection for revenues and profits for those businesses.

Expansion to include other domestic infrastructure firms

The CRG considers that expansion of the sample to include other domestic infrastructure firms may be appropriate because the domestic CAPM could still be used and it may be possible to select comparators where relevant fundamental factors are sufficiently similar. In particular, if the regulatory arrangements are sufficiently similar there may be scope to include other domestic infrastructure firms, although the CRG considers that it is not necessary at this stage.

Expansion to include international firms

When considering whether to include international firms in a sample for estimating beta there are two comparability issues.

- The first issue is that the foreign market portfolio itself will have a different composition to the Australian market portfolio. It is well known that the composition of the ASX includes a much larger representation of mining and banking firms and smaller representation of technology firms than for example the broad market indices in the United Kingdom and the United States. The point is that the equity betas from international comparators do not measure the systematic risk relative to the Australian market.

- The second issue is that, even if one could allow for such compositional effects, there can be a wide range of economic conditions, specific operational and structural characteristics for individual firms and importantly regulatory arrangements that affect systematic risk. Furthermore, apart from adjustments for gearing, there is no well-defined method for adjusting for such risk differences.

The CRG considers that the inclusion of international network energy companies is not appropriate at all because of material differences in economic features of international energy firms including vertical integration of generation and network services and the presence of other non-regulated activities and likely differences in the nature and extent of application of the regulatory arrangements.

There is also an inconsistency in using international beta estimates as the systematic risk as reflected in the beta for other countries is calibrated against their stock market indices with no adjustment to take account of this.

It is also not necessary at this stage and would mean a material, adverse impact on the long term interests of consumers.

1.3.15 Equity beta – Economic Shocks

18. When considering equity beta should the ERA consider shocks such as COVID-19 and takeover announcements? If so, please explain why and how these events can be accounted for.

ERA approach

The ERA's current thinking is to retain its current approach of using the latest five-year period. It makes the following points to support its position:

- An estimation window is intended to capture returns throughout the economic cycle which also includes downturns. Economic shocks are a natural part of the economic cycle and to remove these observations would be to affect the distribution of returns.

- Shocks can provide local evidence about the true systematic risk of a firm, where the revealed preference of investors is that during a market-wide shock the domestic energy sample were not as affected as the market portfolio.

- It may not be easy to identify COVID-19 related shock events given the multiple waves and interventions that occurred during 2020.

- The ERA's current approach of using robust estimators would moderate the impact of outliers, where COVID-19 could be considered to be such an outlier.

CRG view

The CRG considers that the guiding principle should be to establish the best estimates for the parameters of the CAPM that are expected to apply over the regulatory period. This then requires a judgement as to whether relatively normal conditions are likely to apply over the next regulatory period or more instability in economic conditions is expected similar to what has occurred in the COVID 19 period.

If normal conditions are considered more likely to apply then this would support excluding data periods relating to significant and sustained economic shocks. However, recognising that such shocks happen every now and then, excluding them could introduce bias and from an econometric perspective including these periods may be the best means of establishing a longer term estimate of beta. This point is consistent with using data for the longest period available as is the approach adopted by the AER.

The CRG's preliminary view is that the ERA should not exclude data corresponding to economic shocks but that it should give consideration to adopting a longer time frame so that the estimation window better captures returns through the economic cycle.

It is suggested that it would be useful to review beta estimates for the latest 10 year period and assess relative to the latest 5 year period and that it would be useful to undertake stability tests for the beta estimates.

1.3.16 Equity beta – ERA General Approach

19. Do you support the ERA's general approach and simplifications for estimating equity beta (regardless of any potential changes to the sample firms)? If not, please explain why and your alternative approach. Specifically, the ERA is interested in views on the following aspects of the method applied to estimate equity beta in this paper:

- **Use of a 5-year estimation window with weekly returns.**
- **Use of the Bloomberg total return index for individual stocks and market indices.**
- **Use of the Ordinary Least Squares estimator, with the Least Absolute Deviations method as a robust estimator.**

ERA approach

The ERA's working view for the 2022 gas instrument is to maintain a similar equity beta estimation method as for the 2018 gas instrument. Three issues to consider are: the time interval (data frequency) and length of the estimation period for estimating beta; some proposals for simplification of the data; and the statistical method for estimation. Each of these is discussed below.

The ERA's working view for the 2022 gas instrument is to retain the use of a five-year estimation window with weekly data.

The ERA is also proposing to simplify its approach by using the total return index as calculated by Bloomberg for individual stocks and the market index.

The ERA is also proposing that ordinary least squares (OLS) and the least absolute deviation (LAD) estimators are to be the statistical methods to be used for estimating equity beta. OLS is the most basic statistical technique for estimating beta but OLS estimates may be unduly affected by outliers and the LAD estimator is a standard statistical method for reducing the impact of outliers.

CRG view

Time (frequency) interval and estimation period

Beta can be estimated with daily, weekly or monthly data. For a given estimation period higher frequency data means more observations and a lower standard error for the beta estimate i.e. a narrower statistical confidence interval for the estimate. However, reducing the time interval can lead to various biases in the estimate so that the mean estimate is not reliable even though it may have a low statistical standard error.

The CRG understands that monthly data provides less scope for various sources of bias then daily or weekly data and that beta estimates with monthly data tend to be lower than beta estimates with weekly data for Australian and United States energy businesses.

The lower number of observations with monthly data can be addressed by using a longer time frame which is also helpful in obtaining estimates that are likely to be more reflective of normal conditions. Statistical stability tests could be used to check changes in beta and it is considered that given that regulators choose the mean estimate of a statistical confidence interval, removing or reducing the scope for bias is particularly important.

Bloomberg data

The CRG supports the ERA's reasons and proposals to use the Bloomberg data which will simplify the process without compromising the integrity of the estimates.

OLS and LAD estimators

The CRG understands that the LAD estimator is less sensitive to outliers than is OLS. However, it is not clear that outliers should be automatically excluded or given less weight. If the extreme observations are actually correct measurements, then removing theme may mean removing the most important observations in the sample. Conversely the outliers may be the result of unique events such that their recurrence is highly unlikely and then removing them would mean a more accurate model for prediction or parameter estimation purposes.

The CRG is concerned about the assumption that the LAD estimator is necessary and given equal weight as the OLS estimator. The CRG suggests that the ERA needs to give more consideration as to why the LAD estimator is always necessary and to be given the same weight as the OLS estimator.

1.3.17 Equity beta – Treasury Bond Implied Inflation

20. When estimating the expected rate of inflation do you support the use of Treasury bond implied inflation approach? If not, please explain why and your alternative approach.

ERA approach

To invest, debt and equity investors will require compensation for expected inflation. An estimate of the expected inflation rate is needed for: indexing the asset base over the regulatory period; determining depreciation allowances; adjustment to other nominal building block allowances; and allowing observance of real rates of change in tariffs and the real rate of return. Under the 2018 gas instrument, the ERA estimated the expected inflation rate using the Treasury bond implied approach over a term that matched the regulatory period of five years.

The Treasury bond approach recovers the expected inflation rate from Treasury bonds that specify a fixed interest rate on indexed bond and the relationship with unindexed Treasury bonds with nominal interest rates

The main alternative is to use the mid-point of Reserve Bank of Australia (RBA) inflation forecasts over the next 2 years and the mid-point of the target inflation band of 2 to 3 per cent over subsequent years or some path to achieve the 2.5 per cent mid-point by some future point in time.

However, the ERA notes there that the RBA inflation forecast is updated infrequently and may not effectively reflect changing market-based inflation expectations. In contrast the Treasury bond approach makes use of nominal and risk free rates observed in the market and is updated on close to a daily basis.

CRG view

The CRG supports the use of the Treasury bond approach to estimating expected inflation with a term matching the term of the regulatory period (consistent with achieving the expected NPV=0 condition).

Table 1 provides a more concise summary of the CRG views.

Table 1: CRG views on the regulatory framework and specific ERA questions

Issue or question	CRG reasoning	CRG position and request
The impact of the regulatory arrangements on the allowed rate of return	An important aspect that the CRG considers needs explicit attention by the ERA relates to the extent to which the regulatory arrangements in effect guarantee revenue that is calibrated to recover allowable costs and an allowable return and the extent to which this is likely to apply for the life of major assets. If the allowance for risk in the regulated rate of return represents higher compensation for risk than is appropriate from an economic efficiency perspective then this will mean higher prices for all consumers contrary to their long term interests. There is also reference in the ERA discussion paper on making use of a benchmark efficient entity to inform the WACC parameters and to compensating the regulated service provider for operating efficiently and not necessarily for its actual decisions. However, there is no discussion of aspects of incentive regulation that may affect allowances for capital and operating expenditure and impact on risk and incentives for economic efficiency. The CRG understands that there is evidence that the market value of listed energy firms has exceeded the value of the regulatory asset base for listed network energy businesses and that this may indicate investors are able to receive rates of return that are higher than is required to ensure efficient investment occurs. The definition of the benchmark efficient entity precludes the recognition of parental ownership characteristics but this treatment could mean a higher than efficient allowed rate of return and higher than efficient prices for consumers in the long term. In terms of allocative efficiency there is also an issue of how the structure of prices best promotes efficient use of infrastructure particularly when there is excess capacity.	The CRG considers that the ERA needs to make more explicit how the regulatory arrangements as a whole may impact on the rate of return parameters and the extent to which this is likely to apply for the life of major assets. The CRG suggests that the ERA should consider using RAB multiples as a cross check in the determination of an allowed rate of return for the 2022 determination. The CRG also considers that there is a need for the ERA to provide a rationale as to why parental ownership characteristics should be precluded. The structure of prices is not directly a matter for the allowed rate of return but it is relevant for achieving allocative efficiency and it would be helpful to know how it is being addressed for completeness.
Q 1. Term of return	The term of return should match the term of the regulatory period to achieve NPV=0. This ensures there is no above	Agree.

	normal commercial profit but sufficient revenue to finance efficient costs.	More intuitive explanation and examples would help in understanding.
Q 2. Averaging time frame	The CRG supports the standardised averaging period process because it is effective in representing prevailing financial conditions, while providing the opportunity for gas network service providers to best manage their financing arrangements.	Agree. It would be helpful if the ERA could explain more why the approach of annual updating of the debt risk premium differs from the 5 year fixed term for the market return parameters.
Q3. Gearing	The CRG understands that a gearing level of 55 per cent is broadly similar for benchmark businesses and there is minimal impact within about plus or minus 5 percentage points.	Agree. The CRG considers that it would be useful to check the actual gearing levels of the firms it regulates as this might provide relevant information about market assessments of risk for these firms.
Q4 Hybrid securities	There is no simple, clear method for determining the equity and debt composition of hybrid securities. It is not clear at this stage of the materiality of adjusting for hybrid securities or using different simple methods for making adjustments. It is also noted that re-classification of all of a hybrid security as equity rather than a component of the security is an extreme position and that a 50/50 allocation would likely be a more accurate disaggregation in the absence of other information.	It would be helpful if the ERA could present some examples of the likely impacts of the two alternatives it is considering on the rate of return.
Q5. Hybrid trailing average	The CRG considers that, based on current information the hybrid trailing average is the best method for estimating the risk free rate and debt risk premium components of the return on debt with respect to promoting the long term interests of consumers. However, the AER has provided evidence that that average term that regulated network energy businesses borrow at has been around 7.5 years rather than 10 years and this has meant a lower debt risk premium than assuming a 10 year tenor.	Agree subject to further information. The CRG considers that the ERA should investigate the AER findings that the average debt term is 7.5 years rather than 10 years as well as their index of actual debt costs and its scope for use as a check on the ERA approach. See Q7 as well.
Q6. Benchmark credit rating	In terms of a conclusion about the appropriate credit rating the CRG considers that there is strong support for at least a BBB+ credit rating given in particular the strong revenue and cost protection afforded by the regulatory arrangements. Where foreign parental ownership provided a higher credit rating the cost of debt would likely be lower, without support of Australian taxpayers, and this would seem to be of benefit to consumers over the longer term. This raises the issue of the justification for selecting a benchmark that precludes the recognition of foreign parental ownership.	Agree that the credit rating should be at least BBB+. The CRG requests the ERA to investigate why the benchmark precludes the recognition of foreign parental ownership.

Q7. Revised bond yield	A matter not covered in the ERA discussion paper relates to AER work on developing an Energy Infrastructure Credit Spread Index (EICSI). This index provides a rolling 12 month historical average of all new debt instruments issued by privately owned energy networks and has been refined by the AER to essentially include debt that has the purpose of financing the RAB. The EICSI is constructed from debt issued directly by the business on the primary market for debt. It differs from the information used to construct the current AER efficient benchmark which makes use of third party yield curves provided by the RBA, Bloomberg and Thompson Reuters using data from the secondary market for debt. There may be material differences between the primary and secondary debt markets and the third party yield curves also include debt in other industries. The AER reports that on average the EICSI, with debt weighted by tenor, so that longer term debt has more weight, has been 18 basis points lower than the AER benchmark since January 2014. The AER also notes that the average debt term has been reducing reflecting active management and a preference for a shorter term and has confirmed that differences in term between the EICSI and the AER benchmark accounted for most of the difference in performance. The issue is whether the current approaches of the AER and ERA overstate an appropriate benchmark return on debt because if this were the case than it would be in consumers' long term interests for there to be an adjustment to the benchmark. The point is that regulated energy networks may be able to outperform the benchmark on average by raising debt at a lower rate than what the AER third-party credit curve or ERA method would indicate. If the EICSI provided a more accurate measure of the average actual cost of debt for regulated energy network businesses it would also offer a simpler approach then the current approach of determining a credit rating and risk premium because both would be embodied in the one step (although there may be a need to change the term in the trailing average measure).	CRG suggests that although the revised bond yield approach is reasonable there needs to be further investigation of using the AER's Energy Infrastructure Credit Spread Index (EICSI). The CRG suggests the ERA should consider whether the EICSI could be used as a cross check on its estimates to help provide assurance that the ERA estimates of the return on debt are robust and provide the best value for the long term interests of consumers.
Q8. Risk free asset	The relevant return on equity is the return on equity at the start of the regulatory period and relating to the term of the regulatory period. So the risk free rate, as a component of the return on equity, should reflect prevailing conditions at the start of the regulatory period and those expected to prevail over the regulatory period. The CRG notes that service providers may propose an uplift to the risk free rate based on longer term historical figures. However, such an approach would not reflect prevailing conditions for risk free assets and would therefore not be justified.	Agree. CRG supports the ERA's working view for 2022 to maintain its use of a five year Commonwealth Government bond for the risk free rate for the return on equity.
Q9. Market risk premium – post-1958	The CRG considers that it is reasonable to question the relevance of data from 1883 to 1958 given measurement issues and the likelihood of a higher risk environment in that period when financial markets and the economy and institutions were less developed. Also importantly the objective should be to obtain the best estimate of the market risk premium that is	Agree. CRG supports the use of sampling periods post-1958. The CRG considers more weight should be given to

	relevant at the start of the regulatory period for the regulatory period. This consideration suggests more weight should be given to recent estimates where they are considered to better inform investor expectations over the forthcoming regulatory period. The CRG notes that the post-1958 data tends to mean a lower market risk premium than if data pre-1958 is used. Furthermore a lower market risk premium is evident in the period from 1980 to 2017. The CRG notes that when shorter periods are used the lower bounds of the 95 per cent statistical confidence intervals are likely to be negative but this is not considered to be necessarily a problem if average values are used and are considered to be good estimates of the forward looking market risk premium over the regulatory period.	recent estimates where they are likely to better inform investor expectations over the forthcoming regulatory period.
Q10. Market risk premium – post-2000	The CRG considers that it is relevant to consider more recent periods, although it is not clear why the introduction of the Goods and Service Tax would have a material impact by itself on the market risk premium for years subsequent to 2000. It should also be acknowledged that the averaging method implicitly weights more recent history higher since the later years are included in all data scenarios whereas earlier years are not.	It is not clear why the introduction of the Goods and Service Tax would have a material impact on the market risk premium and why it would by itself justify a separate post-2000 sample period.
Q11. Market risk premium – Brailsford, Handley and Mahesearan	The CRG supports the ERA approach of only considering the BHM dataset, if the post-1958 period proposal is adopted.	Agree.
Q11. Market risk premium – Average of arithmetic and geometric	An arithmetic average is more suitable if investors focus on annual returns and treat each expected annual return independently. Average annual returns will inherently mean more variability than geometric returns. In contrast if investors focus on historic returns over a longer period and those returns are compounded then the geometric average is more suitable. So the issue is whether whether the continuous compounding embodied in the geometric average is more representative of investor behaviour than the effect of volatility inherent in the arithmetic average. With a regulatory period of five years, the term of the return being specified as five years and the roll forward of the RAB each year with the five year rate continuing to apply with the roll forward process, the CRG considers that a geometric average measured over a five year period may be more appropriate than an arithmetic average that assumes annual returns for each year are relevant. The CRG considers that the ERA should give consideration as to whether more weight should be given to the geometric return based on whether investors are more likely to target returns over 5 years than 1 year.	The CRG considers that the ERA needs to give consideration as to which of the two methods is more appropriate from a conceptual perspective. If the averaging of arithmetic and geometric means is retained the CRG supports the simple averaging process, rather than selection of the lowest arithmetic and highest geometric means, for the reasons noted by the ERA.
Q12. Market risk premium –	The CRG supports the ERA position that there is no clear, usable relationship between the risk free rate and the market risk premium.	Agree. The CRG supports the ERA's current approach of

Relationship with the risk free rate	The CRG notes that the objective in estimating the market risk premium is to obtain the best estimate of the market risk premium that should apply over the forthcoming period and considers that an historic market risk premium with more weight given to recent years along with the application of the conditioning variables provides the most useful method for establishing an appropriate forward looking estimate. The CRG recognises that the dividend growth model is forward looking but is concerned about the sensitivity of its estimates to input assumptions and considers it should be only used to inform the direction of any change to the market risk premium.	estimating and considering the market risk premium and risk free rate independently from one another. The CRG considers that an historic market risk premium with more weight given to recent years along with the application of relevant conditioning variables provides the most appropriate approach for estimating the relevant forward looking market risk premium.
Q13 – Q17. Equity beta – expanding the sample	*Continued use of domestic energy networks* The CRG considers that the selection of firms operating in the same or a similar industry is an appropriate starting point for forming a benchmark sample to estimate an appropriate equity beta. However, it also considers that one particularly important fundamental factor is the extent to which regulation provides revenue and cost recovery protection relative to unregulated firms or firms where only part of their operations are regulated with similar regulatory arrangements. It also notes that with strong revenue and cost recovery protection arrangements firms in other regulated industries could provide relevant observations. The CRG supports restricting the sample at this stage to domestic energy networks based on the reasoning set out by the AER. To help contribute to regulatory predictability and stability the CRG considers that it is reasonable for the ERA to continue to use its benchmark sample of four firms. Although including other delisted firms would reduce statistical standard errors it is possible that the average beta estimates for some of these delisted firms could be materially different and introduce bias, particularly recognising that three of them have been delisted for approximately 15 years. However, the ERA needs to clarify what period it will use for the DUET beta estimates as it has been delisted since May 2017. The CRG requests that the ERA give consideration to estimating beta over a longer period as this would likely provide more statistically reliable estimates given the evidence suggesting stability of the beta estimates over longer periods and the advantages that longer term estimates have in reducing the impact of one-off events. The CRG also considers that the ERA needs to give more recognition of the impact of regulation on beta estimates as there seems to be reasonable evidence the regulatory arrangements in Australia for network energy businesses provide considerable regulatory protection for revenues and profits for those businesses. *Expansion to include other domestic infrastructure firms*	Agree to using the current sample of four domestic energy firms (one of which is no longer listed) subject to qualifications giving more emphasis to the impact of regulation in choosing the sample of firms for the benchmark, or making appropriate adjustments for the impact of regulation, and considering a longer time frame for estimation.

	The CRG considers that expansion of the sample to include other domestic infrastructure firms may be appropriate because the domestic CAPM could still be used and it may be possible to select comparators where relevant fundamental factors are sufficiently similar. In particular if the regulatory arrangements are sufficiently similar there may be scope to include other domestic infrastructure firms. However, there would be a need for convincing detail in any assessment of fundamental factors. Also the CRG considers that it is not necessary to expand the sample to include other domestic infrastructure firms at this stage, but there may be merit in estimating beta over a longer period given the likely stability of beta and the relevance of reducing the impact of one-off events. *Expansion to include international firms* The CRG considers that the inclusion of international network energy companies is not appropriate at all because of material differences in capital markets, the market indexes, economic features of international energy firms including vertical integration of generation and network services and the presence of other non-regulated activities and likely differences in the nature and extent of application of the regulatory arrangements. It is also not necessary at this stage. The CRG notes that the ERA recognises that most equity betas in other jurisdictions appear to be greater in magnitude than in Australia. And suggests, as previously discussed in the 2018 gas explanatory statement, it seems likely that differences in regulatory, market and operational activities are responsible for some of these differences. However it also observes that the international estimates are derived from large liquid capital markets. The CRG considers that the fact that the international beta estimates are derived in large liquid capital markets is not a sufficient reason to justify the use of these estimates for establishing a suitable Australian benchmark. The Australian capital market is also quite substantial and liquid and analysis of fundamental principles suggests the Australian regulatory environment provides strong protection of revenues and profits. There is also an inconsistency in using the international beta estimates as the systematic risk as reflected in the beta for the four other countries is calibrated against their stock market indices with no adjustment to take account of this. Importantly in the sample of firms the ERA has used from the US, Canada, the UK and New Zealand it is notable that most of the firms have involvement in electricity generation and other apparently unregulated businesses. For example, 7 out of the 8 Canadian firms are vertically integrated with energy generation, 1 of the 2 UK firms also has a generation business, the New Zealand firm Vector also provides broadband services and most of the US firms have generation or other non-regulated businesses. The CRG considers there is strong evidence that regulated services have lower betas then non-regulated services and notes that the ERA has made no adjustments to its sample to account for the existence of non-	Disagree with the ERA view that expanding the sample to include other domestic infrastructure firms is not appropriate. This depends on whether the regulatory arrangements and other fundamental factors affecting non-diversifiable risk are sufficiently similar. However, the CRG considers it is not necessary to expand the sample at this stage. Disagree given the various substantially different fundamental determinants of relevant risk.

	regulated or non-network energy services in its international sample. If the international estimates were to be formally recognised, the CRG considers the ERA would need to establish that the regulatory and economic environments in these other countries provided similar revenue and profit protection as for the Australian economic regulation of network energy businesses and would need to focus on those energy businesses where a substantial majority of the business was regulated or had similar revenue and profit protection as the Australian regulated network energy businesses. The CRG has a strong preliminary view that it is not appropriate and not necessary at this stage for the ERA to use the international sample in forming a preferred point estimate of the equity beta and notes that this would have a material, adverse impact on the long term interests of consumers.	
Q18. Equity beta – economic shocks	The CRG's preliminary view is that the ERA should not exclude data corresponding to economic shocks but that it should give consideration to adopting a longer time frame so that the estimation window better captures returns through the economic cycle. This view is based on recognising the uncertainty about the economic environment over the next regulatory period, the evidence supporting longer term beta stability and the lower standard statistical errors if a larger sample was used. It is suggested that it would be useful to review beta estimates for the latest 10 year period and assess relative to the latest 5 year period and that it would be useful to undertake stability tests for the beta estimates.	Disagree that the data period should be only the latest five year period but agree with not excluding economic shocks as the default starting point.
Q19. Equity beta – ERA general approach	*Time (frequency interval) and estimation period* The CRG understands that daily data are considered to be more likely to lead to biased estimates then weekly or monthly data but there are several key academic studies that suggest monthly data provides less scope for various sources of bias than weekly data and that beta estimates with monthly data tend to be lower than beta estimates with weekly data for Australian and United States energy businesses. However, if monthly data are used there will be a lot less observations compared with weekly data for the same estimation period – 60 versus 260. This can be addressed by using a longer time frame but then a longer time frame increases the likelihood that structural characteristics of the firm have changed during that period, potentially resulting in the beta estimate being unrepresentative of its current value. However, statistical stability tests could be used to check changes in beta and it is considered that given that regulators choose the mean estimate of a statistical confidence interval, removing or reducing the scope for bias is particularly important. *Bloomberg data* The CRG supports the ERA's reasons and proposals to use the Bloomberg data.	Disagree with the use of a five year window of weekly returns given more potential bias with weekly rather than monthly data. Agree with proposed use of Bloomberg data.

	OLS and LAD estimators The CRG is concerned about the assumption that the LAD estimator is necessary and given equal weight as the OLS estimator.	Disagree. The CRG suggests that the ERA needs to give more consideration as to why the LAD estimator is always necessary and to be given the same weight as the OLS estimator.
Q20. Treasury bond implied inflation	The CRG supports the use of the Treasury bond approach to estimating expected inflation with a term matching the term of the regulatory period (consistent with achieving the expected NPV=0 condition).	Agree.

2 INTRODUCTION

The ERA is currently in the process of producing a gas rate of return instrument as part of its responsibilities for determining regulated revenues for regulated gas transmission and distribution pipelines in Western Australia. These gas pipelines are currently: the Dampier to Bunbury Natural Gas Pipeline; the Goldfields Gas Pipeline; and the Mid-West and South-West Gas Distribution Systems. Essentially the ERA needs to establish how it proposes to set an allowed rate of return, relevant for regulating the revenues of these gas pipelines for the next five year regulatory period starting in January 2023.

The National Gas Law prescribes several consultation requirements that the ERA must fulfill to develop the 2022 gas instrument. This includes consideration and advice from a Consumer Reference Group (CRG), an Independent Panel, expert evidence and submissions of other persons invited to make a written submission.

The ERA has published a paper setting out the engagement process (ERA 2021a) and also a technical discussion paper on the 2022 gas instrument review (ERA 2021b). This submission has been prepared by the CRG in response to the ERA's technical discussion paper.

As well as addressing specific questions posed in the ERA discussion paper it explains the ERA methodology and key parameters relevant for establishing an appropriate return for the regulated entities to help improve the understanding of ERA proposals. It also explains the role of the CRG and the process for consumer engagement.

The CRG's views presented in this paper are preliminary and may change as further information is provided and assessed in the course of the review.

3 ROLE OF THE CONSUMER REFERENCE GROUP AND PROCESS FOR ENGAGEMENT

3.1 ROLE

The intent of the CRG is to provide direct and ongoing feedback to the ERA during the gas instrument review process that represents broad consumer perspectives. This is to balance what may otherwise be seen as a process in which only service providers have input to the ERA's determination. The ERA is not required to adopt any recommendations from the CRG, but rather must consider them in developing the gas instrument.

The CRG will have wide scope to engage with consumer interests in the course of the review and will be making submissions on relevant reports prepared by the ERA, the Independent Panel and other experts.

Brief biographical details of the CRG members are set out below.

Dr John Fallon – Director of Economic Insights Pty Ltd. John has 30 years of experience in economic regulation and related public policy matters and is well recognised for his expertise on rate of return matters. He has worked at the Industry Commission, Reserve Bank of Australia, OECD, Queensland Treasury and Queensland Competition Authority. Most of his regulatory work has been for regulators and policy makers. He also Chaired The Independent Panel to review the rate of return guidelines for gas pipelines for the Economic Regulation Authority of Western Australia in 2018.

Mr Graham Hansen –- Senior Policy Officer at the Western Australian Council of Social Service (WACOSS). WACOSS is the peak body for the community services sector and advocates for the interests of those in hardship. Graham is responsible for the coordination and delivery of the organisation's advocacy for residential energy and water consumers, and represents WACOSS on a range of consumer, regulatory and policy committees.

Mr Paul Keay – currently working in private consulting for energyXL, Paul has served as a representative on the Electricity Reform Task Force groups to develop the WA Wholesale Electricity Market and also formed WA Major Energy Users (WAMEU) to represent major WA energy consumers.

Ms Adrienne LaBombard – Manager of Industry Competitiveness at the Chamber of Minerals and Energy of Western Australia (CMEWA). The CMEWA is the peak resources sector representative body in Western Australia. Adrienne has oversight of CME's policy and advocacy in the areas of economics and productivity and infrastructure including energy policy, strategic industry development and supply chains..

The CRG confirms that, as the CMEWA represents the interests of both large consumer interests as well as some firms involved in the transmission and distribution of gas, all CRG members will only consult directly with CMEWA members representing consumer interests, but will respond publicly to public submissions by other CMEWA members.

3.2 ENGAGEMENT OF CONSUMER INTERESTS

The CRG has circulated a draft of this submission to various stakeholders and incorporated or addressed their comments in the submission.

The CRG is interested in hearing the views of consumer interests and options for facilitating consumer engagement in the process for making the instrument.

Submissions and papers that consumers consider the ERA should review are welcome. The CRG invites consumers to identify issues of concern and matters that they would like the CRG to explain or investigate further.

A timetable of key milestones for the review is presented at p. 5 of the ERA Discussion Paper. It is noted that the deadline for submissions on the ERA Discussion Paper has been changed from the end of January 2022 to 14 February 2022.

Please send any ideas, questions or information that is considered relevant to the CRG via the following contact points.

Response to request for submissions (we prefer to receive submissions electronically) rateofreturnCRGsubmissions@erawa.com.au

General enquiries
rateofreturnCRGinfo@erawa.com.au

4 REGULATORY FRAMEWORK

This section provides a summary of the national gas objective and how the ERA defines the rate of return and key parameters when estimating the allowed rate of return to aid in understanding of the more specific questions posed by the ERA in its discussion paper and considered in the rest of this paper.

The paper draws on the ERA Discussion Paper of December 2021, the Independent Panel Review of Economic Regulation Authority Draft Rate of Return Guidelines for 2018 and various consumer interest perspectives highlighted in the AER 2018 and current reviews of rate of return issues in setting a rate of return instrument for regulated network energy businesses.

4.1 THE NATIONAL GAS OBJECTIVE AND THE RATE OF RETURN

4.1.2 The national gas objective and economic efficiency

In setting an appropriate allowed rate of return for gas transmission and distribution service providers in Western Australia, the National Gas Law requires the ERA to have regard to the national gas objective (NGO) and various revenue and pricing principles.

The national gas objective is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers with respect to price, quality, safety, reliability and security of supply of natural gas.

The revenue and pricing principles refer to various principles to ensure the various aspects of economic efficiency (efficient investment, efficient provision of pipeline services and efficient use of the pipelines) and effective incentives to promote economic efficiency are taken into account.

The AER has prepared a recent paper on assessing the long term interests of consumers and the role of economic efficiency in relation to the national gas objective and the national electricity objective.[1] The CRG understands that the ERA may have a similar position to the AER position as set out in in the AER paper and this is consistent with regulatory and legal precedent. In particular it is understood that the legislative premise is that the **long term interests of consumers are served through the promotion of efficient investments in, and efficient operation and use of, natural gas services, with respect to the matters specified, and there is no separate consideration of long term interests of consumers.**[2] In other words the various aspects of economic efficiency are the overarching focus of considerations in determining an appropriate allowed rate of return for the regulated entities under consideration. Furthermore, as explained in the AER paper, the national electricity objective does not extend to broader social and

[1] AER (2021d).
[2] AER (2021d, p. 14).

environmental objectives[3] and consumers are consumers in general rather than a particular type or group.[4]

The three aspects of economic efficiency defined in the national gas objective have relevance for other aspects of the regulatory arrangements, for example, in determining allowable costs and incentive arrangements and the structure of prices. In terms of the rate of return, essentially the rate of return needs to be set so that it provides sufficient revenue for the regulated entity to just cover efficient costs including efficient investment costs. This is expressed in exact mathematical terms when determining allowed revenues or prices – see the discussion in 4.3 on the NPV=0 condition.

4.1.3 CRG view

The promotion of economic efficiency as defined in the national gas objective is considered by regulators, policy makers and many experts to be consistent with the long term interests of consumers. In addition, competitive benchmarks are a key part of the methodology for setting allowed rates of return for regulated infrastructure businesses reflecting the view that economic theory supports the proposition that competitive benchmarks are consistent with achieving economic efficiency.

However, sunk costs are irrelevant in competitive markets whereas substantial sunk costs are highly relevant for regulated infrastructure businesses and this raises the issue of the use of competitive benchmarks in establishing key parameters in the allowed rate of return for regulated infrastructure. This is not to say that competitive benchmarks are not appropriate but rather to understand their limitations when they are used. There is also a need to recognise that large consumers of gas also have substantial sunk costs that need to be recognised when considering their long term interests.

The CRG considers that it would be useful to give wider consideration to sunk cost issues and associated broader economic efficiency considerations including for consumers of gas. This issue is considered in more detail in the discussion below on the impact of the regulatory arrangements.

4.2 METHODOLOGY

4.2.1 Definition and assumptions

The assets of businesses are typically financed by two types of capital: debt and equity. The total expected return for a business is a weighted average of the expected returns to debt and equity and is described as the weighted average cost of capital (WACC) with the weights reflecting the shares of debt and equity in the total capital of the business.

There are various ways of defining the WACC depending on how taxes and the deductibility of interest are recognised in the cash flows of businesses and whether returns are expressed in nominal or real terms.

[3] AER (2021d, pp. 13-14).
[4] AER (2021d, p. 4).

The ERA and other regulators have typically adopted what is known as a nominal vanilla WACC. It is nominal in the sense that it embodies a component reflecting expected inflation and it is vanilla in the sense that there are no explicit tax effects in the formula. Allowances for tax are established separately in the allowed revenues specified by the regulator.

The formula for the nominal vanilla WACC for a particular business is as follows:

$$Nominal\ vanilla\ WACC = E(R_e) \times \frac{E}{V} + E(R_d) \times \frac{D}{V} \quad (1)$$

where

$E(R_e)$ is the expected nominal post-(company) tax rate of return on equity;[5]

$E(R_d)$ is the expected nominal pre-(company) tax rate of return on debt;[6]

E/V is the proportion of equity in total financing;

D/V is the proportion of debt in total financing;

V is E plus D and represents the total asset value.

To arrive at an appropriate rate of return in the form of the WACC the regulator has to decide on the various components on the right hand side of equation 1. The ERA approach is to specify parameters that reflect efficient financing costs of a benchmark entity with similar risk to the regulated entity, based on the proposition that if the WACC is based on efficient financing costs that recognise relevant risks then the allowed rate of return will promote achievement of the National Gas Objective provided other aspects of the regulatory arrangements are appropriate.

A brief explanation of the components is as follows:

The capital structure i.e. the relative proportions of equity and debt (often referred to as gearing) is derived by reference to a benchmark sample of firms with similar capital intensity and operating and risk characteristics.

The required rate of return for debt is relatively straightforward to estimate because there are observable competitive market-based costs of debt that can be used as a proxy for the "true" cost of debt to the regulated entity.

The cost of debt, E(Rd), is proxied by identifying the cost of debt for a private entity with a benchmark credit rating. It comprises a risk free rate of return, a debt risk premium reflecting the risk of the benchmark entity and relevant debt hedging and issuing costs. One point about this approach is that it will estimate the promised return on debt as observed in debt markets and as there will be some defaults the promised return on debt will exceed the expected return on debt. However, the differences for regulated network gas businesses are considered to be relatively small given the nature of the regulated assets.

In contrast to the cost of (required return on) debt there are no readily observable proxies for the expected return on equity. As a result, the expected return on equity has to be estimated with the help of models. The main model used by Australian regulators, including the ERA, to estimate the cost of equity, E(Re), is the widely accepted Sharpe-Lintner Capital Asset Pricing Model (CAPM).

[5] The post-tax return on equity is post company tax but before personal income taxes. The pre-tax return on debt is before company taxes and personal income taxes.

[6] There is a tax benefit from taking on debt as interest costs are tax deductible. This benefit is taken into account when calculating the tax cost that is allowed to be recovered by the regulated entity.

The derivation of the CAPM is based on modern portfolio theory in the field of finance which is a theory of how risk-averse investors can construct portfolios to maximise expected return based on a given level of market risk. A fundamental insight from modern portfolio theory is that a distinction can be made between diversifiable (unique) risk and non-diversifiable (systematic) risk and that by selecting an appropriate diversified portfolio of stocks investors can diversify away unique risk so that the only risk that is priced in the CAPM is non-diversifiable systematic risk which is reflected in a single 'beta' parameter as explained below. However, it is important to recognise the assumptions that are adopted in using the standard CAPM. The assumptions are noted further below.

The CAPM is a relative pricing model and measures the risk of a security or firm relative to the risk of the market portfolio as a whole. Securities whose value is more sensitive to economic fluctuations than the market portfolio are riskier and so investors require an expected return higher than the expected return to the market portfolio to hold them (and vice versa for less sensitive securities).

The standard CAPM is used by the ERA and is defined as follows:

$$E(r_e) = r_f + \beta_e\left[\left(E(r_m) - r_f\right)\right] \qquad (2)$$

where

r_f is the risk free rate;

β_e is the equity beta, which is a measure of the amount of relevant risk of the investment (as measured by the sensitivity of the return on the specific asset to the return on the market as a whole); and

$E(R_m) - r_f$ is the expected market risk premium above the risk free rate which represents compensation for investing in the market as a whole relative to a risk free return and can be interpreted as the price of relevant (non-diversifiable) risk.

Thus, the CAPM requires only three parameters to be implemented: a risk free rate; a market risk premium that reflects the risk relating to the market for investments as a whole relative to the risk free rate; and a beta parameter that reflects the sensitivity of the benchmark entity's returns relative to the return for the market as a whole.

Note that beta is the only parameter specific to the equity component of the business entity under consideration; the other two parameters, the risk-free rate and expected market risk premium, relate to the market for investments as a whole. The product of the beta parameter and market risk premium measures the value or cost of the firm specific risk that is priced in the CAPM.

The nominal risk-free rate is readily observable from the return to securities issued by riskless entities (e.g., government bonds).

The main challenges in applying the CAPM derive from estimating the expected market risk premium and estimating beta for the specific entity.

The expected market risk premium must be inferred from historical data or estimated by forecasting expected dividends and capital gains. There tend to be a lot of different views about an appropriate estimate for the market risk premium.

The practical difficulties in estimating beta and the expected market risk premium include: (a) whether the past is a reliable guide to present expectations of the future; (b) data quality relating to, for example, accuracy, coverage of assets, representativeness, and survivor bias; (c) when estimating the market risk premium using historical data, whether one should use the geometric mean or arithmetic mean; and (d) how various aspects of the regulatory arrangements beyond just a consideration of WACC parameters may affect those parameters. These issues are discussed further in Section 4 of this paper.

It is important to be aware of the assumptions on which the CAPM is based, to help understand how to interpret the beta parameter. This is particularly the case where the existence and form of economic regulation may affect the applicability of certain assumptions or the nature and extent of risk reflected in the beta parameter.

The assumptions fall into two categories: structural assumptions and behavioural assumptions.[7]

The market structure assumptions effectively amount to assumptions that the investment market is perfectly efficient, there are no taxes that differentiate between securities or investors, and all investors have the same one period investment horizon and identical views about expected returns and the variability of returns. Note that the time frame for the investment horizon is defined as being for one period but the period is not defined.

The behavioural assumptions for the CAPM are:

(1) Investors are risk averse and choose investments that will have the highest possible expected return for a given risk level or the lowest possible risk for a given return level.

(2) Investors make their decisions based solely on consideration of the expected mean return and variance of returns. The variance of returns is the measure of risk. This assumption implies either: that returns are symmetric (so that good outcomes perfectly offset bad outcomes) or that investors do not care about asymmetry in the expected distribution of returns or other characteristics of the probability distribution of returns (for example they do not care if the expected distribution of returns is skewed).

4.1.3 Benchmark efficient entity

In specifying the parameters of the WACC, the ERA makes use of the concept of a benchmark efficient entity. *The ERA defines the benchmark efficient entity as a pure-play network service provider operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in respect of the provision of gas network services*. The term 'pure play' refers to the benchmark being involved in the provision of substantially similar services as the regulated entity. The term 'without parental ownership' refers to removing the influence of 'parental ownership' that may affect risk and that is not a characteristic for many other firms forming the benchmark.

[7] See Patterson 1995, pp. 31-36.

4.1.4 Impact of regulatory arrangements

The determination of the allowed rate of return is one key feature of the regulatory arrangements but the form of those arrangements in terms of allowances for capital and operating expenditure and depreciation and whether or not a revenue cap or a strict price cap applies are likely to impact on risk and the parameters allowed for in the WACC.

Issues for consideration are the extent to which the circumstances facing regulated firms, including the regulatory arrangements, may impact on the assumptions and how different aspects of the regulatory arrangements may address concerns about the assumptions and impact on the choice of appropriate parameters in the methodology for determining the rate of return.

A particular issue of concern to large consumers is the extent to which the regulatory arrangements provide a degree of profit protection to the regulated entities that is not feasible for large consumers with substantial sunk costs.

The main issue for the long term interests of consumers in general, given the NGO as defined, is in ensuring that the allowed rate of return does not entail excess profits and does not provide more compensation for risk than is necessary to ensure efficient investment occurs.

4.1.5 CRG view

The CRG recognises that the nominal vanilla WACC as used by the ERA and other Australian regulators is a relevant default or starting point methodology for setting an allowed rate of return. However, there is a need to consider the extent to which the regulatory arrangements themselves impact on the assumptions of the WACC methodology and the implications for the WACC parameters. The CRG considers that the ERA needs to give explicit consideration to this perspective in establishing its approach to setting an allowed rate of return.

Some of the competitive benchmark and market structure assumptions for the WACC and the CAPM are unlikely to be met exactly in actual markets but the key consideration is whether markets come sufficiently close to approximating these assumptions to validate use of the model in practice.

An important aspect that the CRG considers needing explicit attention by the ERA relates to the extent to which the regulatory arrangements in effect guarantee revenue that is calibrated to recover allowable costs and an allowable return. The issue is the extent to which such an approach would mean a material impact on the allowed WACC relative to a situation where there was no such guarantee of revenue. It is understood that currently a revenue cap applies for the regulated gas pipeline businesses so the issue is highly relevant. This aspect is not addressed in the ERA's discussion paper on the rate of return instrument.

To elaborate, an important matter that affects the regulated entities and consumers is uncertainty about natural gas demand and how this may be addressed in the regulatory arrangements including for the period of recovery of sunk costs. The CRG recognises the overarching status and importance of the national gas objective and reference to economic efficiency and the long term interests of consumers. However, it is concerned that, the regulated monopoly entities will in effect be accorded a degree of continuing regulatory protection for their assets that is not feasible for the sunk assets of major consumers and that

such treatment will not be appropriately recognised in the allowance for risk in the regulated rate of return.

If the allowance for risk in the regulated rate of return represents higher compensation for risk than is appropriate from an economic efficiency perspective then this will mean higher prices for all consumers contrary to their long term interests. Although small consumers may not have substantial sunk costs they have the same interest as large consumers in being assured that the allowed rate of return does not compensate for risks that do not exist or over compensate for risks that are in effect ameliorated by the regulatory arrangements. It is also important to recognise that if there is over compensation for risk this would mean higher prices and be contrary to achieving economic efficiency in the use of the asset by consumers i.e. contrary to achieving allocative efficiency.

To sum up, if the allowance for risk in the regulated rate of return represents higher compensation for risk then is appropriate from an economic efficiency perspective then this will mean higher prices for all consumers contrary to their long term interests.

Another example is the reference in the discussion paper to 'effective incentives' and 'incentive regulation' in a few places. There is reference in the ERA discussion paper on making use of a benchmark efficient entity to inform the WACC parameters and to compensating the regulated service provider for operating efficiently and not necessarily for its actual decisions. However, there is no discussion of aspects of incentive regulation that may affect allowances for capital and operating expenditure and the impact on risk and incentives for economic efficiency. For example, are the regulated firms provided with allowances for forecast capital and operating expenditure but allowed to retain all or part of the difference between forecast and actual outcomes?

The CRG considers that the ERA needs to make more explicit how the regulatory arrangements as a whole may impact on the rate of return parameters and the extent to which this is likely to apply for the life of major sunk assets.

The CRG understands that there is evidence that the market value of listed energy firms has exceeded the value of the regulatory asset base for listed network energy businesses and that this may indicate investors are able to receive rates of return that are higher than is required to ensure efficient investment occurs. This can be examined by reference to RAB multiples which are the market value of a network relative to the RAB for that network. The CRG suggests that the ERA should consider using RAB multiples as a cross check in the determination of an allowed rate of return for the 2022 determination.

The CRG also considers that there is a need for the ERA to provide a rationale as to why parental ownership characteristics should be precluded as parental ownership could mean a lower expected rate of return by shareholders and lower prices for consumers in the longer term.

In terms of allocative efficiency there is also an issue of how the structure of prices best promotes efficient use of infrastructure particularly when there is excess capacity. This is not directly a matter for the allowed rate of return but it is relevant for achieving allocative efficiency and it would be helpful to know how it is being addressed for completeness.

4.3 THE NPV=0 CONDITION

Once an appropriate allowed rate of return in the form of the nominal vanilla WACC is determined, the regulator sets prices or revenues such that the expected present value of revenues over the regulatory period just equals the expected present value of costs. This is known as the NPV=0 condition. The term present value simply refers to the conversion of a stream of values over time to a single present value at a point in time. The NPV=0 condition is relevant in considering aspects of the allowed rate of return as well as other aspects of the form of regulation that is adopted. This condition is noted here because it is relevant in deciding on certain features of the allowed rate of return.

5 ERA DISCUSSION PAPER QUESTIONS

This section provides the CRG's initial responses to the 20 questions set out in the ERA Discussion Paper. For each question a brief explanation of the ERA approach is provided followed by the CRG's initial views on the ERA proposals and questions.

5.1 TERM OF RETURN PARAMETERS

1. Do you agree with the use of a five-year term of estimates of the rate of return? If not, please explain why and your alternative approach?

5.1.1 ERA approach

In setting an allowed rate of return it is necessary to decide on the time horizon to which the return applies. This is because the expected rate of return is dependent on the time horizon. The 2018 gas instrument required that the term of the estimates for the rate of return would be, as far as possible, consistent with the term of the regulatory period which is five years for ERA's gas pipeline decisions.

This approach is based on ensuring that the NPV=0 principle is achieved in each regulatory period i.e. that prices are set for the forthcoming regulatory period consistent with expected revenues in present value terms being just equal to expected costs in present value terms. As noted, this is a widespread standard principle applied in economic regulation for helping to ensure that prices are economically efficient in terms of providing expected profits just sufficient to ensure investment efficiently meets the needs of consumers.

In application, the depreciated asset base is rolled forward each year reflecting deprecation that is recovered in the previous year and the approach extends over regulatory periods with appropriate updating of parameters. In subsequent regulatory periods the firm would be allowed to reset prices with the same methodology but with updated depreciated asset values, depreciation and a revised allowed expected rate of return base on the new forthcoming regulatory period. With this approach the NPV=0 condition is achieved for each regulatory period and the asset base continues to be rolled forward consistent with that principle. Prices in the next regulatory period are set in the future so that the expected revenue over that regulatory period ensure the present value of revenue and the residual asset base at the end of the period just equal the starting value of the regulatory asset base.

The mathematical proof that it is necessary to adopt a return term that matches the regulatory period of five years is provided in a paper prepared by Lally (2021) for the AER.

In the past and in some other jurisdictions, including the AER treatment, the term for certain rate of return parameters was based on a longer term horizon of typically 10 years based on the proposition that such a time horizon was more appropriate for investors given the expected life of the regulated assets. However, gradually there has been more recognition by regulators of the relevance of the accepting the term of the regulatory period as most appropriate in satisfying the NPV=0 condition.

5.1.2 CRG view

The CRG agrees that ERA approach of adopting a term for the rate of return that matches the term of the regulatory period is currently the most appropriate approach for achieving the national gas objective of promoting efficient investment in natural gas services for the long term interests of consumers of natural gas. As well as ensuring efficient investment incentives, including the avoidance of above commercially normal expected profits, it is noted that the alternative of a longer term horizon would typically mean higher expected profits and higher prices because longer term expected rates of return are typically larger than shorter term expected rates of return.

But even where this is not the case the regulatory term is still considered most appropriate because it means the NPV=0 condition will be satisfied.

The CRG suggests that the ERA provide more intuitive explanation and examples of why the term of the regulatory period is preferred in selecting a term for the allowed rate of return.

5.2 AVERAGING TIME FRAME

2. Do you agree with the standardised averaging period process? If not, please explain why and your alternative approach.

5.2.1 ERA approach

There are certain parameters in the allowed rate of return that need to be based on recent financial market observations. Assuming financial markets are reasonably efficient it is considered appropriate to use recent observations of certain parameters for the allowed rate of return.

These parameters are: the risk free rate used in calculating the allowed return on equity, a base rate and debt risk premium used in calculating the return on debt; and a forecast of expected inflation. In addition, during the access arrangement process, the gas network service providers must propose averaging periods within a nomination window for determining suitable averages for the foregoing parameters.

It is our understanding that the ERA considers that averaging over 20 days effectively provides estimates for these parameters that reflect prevailing rates that remove volatility that may be associated with a shorter averaging period. A period of 20 days is considered appropriate as a default position but the ERA is considering periods of up to 40 days to help mitigate the effects of market volatility.

The ERA also proposes to continue to allow gas network service providers to nominate the averaging periods, subject to the specified number of days for the averaging. In addition: averaging periods are to be nominated before any of the dates in the averaging period have occurred; are to be nominated within 30 business days following the release of an access arrangement draft decision; and between two and six months prior to the start for the regulatory period. The averaging periods for these market rates are also to remain confidential until the period has passed and will then be disclosed in the final decision.

The ERA considers this approach provides robust (unbiased) prevailing estimates for these market rates while providing the opportunity for the gas network service providers to best manage their financing arrangements without adversely affecting their ability to obtain finance.

The averaging approach for the risk free rate, base rate for debt and expected inflation are fixed for the whole of the regulatory period while the debt risk premium is updated annually through a tariff variation mechanism. The ERA is also proposing an additional month for finalising the debt risk premium estimations for the relevant regulatory year.

5.2.2 CRG view

The CRG supports the standardised averaging period process but has a number of observations.

In setting parameters for the allowed rate of return the focus should be on obtaining the best estimates for the forthcoming regulatory period.

It is understood that typically longer averaging periods e.g. 40 days typically do not make a material difference and a shorter period relates more closely to current conditions. The requirement to nominate the averaging period in advance is considered relevant for ensuring regulated business do not in effect 'cherry pick' the best outcome.

The ERA discussion paper does not explain why the approach of annual updating of the debt risk premium differs from the 5 year fixed term for the market return parameters, although it is understood to be related to the acceptance of a trailing average approach for estimating the cost of debt. It would be helpful if this link was made clearer.

The proposal to allow for an additional month for finalising the debt risk premium estimations for the relevant regulatory year is considered reasonable.

5.3 GEARING

3. Do you support the use of a gearing level of 55 per cent for the 2022 gas instrument? If not, please explain why and your alternative approach.

5.3.1 ERA approach

Gearing is the proportion of a business's assets financed by debt, defined as the ratio of debt to the sum of debt plus equity. The ERA uses the gearing ratio to weight the costs of debt and equity when the regulated WACC is determined. It is also used: to convert asset betas (which are not affected by gearing) to equity betas and vice-versa; as a factor in determining an appropriate credit rating which affects the cost of debt; and in determining allowed interest and tax expenses.

The ERA determines an appropriate gearing ratio by reference to average gearing levels for a benchmark sample of listed Australian energy networks. The values of debt and equity are based on market-based estimates rather than obtained from financial statements.

The 2018 gas instrument applied a gearing level of 55 per cent, which was fixed over the period of the instrument. After reviewing recent evidence, the ERA's working view is to continue to use a gearing level of 55 per cent.

5.3.2 CRG view

The CRG understands that a gearing level of 55 per cent is broadly similar for regulated network energy and similar businesses and that the capital structure of network energy business is relatively stable. It is also understood that there is minimal impact on the overall rate of return if gearing changes are within a plus or minus 5 percentage points of the benchmark.

The CRG also notes that the benchmark sample of listed Australian energy networks contains many regulated entities which raises the issue of the extent to which the benchmark reflects a competitive market-based outcome. However, the gearing is in effect determined in an effectively competitive financial market and in that sense can be treated as competitively based.

The ERA recognises that actual gearing of the regulated businesses may differ from the benchmark but consistent with the principles of incentive regulation this is not precluded.

Although the CRG recognises the value in using a benchmark to set the gearing and for providing incentives for firms to differ from the benchmark based on financial efficiencies, a difference could also arise because the market's assessment of risk characteristics could differ from the ERA assessment and this might mean a higher level of gearing and potentially a lower overall rate of return. This would arise to the extent that the cost of debt, including recognition of the tax deductibility of debt interest, is less than the cost of equity and the entity has lower risk then assumed in specifying the gearing and credit rating benchmarks.

In this respect, the CRG understands that at least one regulated pipeline has a gearing level of 70% and that this may be representative of standard financing for gas pipelines. The CRG considers that it would be useful to check the actual gearing levels of the firms the ERA regulates and determine the reasons for any higher gearing, show the impact on the allowed rate of return and tariffs and consider whether higher gearing better meets the economic efficiency criteria and the long term interests of consumers. The review might also provide information that the market assesses the risk of the regulated entities differently to the ERA assessment.

5.4 HYBRID SECURITIES

4. When determining gearing do you support the ERA adjusting debt and equity to recognise hybrid securities and what is a suitable method for allocating hybrid securities between debt and equity? If not, please explain why and your alternative approach.

5.4.1 ERA approach

A complication in selecting an appropriate average is the extent to which firms issue hybrid securities that have characteristics of both debt and equity. The current AER review is considering the treatment of hybrid securities when estimating gearing and the allocation for debt and equity.

The ERA's current approach to estimating gearing uses publicly available information to remove all hybrid securities that have equity characteristics from debt. The ERA is considering the treatment of new hybrid securities and has suggested two approaches: remove from the debt

estimates the hybrid securities that have predominately equity characteristics; or take a simple approach of a 50/50 allocation between debt and equity.

5.4.2 CRG view

The CRG understands that the hybrid securities have a wide range of terms and conditions and there has been an increase in hybrid securities but there is no simple, clear method for determining the equity and debt composition of hybrid securities. It is also not clear at this stage of the materiality of allowing for hybrid securities or using different simple methods for treating hybrid securities.

This is a technical matter that needs further consideration and it would be helpful to monitor the AER approach on this. However, it is noted that the more hybrids are classified as equity, if this is what occurs with the procedure, then the higher will be the allowed rate of return, reflecting the impact of lower gearing, although the impact is likely to be moderated by the impact of lower gearing on the equity beta. It is also noted that re-classification of all of a hybrid security as equity rather than a component of the security is an extreme position and that a 50/50 allocation would likely be a more accurate disaggregation in the absence of other information.

It would be helpful if the ERA could present some examples of the likely impacts of the two alternatives it is considering on gearing and the rate of return.

5.5 HYBRID TRAILING AVERAGE

5. Do you support the use of a hybrid trailing average approach for the cost of debt estimation? If not, please explain why and provide details of your alternative approach, including transitionary arrangements.

5.5.1 ERA approach

The ERA approach to estimating the return on debt is designed to achieve various aspects of efficient financing.

The return on debt estimated by the ERA for the 2018 gas rate of return estimate is defined as follows:

(3) Return on debt = Risk free rate + Debt risk premium + Debt raising costs + Hedging costs

The first two components of the return on debt are estimated with the hybrid trailing average approach which:

- adopts the 5-year bank bill swap rate, set on a daily basis averaged over a 20-day period just prior to the regulatory period comprising a risk free rate and the margin between the risk free rate and the bank bill swap rate; and

- uses a 10-year trailing average for the debt risk premium, which is updated annually so that each year a new year's debt risk premium is estimated and included in the trailing average and the oldest estimate in the 10-year series is removed.

The bank bill swap rate in effect represents the rate at which an investor is indifferent between receiving a fixed and a floating rate of return. It is a widely used reference rate or benchmark for floating rate debt instruments. It is the rate at which financial institutions borrow from and lend to each other. The bank bill swap rate contains a risk free component plus a margin representing the difference between the swap rate and the risk free rate (the spread of the swap). The debt risk premium then represents the difference between the yield on the relevant debt instrument and the swap rate. The rationale for using a swap rate, rather than an explicit risk free rate, is that it is difficult to hedge government bonds which provide a direct estimate of the risk free rate. This means that regulated firms can be exposed if the risk free rate does not correlate with the swap rate. The use of the swap rate also simplifies the calculation of the debt risk premium.

It is assumed that the benchmark entity uses derivative instruments to lock in five year bank bill swap rates set at the start of the regulatory period so that the NPV=0 condition can be met for the base rate component of the trailing average. The NPV=0 condition is met for the debt risk premium component because it reflects the term for which the benchmark efficient entity borrows.

The term 'hybrid' in the hybrid trailing average refers to the fact that it combines a trailing average of the debt risk premium in combination with an on-the-day measure of the bank bill swap rate measured as a 20-day average of the bank bill swap rate just prior to the regulatory period.

Prior to the adoption of the hybrid trailing average, regulators in Australia used an on-the-day approach which assumed that all debt was refinanced on a single day (measured over a 20-40 day averaging period). However, subsequently it was recognised that the approach entailed unnecessary refinancing risk as well as a mis-match relative to the interest rates underpinning allowed prices and revenue and that in practice firms tended to adopt debt portfolios with components having different terms.

Another alternative to the hybrid trailing average is a full trailing average which differs from the hybrid trailing average by not including an on-the-day component for the base rate component of the trailing average. The full trailing average would only satisfy the NPV=0 condition in some cases.

The hybrid trailing average recognises, that in practice, typically not all debt is refinanced on a single day while also recognising the role of current risk free interest rates in the period immediately before the regulatory decision for the particular regulatory period in providing efficient investment signals and satisfying the NPV=0 condition.

Debt raising and hedging costs are the administrative costs and other charges incurred by businesses in raising and hedging finance.

The ERA's working view is to maintain the approach it adopted for its trailing average return on debt as used in its 2018 gas instrument plus a margin for administrative and hedging costs as this approach is considered to measure the efficient financing costs of the benchmark entity, is implementable, satisfies the NPV=0 condition and promotes regulatory certainty.

Although there is not a specific question about the risk free component of the cost of debt it is noted that the five-year bank bill swap rate comprises a risk free rate as reflected in Commonwealth bonds and a margin to arrive at slightly higher risk for the bank bill swap rate. The bank bill swap rate is referred to as the base rate in the return on debt calculation. The ERA's working view is to continue to use the five-year bank bill swap rate for determining the base rate in the return on debt calculation. This reflects the interpretation that: the proposed swap rate provides a strong means to hedge and manage risk; is simple to calculate; and provides a close match between the allowed cost of debt and the actual cost of debt incurred by the regulated firms.

5.5.2 CRG view

The CRG recognises that considerable effort and experience underlying the development of the hybrid trailing average approach and considers that, based on current information, it is the best method for estimating the risk free rate and debt risk premium components of the return on debt with respect to promoting the long term interests of consumers.

The CRG agrees with the ERA proposition that the proposed form of the swap rate provides a reasonable estimate of an efficient rate of return for the benefit of the long-term interests of consumers.

However, the AER has provided evidence that that average term that regulated network energy businesses borrow at has been around 7.5 years rather than 10 years and this has meant a lower debt risk premium than assuming a 10 year tenor.[8]

This is discussed more in section 5.7 on the ERA's revised bond yield approach. The CRG considers that the ERA should investigate the AER findings as well as their index of actual debt costs and its scope for use as a check on the ERA approach.

5.6 BENCHMARK CREDIT RATING

6 Do you support the use of a benchmark credit rating of BBB+ for the 2022 gas instrument? If not, please explain why and your alternative approach.

5.6.1 ERA approach

The credit rating is defined as the forward-looking opinion provided by a ratings agency of an entity's credit risk. Credit ratings are used to determine the debt risk premium in the allowed return on debt. Firms with the same credit rating are considered to have similar levels of default risk for their debt. Lower credit ratings are associated with higher debt risk premiums. For this measure of risk, there is no need to rely on a sample of listed benchmark firms since the measure of risk is defined based on the credit rating.

The 2018 gas instrument used a benchmark credit rating of BBB+ based on the median credit rating of a sample of comparator businesses with other regulators' decisions used as a cross check. The credit rating was used to determine a debt risk premium for a sample of 10 year bonds with that credit rating.

[8] AER 2021c, pp. 2-13-2-14.

The use of a median is preferable to an average because it is relatively robust to the presence of outliers in the sample. The ERA's sample was confined to Australian electricity or gas network service providers with credit ratings published by Standard & Poors or Moodys. The S&P credit rating categories were used.

Results were presented with and without government ownership and parent control. The sample with government ownership and parent control produced an average of BBB+ for four out of five years for the period 2013 to 2017. The sample without government ownership and parent control produced an average of BBB for each of the five years. It was noted that credit ratings had been improving and most regulatory credit ratings supported a BBB+ credit rating, including AER decisions that were upheld in an appeal process before the Australian Competition Tribunal.

The ERA's working view is that the benchmark entity is a 'pure-play' gas network business operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in the provision of the reference services. The ERA considers that there should be no elevation of the credit rating from the benchmark sample due to parental ownership.

The ERA's working view is that the BBB+ credit rating should be maintained for the 2022 gas instrument.

5.6.2 CRG view

The reference to without parental ownership is understood to be included to ensure that parental ownership does not affect risk and the compensation for risk in determining relevant rate of return parameters. It may well be that the term 'parental ownership' was originally specified to ensure that the credit ratings for Australian government owned entities were not included because government implicit backing would not be available for regulated private entities. This reasoning is considered correct for Australian government owned entities if one takes a local taxpayer perspective because the implicit government support is in effect backed by the local tax system. However, where foreign parental ownership provided a higher credit rating, the cost of debt would likely be lower, without support of Australian taxpayers, and this would seem to be of benefit to consumers over the longer term. This point may be moot if there is little material difference in the sample estimates. However, there is a concern that precluding the impact of foreign ownership would in effect be contrary to recognition of efficient financing arrangements and this is likely to become more important if foreign ownership of regulated infrastructure businesses operating in Australia increases. The CRG would like to see the ERA undertake more investigation of this perspective.

In terms of a conclusion about the appropriate credit rating the CRG considers that there is strong support for at least a BBB+ credit rating and notes that for the 2018 instrument the Independent Panel report considered that other aspects of the regulatory arrangements including application of a building blocks model at five year intervals, the assurance that model provides for cost recovery and the revenue cap form of regulation provide sufficient information to support the conclusion of at least a BBB+ credit rating for the Western Australia regulated gas network businesses.[9]

[9] Independent Panel Review (2018, p. 39).

5.7 REVISED BOND YIELD APPROACH

7. Do you support the use of the revised bond yield approach for estimating the debt risk premium? If not, please explain why and your alternative approach.

5.7.1 ERA approach

The debt risk premium is the return above the risk free rate that lenders require to compensate them for the risk of providing debt funding to a benchmark business.

The ERA has applied a bond yield approach to estimate the debt risk premium in its regulatory decisions since 2010. It is described as the revised bond yield approach reflecting revisions to its approach to include statistical estimation of a yield curve and the inclusion of international bonds with Australia as their country of risk converted to Australian dollar equivalents.[10]

The bond yield approach constructs a sample of bonds with the same credit rating as that of the benchmark efficient entity and expressed in Australian dollar equivalent terms. The sample is specified to have a time to maturity of two years or longer and bond yields are averaged over a period of 20 trading days and yield curves estimated so that the 10 year yields can be obtained.

From this sample, the debt risk premium is estimated for each bond from its observed yields by subtracting the 10 interest swap rate from the 10-year estimate of the cost of debt as indicated by the estimated yield curves. The ERA then uses the debt risk premium in the 10 year hybrid trailing average estimate.

It is worth noting how the ERA approach compares with the AER and other approaches for estimating the debt risk premium. The AER currently estimates the return on debt by reference to third party data from the RBA and Bloomberg. In its 2018 Explanatory Statement the ERA noted that Ofgem in the United Kingdom estimated the cost of debt directly form a sample of corporate bonds without separately identifying the risk free rate or debt risk premium.[11] IPART and ESCOSA have also used the RBA bond yield curve while the QCA has used an econometric approach to directly estimate the debt risk premium. The NZCC has also used a similar approach to the ERA.[12]

The ERA approach is market based including recognition of foreign sourced financing, is transparent because it publishes the sample of bonds, provides flexibility in choosing the exact credit rating and provides advanced and transparent statistical estimates of the yield curves in order to obtain the 10 year estimates. In contrast the current AER approach relies on third party estimates, only produces estimates of the cost of debt for BBB and broad A bands and not the BBB+ benchmark and only produces monthly data. The AER is undertaking development work on an alternative approach as described in the following sub-section.

[10] ERA (2018, p. 116).
[11] ERA (2018, p. 120).
[12] ERA (2018, p. 122).

5.7.2 CRG view

The CRG recognises the advantages of the ERA approach relative to the AER's current approach. It is noted that the approach requires considerable statistical expertise to implement but that the ERA has provided helpful templates and guidelines for implementation.[13]

However, a matter not covered in the ERA discussion paper relates to AER work on developing an Energy Infrastructure Credit Spread Index (EICSI). This index provides a rolling 12 month historical average of all new debt instruments issued by privately owned energy networks and has been refined by the AER to essentially include debt that has the purpose of financing the RAB. The EICSI is constructed from debt issued directly by the business on the primary market for debt. It differs from the information used to construct the current AER efficient benchmark which makes use of third party yield curves provided by the RBA, Bloomberg and Thompson Reuters using data from the secondary market for debt. There may be material differences between the primary and secondary debt markets and the third party yield curves also include debt in other industries.

The primary metric, for the EICSI, is the spread over the swap rate which allows comparison of the AER benchmark return on debt against the networks' actual average cost of debt. The dataset also provides detail on the average debt term and credit rating. The AER reports that on average the EICSI, with debt weighted by tenor, so that longer term debt has more weight,[14] has been 18 basis points lower than the AER benchmark since January 2014.[15] The AER also notes that the average debt term has been reducing reflecting active management and a preference for a shorter term.

The issue is whether the current approaches of the AER and ERA overstate an appropriate benchmark return on debt because if this were the case than it would be in consumers' long term interests for there to be an appropriate adjustment to the benchmark. The point is that regulated energy networks may be able to outperform the benchmark on average by raising debt at a lower rate than what the AER third-party credit curve or ERA method would indicate.

If the EICSI provides a more accurate measure of the average actual cost of debt for regulated energy network businesses it would also offer a simpler approach than the current approach of determining a credit rating and risk premium because both would be embodied in the one step (although there may be a need to change the term in the trailing average measure).

The AER investigated the outperformance of the EICSI relative to the benchmark estimates by decomposing the outperformance into the following components: term of the estimates; rating; and residual. The AER found that differences in term between the EICSI and the AER benchmark accounted for most of the difference in performance, although there was some residual outperformance.[16] The AER noted that there has been a decline from an average term at issuance of 10 years in April 2019 to around 7.5 years in mid-2021.[17] However, changing the term would have significant practical implications with respect to implementing the trailing average concept which assumes a 10 year trailing average. For completeness note that although

[13] Independent Panel Review (2018, p. 42).
[14] AER (2021a, p. 74).
[15] AER (2021a, p. 69).
[16] AER (2021a, pp. 71-86).
[17] AER (2021a, p. 78).

the AER analysis identified that there may be some residual outperformance it appeared to only exist when credit spreads from the third party debt series were above a certain level.

The AER advised that it would not make any adjustments to its benchmark at this stage but would continue to consult in relation to the need to make any adjustments to the efficient benchmark for the 2022 instrument.[18]

The CRG would like the ERA to consider whether the EICSI could be used as cross check on its estimates to help provide assurance that the ERA estimates of the return on debt are robust and provide the best value for the long term interests of consumers.

5.8 RISK FREE ASSET

8. When estimating the return on equity do you support the use of Commonwealth Government bonds as the risk free asset? If not, please explain why and your alternative approach.

5.8.1 ERA approach

As noted in Section 3.2, when applying the CAPM there is a need to estimate the risk free rate, the market risk premium and the equity beta.

The risk free rate is the rate of return an investor receives from holding an asset with a guaranteed payment stream (that is, where there is no risk of default). As the WACC and its components are defined in nominal terms and five-year terms are to be used, where relevant, it is necessary to use a five-year nominal risk free rate. It is widely accepted that the best estimate of the risk free rate for Australia is the yield on Commonwealth Government Securities.

The ERA has noted that recent five-year Commonwealth Government Securities yields have been relatively low albeit with some uptick since mid-2021 and there is considerable uncertainty about expected inflation and risk free interest rates in relation to the period for which the 2022 gas instrument will be in effect.

The ERA's working view for 2022 is to maintain its use of a five-year Commonwealth Government bond for the risk free rate for the return on equity and the rate at the start of the regulatory access period will be fixed for the duration of the regulatory period.

5.8.2 CRG view

With a five-year regulatory cycle, prices are reset every five years and the relevant return on equity is the return on equity at the start of each regulatory period. With the nominal CAPM the risk free rate and expected market risk premium at the time should reflect prevailing conditions expected over the five-year time frame. Thus the observed nominal Commonwealth Government Security for a five-year security is relevant even if it is very low but provided it is positive.

[18] AER (2021a, p. 71).

The CRG notes that service providers may propose an uplift to the risk free rate based on longer term historical figures. However, such an approach would not reflect prevailing conditions for risk free assets and would therefore not be justified.

The CRG supports the ERA's working view for 2022 to maintain its use of a five-year Commonwealth Government bond for the risk free rate for the return on equity

5.9 MARKET RISK PREMIUM – POST-1958

9. When estimating the historical market risk premium do you support the use of sampling periods post-1958? If not, please explain why and your alternative approach.

5.9.1 ERA approach

The market risk premium is the expected rate of return in excess of the risk free rate that investors require to invest in a fully-diversified portfolio. The market risk premium is always positive from an ex ante perspective but may turn out negative as an ex post outcome. The market risk is risk that cannot be diversified away by investors and affects the market as a whole. Market risk is also referred to as systematic or non-diversifiable risk.

The 2018 gas instrument applied a market risk premium of 6.0 per cent, which was fixed over the period of the instrument. The market risk premium was based on estimates of the historic market risk premium, the dividend growth model and conditioning variables. Returns to the market were measured by reference to the Australian all ordinaries accumulation index which includes capital gain and dividend components.

The historic market risk premium was calculated as annual average estimates for six overlapping averaging periods with the longest covering the period 1883-2017. A simple average of the lowest arithmetic and highest geometric averages was used to estimate the historic market risk premium.

The dividend growth model calculates the return on equity that makes forecast dividends consistent with the market valuation of the Australian share market. In other words, it solves for the discount rate that makes the present value of future dividends just equal to the observed market valuation for the Australian share market. The market risk premium is then calculated by deducting the risk free rate. The dividend growth model is sensitive to the assumptions and input values used in its application in determining the return on equity, there is no clear agreement on the best form of the dividend growth model or its input assumptions and it is likely to be upwardly biased due to the sensitivity of the model to low interest rates.[19]

The conditioning variables were: default (corporate bond) spreads over the risk free rate, the five-year interest rate swap spread, dividend yields and the ASX 200 stock market volatility index.

In arriving at an estimate of the market risk premium for the 2018 gas instrument, the ERA placed more reliance on the historic market risk premium and used the conditioning variables to determine a final point estimate.

[19] ERA 2018, p. 172.

The ERA noted that with the use of a fixed market risk premium, the return on equity has tracked lower since 2018 as interest rates have declined. There has been a considerable amount of material discussing the issue of whether there is an inverse relationship between the market risk premium and the risk free rate, with the implication of leading to a substantially higher market risk premium as risk free interest rates have tracked down. The ERA discussion paper notes the various studies that have been undertaken on this issue.[20] This relationship between the market risk premium and the risk free rate is further discussed in section 4.13.

The ERA's working view for the 2022 gas instrument is that a market risk premium of 6.0 per cent should be maintained.

The ERA estimates a historic market risk premium of 5.8 per cent using current data relating to three periods: 1958-2020, 1980-2020, 1988-2020.

The ERA estimates a market risk premium of 8.1 per cent from the dividend growth model but notes that the conditioning variables support a market risk premium at the lower end of its range.

The ERA is considering simplifying its existing market risk premium approach reflecting data quality concerns and the representativeness of long-dated historical returns. A long time frame reduces standard statistical errors but is more likely to contain a bias reflecting circumstances and behaviour that are no longer relevant. The ERA has also noted a number of data problems in the pre-1958 data.

The ERA is considering using the following periods:

- 1958 to current (data is more reliable since 1958)
- 1980 to current ((data is more reliable since 1980)
- 1988 to current (dividend imputation was introduced in 1988)
- 2000 to current (GST introduced in 2000).

The first question is whether the market risk premium should be based on post-1958 data.

5.9.2 CRG view

The CRG considers that it is reasonable to question the relevance of data from 1883 to 1958 given measurement issues and the likelihood of a higher risk environment in that period when financial markets and the economy and institutions were less developed. Also importantly the objective should be to obtain the best estimate of the market risk premium that is relevant at the start of the regulatory period for the regulatory period. This consideration suggests more

[20] ERA 2021, pp. 53-55.

weight should be given to recent estimates where they are considered to better inform investor expectations over the forthcoming regulatory period.

The CRG notes that the post-1958 data tends to mean a lower market risk premium than if data pre-1958 is used. Furthermore a lower market risk premium is evident in the period from 1980 to 2017.[21]

The CRG notes that when shorter periods are used the lower bounds of the 95 per cent statistical confidence intervals are likely to be negative but this is not considered to be necessarily a problem if average values are used and are considered to be good estimates of the forward looking market risk premium over the regulatory period.[22]

5.10 MARKET RISK PREMIUM – POST-2000

10. When estimating the historical market premium do you support expanding the sampling periods to include a new period of 2000 to current? If not, please explain why and your alternative approach.

5.10.1 ERA approach

The ERA is giving further consideration to the introduction of an additional period from 2000 that reflects the introduction of the Goods and Services Tax.

5.10.2 CRG view

The CRG considers that it is relevant to consider more recent periods, although it is not clear why the introduction of the Goods and Service Tax would have a material impact by itself on the market risk premium for years subsequent to 2000. It should also be acknowledged that the averaging method implicitly weights more recent history higher since the later years are included in all data scenarios whereas earlier years are not.

The CRG considers that it would be helpful for the ERA to provide further explanation as to why the introduction of the Goods and Services Tax in 2000 would likely have a material impact on the market risk premium.

5.11 MARKET RISK PREMIUM – BRAILSFORD, HANDLEY AND MAHESWARAN

11. When estimating the historical market premium do you support the approach to only consider the Brailsford, Handley and Maheswaran (BHM) dataset? If not, please explain why and your alternative approach.

5.11.1 ERA approach

The ERA uses two data sets for the period prior to 1958 and they produce different numbers prior to 1936 but similar numbers after 1936. The ERA's working view for the 2022 gas instrument is to simplify its method using the preferred original Brailsford, Handley and

[21] Independent Panel Review, 2018 p. 56.
[22] Independent Panel Review, 2018 p. 56.

Maheswaran (BHM) data set. With a preferred approach of only using post-1958 data the other data set would in any case be redundant.

5.11.2 CRG view

The CRG supports the ERA approach of only considering the BHM dataset, if the post-1958 period proposal is adopted.

5.12 MARKET RISK PREMIUM – AVERAGE OF ARITHMETIC AND GEOMETRIC MEANS

12. When estimating the historical market premium do you support the approach to calculate the historic market risk premium through the average of the arithmetic and geometric means? If not, please explain why and your alternative approach.

5.12.1 ERA approach

The expected market risk premium in the Sharpe-Lintner CAPM is currently expressed as an annualised return although the theory on which the model is based does not define the period except to assume it is a one period model.

There are two averaging methods which can be used to derive an annualised return — the arithmetic and geometric average. The arithmetic average is just a simple average. The geometric average is calculated as the average of a set of products of the terms i.e. it is the nth root product of n numbers and it takes into account the effects of compounding.

The difference between the two measures can be seen by considering a simple example where there are two periods with a return of +25% in the first period and -20% in the second period. The arithmetic average would be (+25-20)/2 = 2.5%. The geometric average would be (1+25/100)x(1-20/100) – 1 = 0%.

An arithmetic average will tend to overstate returns, whereas a geometric average will tend to understate them. The upward bias for the arithmetic average arises because of the variability of returns whereas the downward bias for the geometric average arises because it is based on continuous compounding of returns.

The averaging of the two methods is meant to reduce bias. However, the nature of the bias is different for the two approaches so that simple averaging does not necessarily eliminate the biases.

The ERA's working view for the 2022 gas instrument is to retain the use of arithmetic and geometric means when calculating the historical market risk premium and continue to take the average of the lowest arithmetic and highest geometric means. However, the ERA is considering a further simplification of a simple average of the two approaches.

The ERA considers that simple averaging of the arithmetic and geometric means would have the following advantages:

- Greater utilisation of all the sample periods, whereas the minimum/maximum method takes into account only two periods.

- Does not result in a potential mismatch between the time periods that are chosen with the minimum/maximum approach for the arithmetic and geometric means.

- Through the incorporation of overlapping periods, places more weight on more recent term data.

Currently the two approaches provide the same estimate of market risk premium of 5.83.

5.12.2 CRG view

The CRG considers that the ERA needs to give consideration as to which of the two methods is more appropriate from a conceptual perspective. An arithmetic average is more suitable if investors focus on annual returns and treat each expected annual return independently. Average annual returns will inherently mean more variability than geometric returns. In contrast if investors focus on historic returns over a longer period and those returns are compounded then the geometric average is more suitable. So the issue is whether whether the continuous compounding embodied in the geometric average is more representative of investor behaviour than the effect of volatility inherent in the arithmetic average.

With a regulatory period of five years, the term of the return being specified as five years and the roll forward of the RAB each year with the five year rate continuing to apply with the roll forward process, the CRG considers that a geometric average measured over a five year period may be more appropriate than an arithmetic average that assumes annual returns for each year are relevant.

The CRG considers that the ERA should give consideration as to whether more weight should be given to the geometric return based on whether investors are more likely to target returns over 5 years than 1 year.

If the averaging of arithmetic and geometric means is retained the CRG supports the proposed simple averaging process for the reasons noted by the ERA and not the current practice of taking the average of the lowest arithmetic and highest geometric means.

5.13 MARKET RISK PREMIUM – RELATIONSHIP WITH THE RISK FREE RATE

13. When estimating the market risk premium do you support the current approach of estimating and considering the market risk premium and the risk free rate independently from one another? If not, please explain why and your alternative approach. Specifically, the ERA is interested in:

- **The empirical relationship (magnitude and direction) between the ex-ante market risk premium and the ex-ante risk free rate in Australia and the conceptual logic underpinning such a relationship.**

- **Whether the relationship is sufficiently stable and persistent (that is, not volatile and transitory) on an ex ante basis.**

- **Ways in which the relationship can be implemented to estimate the market risk premium in a manner suitable for regulatory purposes.**

5.13.1 ERA approach

Since the development of economic regulation in Australia in the late 1990s typically the risk free rate and market risk premium have been estimated independently from one another. However, there are views that there is an inverse relationship for these variables and that in periods of very low interest rates the ex-ante market risk premium is likely to be higher than for periods where interest rates have been higher. In contrast to the independence approach, the total market return method (or the Wright method) implies a one-for-one negative relationship between the market risk premium and the risk free rate.

This issue was considered as part of the 2018 gas instrument and also continues to be considered by the AER and other economic regulators. The ERA discussion paper summarises extensive material that casts doubt on a robust relationship between the risk free rate and market risk premium that could be of use for regulatory purposes.

The ERA's working view is to maintain the position adopted in the 2018 gas instrument which means that it would not make use of the Wright method. However, it noted that it will continue to review regulatory developments on the issue and invited submissions on the relationship between the market risk premium and the risk free rate.

5.13.2 CRG view

The CRG supports the ERA position that there is no clear, usable relationship between the risk free rate and the market risk premium.

The CRG notes that the objective in estimating the market risk premium should be to obtain the best estimate of the market risk premium that should apply over the forthcoming period and considers that an historic market risk premium with more weight given to recent years along with the application of the conditioning variables provides the most useful method for establishing an appropriate forward looking estimate.

The CRG recognises that the dividend growth model is forward looking but is concerned about the sensitivity of its estimates to input assumptions and considers it should be only used to inform the direction of any change to the market risk premium.

5.14 EQUITY BETA – EXPANDING THE SAMPLE FOR ESTIMATING BETA

14. Do you support the continued use of domestic energy networks to estimate equity beta? If not, please explain why and your alternative approach.

15. Do you support the use of a sample of domestic and international comparators to estimate equity beta? If not, please explain why and your alternative approach.

16. If an international sample is to be used for estimating equity beta, which jurisdictions and companies could be considered as part of the sample?

17. If an international sample is to be used for estimating equity beta, how should these international estimates be incorporated into the equity beta estimation method?

5.14.1 ERA approach

Recall from Section 3.2 that the equity beta is the amount of risk that an investor faces and the market risk premium is the price of that risk.

For convenience re-consider the CAPM as defined in equation (2) as:

$$E(r_e) = r_f + \beta_e\left[\left(E(r_m) - r_f\right)\right] \quad (2)$$

where

r_f is the risk free rate;

β_e is the equity beta, which is a measure of the amount of relevant risk of the investment (as measured by the sensitivity of the return on the specific asset to the return on the market as a whole); and

$E(R_m) - r_f$ is the expected market risk premium above the risk free rate which represents compensation for investing in the market as a whole relative to a risk free return and can be interpreted as the price of relevant (non-diversifiable) risk.

The product of the equity beta and the market risk premium represents the margin that needs to be added to the risk free rate to compensate investors for the non-diversifiable risk of the particular equity investment.

The equity beta depends on the type of business that the firm is in which in turn affects the sensitivity of returns to market conditions and the degree of financial leverage or gearing because *ceteris paribus* higher gearing increases the variance in equity returns.

Statistical techniques can be used to measure the equity beta which is formally defined as the covariance over time between returns on the specific investment and returns on the market as a whole divided by the variance of returns for the market as a whole. This formulation can also be converted to the product of the correlation between the return on equity and return on the market and the ratio of the standard deviation of the equity return to the standard deviation of the market return i.e. a standardised correlation coefficient.

An equity beta of 1 means the quantum of the risk of the specific investment is the same as for the market as a whole with lower (higher) risk indicated by betas less (higher) than 1.0.

The 2018 gas instrument applied an equity beta of 0.7, which was fixed over the period of the instrument. The equity beta was estimated using similar methods used by the ACCC and AER but over a much shorter period for the ERA. It is understood that the data covered the most recent five-year period with weekly returns for a sample of four companies: APA Group, DUET Group, Ausnet Services and Spark Infrastructure. The four companies were chosen based on the criteria for a benchmark efficient firm i.e. "a pure-play network service provider

operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in respect of the provision of gas network services".

The ERA noted recent developments in relation to estimates of beta for domestic energy firms with key points and considerations as follows:[23]

- The AER's 2020 annual rate of return update has produced a range of equity beta estimates for remaining listed domestic energy firms from 0.4 to 0.7.
- As an equity beta is calculated through the observed covariance of the market return and an individual stock or portfolio, it is likely that COVID-19 may affect measured systematic risk due to the increased volatility.
- A conceptual analysis would indicate that essential services such as energy networks would have been relatively more immune from COVID-19, compared to other industries.
- The ERA's sample of Australian energy networks is reducing, with DUET already being delisted and Spark Infrastructure and AusNet likely to be taken over and delisted in 2022.
- A sample that is largely reflective of one firm deviates from a benchmark approach and may be statistically unreliable.
- The timing of takeover announcements themselves may influence equity beta due to speculation and have implications of pricing once the acquisitions are complete.
- IPART and the QCA have chosen to use international firms in their estimation of beta but the AER has not (as explained below).

The ERA also noted key features of the AER's preliminary position on equity beta for its 2022 return instrument of network energy businesses as follows:[24]

- The AER has a preliminary position of retaining nine Australian firms to estimate beta including several delisted firms.
- The AER recognises that the inclusion of international firms may bias estimates due to non-comparability to Australian energy service providers due to regulatory, market, structural and operational differences.
- The AER recognises that the Sharpe-Lintner CAPM creates a strong preference to use domestic firms and a domestic index.
- The AER prefers using Ordinary Least Squares as the primary estimator, with the Least Absolute Deviations (LAD) estimator as a robustness check for outliers.

[23] ERA 2021, pp. 69-70.
[24] ERA 2021a, p. 71.

- The AER is using two estimation periods, one being the longest period available and the other using the latest five years of data. The AER proposes to place more weight on the longest estimation window which is considered to be more statistically reliable, includes entire market cycles and better matches the long-term nature of assets.

The ERA considers that its domestic energy sample provides a range of equity beta estimates from 0.5 to 0.6. When international comparators are examined, for the United States, Canada, United Kingdom, and New Zealand this provides a range of estimates is from 0.6 to 1.1. The average beta estimate across all countries is 0.76.[25]

The ERA's working view for the 2022 gas instrument is to use an equity beta of 0.7, based on all the information it has considered.

The ERA's main reasons for maintain the status quo option for the domestic benchmark are that the sample includes the closest, comparable pure-play energy networks and the approach is consistent with prior practice, regulatory approach and precedent.

The ERA is considering how, and if, the benchmark sample needs to change due to market developments, including expanding the domestic sample to include similar domestic industries to domestic energy networks and international energy networks.

The ERA has made the following key points about the sample for estimating the equity beta:

- maintaining the Australian energy sample of four firms in the near term could be justified;

- expanding the sample to include betas from other domestic infrastructure companies is not appropriate as apparently they were not considered to be sufficiently comparable;

- examining both domestic and international listed energy networks may be useful when estimating the equity beta for Australian energy networks;

- international listed energy network firms should have the following characteristics:

    - countries with similar regulatory, legal and institutional arrangements to those in Australia;

    - countries with well-developed capital markets;

    - with these criteria the United Kingdom, Canada, New Zealand and the United States are considered comparable.

- if international comparators are used the ERA proposes to:

    - use a domestic CAPM for each country rather than an international CAPM (which would be too complex);

[25] ERA 2021a, p. 84.

- include only firms where the majority of the observations are present in the estimation window;

- adjust the equity betas in other markets to account for differences in gearing.

5.14.2 CRG view

Factors that affect systematic risk

Essentially the relevant sample for estimation of beta should have characteristics that mean there is likely to be similar sensitivity of returns for firms in the sample relative to the market as a whole. This does not necessarily mean that all firms should be in the same industry or same location, although such characteristics are likely to be relevant in helping to ensure a sample with similar systematic (non-diversifiable) risk. The sample needs to include firms with operating characteristics and economic circumstances that are likely to mean similar fundamental factors affecting systematic risk.

Restricting the sample to firms engaged in the same business is known as the 'pure play' concept and presumes that such firms will have similar systematic risks and debt capacities. However, firms in the same line of business could still have different operating and performance characteristics, different customer basis, be of a different size and be subject to different regulatory arrangements all of which could have material impacts on their variability of their revenues and profits.

Various studies have been done identifying fundamental factors that are likely to affect systematic risk. It is well known that higher financial leverage (gearing), all else equal, will increase the variance in equity earnings leading to a higher beta. However, within reasonable limits, an equity beta can be 'delevered' and converted to an asset beta that is unaffected by gearing, and then relevered to reflect the benchmark gearing.

Lally (2000) reviews some of the literature in this area and considers that key determinants of systematic risk include: the nature of the firm's output, duration of firms' contracts, degree of monopoly power, form of regulation, operating leverage, capital structure, and the firm's real growth options. These sorts of factors have been considered in various regulatory contexts including by the AER in previous determinations of beta for regulated network energy businesses.

Table 2 below describes various fundamental factors that could influence systematic risk, apart from gearing, based on the factors identified by Lally, a recent review by the QCA and a recent report by Economic Insights for the AER.[26] They need to be considered collectively as they may work with different strength and in different directions.

[26] Lally 2000 pp. 27-29, QCA 2021, p. 67, Economic Insights 20221, p. 30, pp. 64-65.

Table 2: Fundamental factors that influence systematic risk

Factors	Description
Capital structure (gearing)	As gearing increases there is greater variability in equity returns. However, gearing can be adjusted for equity betas so that they refer to the same level of gearing.
Operating in the same or similar industry and with a similar production process	There is more likely to be similar non-diversifiable risk, ceteris paribus, for firms in the same industry with a similar production process. This criterion is not so much a fundamental factor but rather an indicator of the likely presence of relevant fundamental factors affecting systematic risk.
Customer and product characteristics	Essential services or services with a relatively low income elasticity of demand will mean that demand for the service will be relatively less responsive to economic shocks for the market as a whole.
Revenue and cost recovery protection mechanisms	Regulation that entails strong revenue or cost recovery protection or long term contractual arrangements that achieve similar protection are likely to contribute to relatively high stability for revenues and profits.
Size and diversity	Larger companies are generally less risky than smaller firms because they have more experience, take less risk per decision made, and are usually more geographically diversified and hence less exposed to economic cycles specific to one country.
Growth options	Real growth options refer to the extent to which a firm may have growth options but their value is uncertain and there is value in delaying an investment which can be shown to impact on non-diversifiable risk. However, regulation may reduce uncertainty about growth.
Operating leverage	Operating leverage refers to the share of fixed operating costs in total costs with high operating leverage, all else being equal expected to mean higher systematic risk. However, the regulatory or pricing arrangements may suppress the impact of operating leverage to the extent they provide revenue protection. If there is strong revenue protection operating leverage has minimal or no material impact.

The factors presented in Table 1 can be used to help select and adjust a benchmark comparator sample for estimating beta. The CRG considers that the selection of firms operating in the same or a similar industry is an appropriate starting point for forming a benchmark sample to estimate an appropriate equity beta. However, it also considers that one particularly important fundamental factor is the extent to which regulation provides revenue and cost recovery

protection relative to unregulated firms or firms where only part of their operations are regulated with similar regulatory arrangements. It also suggests that with strong revenue and cost recovery protection arrangements, firms in other regulated industries could provide relevant observations.

AER approach

It is relevant to note that in its 2018 review the AER looked at the impact of regulation on empirical equity beta estimates and found a general trend of increasing beta estimates as the proportion of regulated revenue decreased which suggests placing more weight on firms that are majority regulated such as Spark and Ausnet.[27] Table 3, which contains the latest AER update for its domestic energy network beta estimates confirms this result. The two listed firms in the sample with majority regulation of their revenues have much lower equity betas than the average for the whole comparator set of nine (listed and delisted) firms or three still listed firms for most of the estimation periods.

Note that the estimates indicate considerable stability for the longest period when comparing the 2018 and 2021 estimates. However, the most recent five year estimates show a notable decline since 2018.

Table 3: AER equity beta estimates for domestic energy network business comparators (OLS estimates for weekly data for various periods from June 2000 to August 2021

Equal and value weighted portfolio estimates	Whole comparator set (9 firms)	Still listed firms (APA Group, Spark Infrastructure, AusNet Services)	Still listed majority regulated firms (Spark Infrastructure, AusNet Services,
Longest period			
2018 review	0.42 – 0.67	0.52 – 0.55	0.42 – 0.43
2021 update	0.40 – 0.68	0.51 – 0.55	0.40 – 0.41
Post tech boom and excluding GFC			
2018 review	0.50 – 0.67	0.64 – 0.67	0.52 – 0.53
2021 update	0.47 – 0.69	0.59 – 0.62	0.47 – 0.47
Recent 5 years			
2018 review	0.49 – 0.88	0.81 – 0.88	0.70 – 0.72
2021 update	0.37 – 0.70	0.53 – 0.59	0.37 – 0.38

Source AER 2021a pp. 103-104.

[27] AER 2018, p. 173.

The AER whole comparator set includes nine Australian energy firms, six of which had been delisted at the time of the 2021 update. Three of the firms have been delisted for approximately 14 years.

The AER's preliminary view is that it will retain the 2018 instrument approach placing the most weight on the longest period estimates for its domestic energy network comparator set and not use international energy firms, domestic infrastructure firms or other regulators decisions to inform its estimated range for beta. However, it advised that it would have an open position on its approach to choosing a benchmark sample.[28]

The AER highlighted the importance of promoting stability and predictability in its regulatory approach and the need to ensure there is clear evidence that its current approach is no longer appropriate and that an alternative approach would lead to a better outcome with respecting to the national electricity and gas objectives.

The AER justifies use of the longest period estimates as this can lead to more robust and statistically reliable equity beta estimates. The AER agreed with the proposition that given the natural monopoly characteristics of the Australian regulated energy networks and the stability of and the protection from the Australian regulatory framework, it is likely that their systematic risk is relatively stable over long periods of time. It also noted that this was consistent with the empirical evidence for the comparator set and stability of revenues and share prices for the listed Australian regulated energy businesses. [29]

The AER justifies continuing to use the existing comparator set essentially based on an assessment that other domestic infrastructure firms would face inherently different risks when compared with Australian regulated energy network firms and in the case of international energy firms differences in regulatory framework, the domestic economy, geography, business cycles and other factors are likely to drive different equity beta estimates.[30]

Continued use of domestic energy networks

The CRG supports restricting the sample at this stage to domestic energy networks based on the reasoning set out by the AER.

To help contribute to regulatory predictability and stability the CRG considers that it is reasonable for the ERA to continue to use its benchmark sample of four firms. Although including other delisted firms would reduce statistical standard errors it is possible that the average beta estimates for some of these delisted firms could be materially different and introduce bias, particularly recognising that three of them have been delisted for approximately 15 years. However, the ERA needs to clarify what period it will use for the DUET beta estimates as it has been delisted since May 2017.

Further reasoning is set out below in relation to other domestic infrastructure firms and international firms.

[28] AER 2021a, p. 102.
[29] AER 2021a, pp. 105-6.
[30] AER 2021, p. 109, 112.

However, the CRG would like the ERA to give consideration to estimating beta over a longer period as this would likely provide more statistically reliable estimates given the evidence suggesting stability of the beta estimates over longer periods and the advantages that longer term estimates have in reducing the impact of one-off events.
The CRG also considers that the ERA needs to give more recognition of the impact of regulation on beta estimates as there seems to be reasonable evidence the regulatory arrangements in Australia for network energy businesses provide considerable regulatory protection for revenues and profits for those businesses.

Expansion to include other domestic infrastructure firms

The CRG considers that expansion of the sample to include other domestic infrastructure firms may be appropriate because the domestic CAPM could still be used and it may be possible to select comparators where relevant fundamental factors, as described in Table 1, are sufficiently similar. In particular if the regulatory arrangements are sufficiently similar there may be scope to include other domestic infrastructure firms. However, there would be a need for convincing detail in any assessment of fundamental factors.

Also the CRG considers that it is not necessary to expand the sample to include other domestic infrastructure firms at this stage, but as noted above there may be merit in estimating beta over a longer period given the likely stability of beta and the relevance of reducing the impact of one-off events.

Expansion to include international firms

When considering whether to include international firms in a sample for estimating beta there are two comparability issues.

The first issue is that the foreign market portfolio itself will have a different composition to the Australian market portfolio. It is well known that the composition of the ASX includes a much larger representation of mining and banking firms and smaller representation of technology firms than for example the broad market indices in the United Kingdom and the United States. The point is that the equity betas from international comparators do not measure the systematic risk relative to the Australian market. The questions then are what adjustments should or could be made to adjust for the different compositions in the market portfolio and to what extent would the estimates of beta be affected?

The second issue is that, even if one could allow for such compositional effects, there can be a wide range of economic conditions, specific operational and structural characteristics for individual firms and importantly regulatory arrangements that affect systematic risk. Furthermore, apart from adjustments for gearing, there is no well-defined method for adjusting for such risk differences.

In discussing the basis for its working approach to the rate of return instrument for the network energy businesses that it regulates, the AER considers that differences in the regulatory framework, the domestic economy, geography, business cycles, industry structure, tax systems, technology, and other factors, such as the degree of vertical integration and extent of involvement in different activities that are not regulated, are likely to drive different equity beta estimates. Further, it noted that the submissions it received which supported use of international

data did not propose a practical, transparent, and consistent methodology which would enable beta estimates from international firms to be compared with the benchmark Australian network service provider on a 'like-for-like' basis.[31]

The AER did not consider that a small set of comparator firms necessarily meant the comparator set should be expanded and noted that Ofgem and Ofwat in the United Kingdom also use a small number of domestic listed entities to estimate beta. The AER's preliminary view was that there was not sufficient evidence to support the use of international firms in the 2022 instrument review. However, they may be considered for appropriate use in the future.[32]

The CRG considers that the inclusion of international network energy companies is not appropriate at all because of material differences in capital markets, economic features of international energy firms including vertical integration of generation and network services and the presence of other non-regulated activities and likely differences in the nature and extent of application of the regulatory arrangements. It is also not necessary at this stage.
The CRG notes that the ERA recognises that most equity betas in other jurisdictions appear to be greater in magnitude than in Australia. And suggests, as previously discussed in the 2018 gas explanatory statement, it seems likely that differences in regulatory, market and operational activities are responsible for some of these differences. However it also observes that the international estimates are derived from large liquid capital markets.[33]

The CRG considers that the fact that the international beta estimates are derived in large liquid capital markets is not a sufficient reason to justify the use of these estimates for establishing a suitable Australian benchmark. The Australian capital market is also quite substantial and liquid and analysis of fundamental principles suggests the Australian regulatory environment provides strong protection of revenues and profits. There is also an inconsistency in using the international beta estimates as the systematic risk as reflected in the beta for the four other countries is calibrated against their stock market indices with no adjustment to take account of this.

Importantly in the sample of firms the ERA has used from the US, Canada, the UK and New Zealand it is notable that most of the firms have involvement in electricity generation and other apparently unregulated businesses.[34] For example 7 out of the 8 Canadian firms are vertically integrated with an energy generation business operation, 1 of the 2 UK firms also has a generation business, the New Zealand firm Vector also provides broadband services and most of the US firms have generation or other non-regulated businesses. The CRG considers there is strong evidence that regulated services have lower betas then non-regulated services and notes that the ERA has made no adjustments to its sample to account for the existence of non-regulated or non-network energy services in its international sample.

If the international estimates were to be formally recognised, the CRG considers the ERA would need to establish that the regulatory and economic environments in these other countries provided similar revenue and profit protection as for the Australian economic regulation of network energy businesses and would need to focus on those energy businesses where a

[31] AER 2021, p. 109.
[32] AER 2021, p. 110.
[33] ERA 2021, p. 85.
[34] ERA 2021, Appendix 4.

substantial majority of the business was regulated or had similar revenue and profit protection as the Australian regulated network energy businesses.

The CRG has a strong preliminary view that it is not appropriate and not necessary at this stage for the ERA to use an international sample in forming a preferred point estimate of the equity beta and notes that this would have a material, adverse and unjustified impact on the long term interests of consumers.

5.15 EQUITY BETA – ECONOMIC SHOCKS

18. When considering equity beta should the ERA consider shocks such as COVID-19 and takeover announcements? If so, please explain why and how these events can be accounted for.

5.15.1 ERA approach

The ERA has noted the during the period of the COVID-19 pandemic there has been increased volatility in overall market returns as well as the returns for each of the still listed domestic energy firms in the benchmark sample.[35]

The ERA's current thinking is to retain its current approach of using the latest five-year period. It makes the following points to support its position:[36]

- An estimation window is intended to capture returns throughout the economic cycle which also includes downturns. Economic shocks are a natural part of the economic cycle and to remove these observations would be to affect the distribution of returns.

- Shocks can provide local evidence about the true systematic risk of a firm, where the revealed preference of investors is that during a market-wide shock the domestic energy sample were not as affected as the market portfolio.

- It may not be easy to identify COVID-19 related shock events given the multiple waves and interventions that occurred during 2020.

- The ERA's current approach of using robust estimators would moderate the impact of outliers, where COVID-19 could be considered to be such an outlier.

5.15.2 CRG view

Economic shocks can be incorporated into the estimation process for betas by the use of dummy variables or variables that proxy the economic shocks but the problem is how to forecast economic shocks for the next regulatory period.

The CRG considers that the guiding principle should be to establish the best estimates for the parameters of the CAPM that are expected to apply over the regulatory period. This then requires a judgement as to whether relatively normal conditions are likely to apply over the

[35] ERA 2021, p. 78.
[36] ERA 2021, p. 78.

next regulatory period or more instability in economic conditions is expected similar to what has occurred in the COVID 19 period.

If normal conditions are considered more likely to apply then this would support excluding data periods relating to significant and sustained economic shocks. However, recognising that such shocks happen every now and then, excluding them could introduce bias and from an econometric perspective including these periods may be the best means of establishing a longer term estimate of beta. This point is consistent with using data for the longest period available as is the approach adopted by the AER.

The ERA also recognises that economic shocks are a natural part of the economic cycle and that an estimation window is intended to capture returns throughout the economic cycle. The ERA also makes the point that shocks can help provide local evidence about the true systematic risk about the firms in the benchmark sample. In this respect refer to Table 2 showing the AER's 2021 update for the still listed firms that shows a marked decline in the beta estimates since 2018 for the three still listed firms since the 2018 update.

The CRG's preliminary view is that the ERA should not exclude data corresponding to economic shocks but that it should give consideration to adopting a longer time frame so that the estimation window better captures returns through the economic cycle. This view is based on recognising the uncertainty about the economic environment over the next regulatory period, the evidence supporting longer term beta stability and the lower standard statistical errors if a larger sample was used.

It is suggested that it would be useful to review beta estimates for the latest 10 year period and assess relative to the latest 5 year period and that it would be useful to undertake stability tests for the beta estimates.

5.16 EQUITY BETA – ERA GENERAL APPROACH

19. Do you support the ERA's general approach and simplifications for estimating equity beta (regardless of any potential changes to the sample firms)? If not, please explain why and your alternative approach. Specifically, the ERA is interested in views on the following aspects of the method applied to estimate equity beta in this paper:

- Use of a 5-year estimation window with weekly returns.
- Use of the Bloomberg total return index for individual stocks and market indices.
- Use of the Ordinary Least Squares estimator, with the Least Absolute Deviations method as a robust estimator.

5.16.1 ERA approach

The ERA's working view for the 2022 gas instrument is to maintain a similar equity beta estimation method as for the 2018 gas instrument.[37] Three issues to consider are: the time interval (data frequency) and length of the estimation period for estimating beta; some proposals for simplification of the data and the statistical method for estimation. Each of these is discussed below.

[37] ERA 2021, pp. 80-82.

The ERA's working view for the 2022 gas instrument is to retain the use of a five-year estimation window with weekly data. The ERA considers that the balance between relevance and statistical robustness still lies in favour of five-year estimation windows and in support notes:

- The findings from the Brattle Group's report that international regulators tend to favour shorter estimation windows.
- Concerns of market shocks are possibly moderated by the ERA's use of robust estimators.

The ERA is also proposing to simplify its approach by using the total return index as calculated by Bloomberg for individual stocks and the market index, noting:

- Bloomberg provides total equity return data that combines price and dividend data into a single series.
- Bloomberg's total equity return data is commonly used and is a high-quality data set.
- This approach creates consistency and replicability for stakeholders as it conducts analysis on standardised data.

Currently the ERA constructs the total return by combining the price and dividend data itself but it would be simpler and still appropriate to use the Bloomberg total equity return data.

The ERA is also proposing that ordinary least squares (OLS) and the least absolute deviation (LAD) estimators are to be the statistical methods to be used for estimating equity beta. OLS is the most basic statistical technique for estimating beta but OLS estimates may be unduly affected by outliers and the LAD estimator is a standard statistical method for reducing the impact of outliers. In the 2018 instrument two other estimators were also used to address the impact of outliers but according to the ERA they provided similar results and it is understood that the LAD is more easily verifiable by external parties.

5.16.2 CRG view

Time (frequency) interval and estimation period

Beta can be estimated with daily, weekly or monthly data. For a given estimation period higher frequency data means more observations and a lower standard error for the beta estimate i.e. a narrower statistical confidence interval for the estimate. However, reducing the time interval can lead to various biases in the estimate so that the mean estimate is not reliable even though it may have a low statistical standard error.

The CRG understands that daily data are considered to be more likely to lead to biased estimates then weekly or monthly data but there are several key academic studies that suggest monthly data provides less scope for various sources of bias then weekly data[38] and that beta estimates with monthly data tend to be lower than beta estimates with weekly data for Australian and United States energy businesses.

However, if monthly data are used there will be a lot less observations compared with weekly data for the same estimation period – 60 versus 260. This can be addressed by using a longer

[38] Economic Insights 2021 pp. 42-43.

time frame but then a longer time frame increases the likelihood that structural characteristics of the firm have changed during that period, potentially resulting in the beta estimate being unrepresentative of its current value. However, statistical stability tests could be used to check changes in beta and it is considered that given that regulators choose the mean estimate of a statistical confidence interval, removing or reducing the scope for bias is particularly important.

Bloomberg data

The CRG supports the ERA's reasons and proposals to use the Bloomberg data.

OLS and LAD estimators

The CRG understands that the LAD estimator is less sensitive to outliers than is OLS. The ERA proposal simplifies the current approach by only using one technique to deal with outliers. The ERA's latest estimates of the equity betas report an OLS simple average of the four firms of 0.474 and LAD average of 0.591.[39]

Ordinary outliers are observations where the dependent variable in a statistical regression takes an extreme value relative to the values of the explanatory variables in a regression. The OLS estimator gives strong weight to outliers causing them to have a strong influence on the estimated parameters. However, it is not clear that outliers should be automatically excluded or given less weight. The relevance of outliers depends on whether they are observations that are correct measurements or data errors. If the extreme observations are actually correct measurements, then removing theme may mean removing the most important observations in the sample. Conversely the outliers may be the result of unique events such that their recurrence is highly unlikely and then removing them would mean a more accurate model for prediction or parameter estimation purposes.[40]

The CRG is concerned about the assumption that the LAD estimator is necessary and given equal weight as the OLS estimator. The CRG suggests that the ERA needs to give more consideration as to why the LAD estimator is always necessary and to be given the same weight as the OLS estimator.

5.17 EQUITY BETA – TREASURY BOND IMPLIED INFLATION

20. When estimating the expected rate of inflation do you support the use of Treasury bond implied inflation approach? If not, please explain why and your alternative approach.

5.17.1 ERA approach

As explained by the ERA, to invest, debt and equity investors will require compensation for expected inflation.[41] An estimate of the expected inflation rate is needed for: indexing the asset base over the regulatory period; determining depreciation allowances; adjustment to other nominal building block allowances; and allowing observance of real rates of change in tariffs and the real rate of return.

[39] ERA 2021, p. 84.
[40] Economic Insights 2021, p. 47.
[41] ERA 2021, p. 68.

Under the 2018 gas instrument, the ERA estimated the expected inflation rate using the Treasury bond implied approach over a term that matched the regulatory period of five years.

The Treasury bond approach recovers the expected inflation rate from what is known as the Fisher equation:

$$1+ I = (1 + r) \times (1 + \pi^e) \quad (4)$$

where i is the nominal interest rate, r is the real interest rate and π^e is the expected inflation rate.

Other points to note in the approach are:

- The nominal rate is the nominal yield on five-year Commonwealth Government Securities.
- The real rate is fixed interest rate on Treasury indexed bonds, whose face value is indexed to movements in the Consumer Price Index.
- The use of an averaging period of 20 trading days, nominated in advance close to and prior to an access arrangement determination to reduce the volatility of the estimate.
- Linear interpolation to derive daily point estimates as needed.

The approach assumes that yields on Commonwealth Government Securities and Treasury Indexed Bonds are efficiently priced and differ only by the impact of an inflation component.

The main alternative is to use the mid-point of Reserve Bank of Australia (RBA) inflation forecasts over the next 2 years and the mid-point of the target inflation band of 2 to 3 per cent over subsequent years or some path to achieve the 2.5 per cent mid-point by some future point in time.

However, the ERA notes there that the RBA inflation forecast is updated infrequently and may not effectively reflect changing market-based inflation expectations. In contrast the Treasury bond approach makes use of nominal and risk free rates observed in the market and is updated on close to a daily basis.

5.17.2 CRG view

The CRG agrees that the RBA approach provides more of an estimate of a policy target rather than a market-based estimate of expected inflation. In addition, given the lag inherent in the method, the outcome can be a negative real risk free rate that may not be appropriate.

The CRG supports the use of the Treasury bond approach to estimating expected inflation with a term matching the term of the regulatory period (consistent with achieving the expected NPV=0 condition).

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