Consumer Reference Group

Submission on ERA 2022 draft gas rate of return instrument

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CRG Members

John Fallon – Chair
Director, Economic Insights Pty Ltd

Graham Hansen
Senior Policy Officer, Western Australian Council of Social Service

Paul Keay
Consultant, energyXL

Adrienne LaBombard, Manager of Industry Competitiveness at The Chamber of Minerals and Energy of Western Australia

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CONTENTS

ACRONYMS

AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
AER CRG	Australian Energy Regulator Consumer Reference Group
AGIG	Australian Gas Infrastructure Group
ATCO	ATCO Gas Australia Pty Ltd
CAPM	Capital Asset Pricing Model
CMEWA	Chamber of Minerals and Energy Western Australia
CRG	Consumer Reference Group
EICSI	Energy Infrastructure Credit Spread Index
ENA	Energy Networks Australia
ERA	Economic Regulation Authority
GGT	Goldfields Gas Transmission
MRP	Market Risk Premium
NGO	National Gas Objective
RAB	Regulated Asset Base
RBA	Reserve Bank of Australia
RORI	Rate of return instrument

1 INTRODUCTION

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 draft gas rate of return instrument and explanatory statement dated 17 June 2022 and requested submissions on the draft instrument by 6 September 2022.

The consultation process in relation to the draft instrument began with an ERA discussion paper published in December 2021. Submissions were made on the ERA discussion paper and on a focussed consultation organised by the ERA on key parameters which was held in April 2022. The submissions are available here.

This submission by the CRG relates to the ERA draft instrument. The submission focusses on key matters where the CRG has a different view to the ERA, namely: the term of the return on equity in a regulatory context; the market risk premium; and estimating an appropriate equity beta. Other issues and matters are treated briefly, with further detail presented in earlier CRG submissions. This submission also considers various issues discussed in the Independent Panel report relating to the ERA's Draft Instrument and Explanatory Statement, where those issues relate to key concerns of the CRG.

The CRG's views on the term of the equity return, equity beta and market risk premium differ from the ERA's preferences in its 2022 draft gas rate of return instrument. The CRG's views on the term of the equity return are presented in section 2. Section 3 discusses the equity beta where the main concerns of the CRG relate to: recognising the impact of regulation and monopoly characteristics on the equity beta; and the use of international data for constructing a benchmark equity beta estimate. Section 4 discusses the market risk premium. Section 5 discusses other issues where there is generally agreement with the ERA position. Section 6 presents the impact of the CRG views on the WACC. Section 7 contains the references.

The CRG is interested in feedback on its views presented in this submission. You can contact the CRG here by 30 September please.

The CRG may provide further advice directly to the ERA depending on the availability of relevant information and timing considerations.

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2 TERM OF THE RETURN FOR EQUITY

2.1 THE ISSUE

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

In its 2021 Discussion Paper the ERA advised that its working view was to maintain the use of a five-year term for estimates of the rate of return, and as far as possible, to be consistent with the regulatory period. It noted that:[1]

> "105. The valuation problem confronting a regulator with a five-year regulatory period is different from that of valuing an unregulated business. The ERA is concerned with estimating efficient costs attributable to a single regulatory period rather than over the entire asset life. This is because the ERA resets the revenue allowance every regulatory period.
>
> 106. The ERA considers that matching the regulatory period, as far as possible, best approximates the NPV=0 principle and delivers efficient financing costs consistent with the national gas objective and revenue and pricing principles in the long-term interest of consumers."

In its 2022 draft gas rate of return instrument the ERA has changed its view to using a 10-year term for the return on equity, based essentially on the proposition that such a time horizon was more appropriate for investors given the expected life of the regulated assets.

The CRG considers that a five-year term is required to satisfy the NPV=0 principle because the five-year term, with subsequent resetting of prices every five years is the relevant pay-off period in valuing regulatory returns and ensuring that investors receive sufficient revenue to cover their efficient costs. If a ten-year term is used when prices are reset for every five-year regulatory period, the NPV=0 condition will not be met for every regulatory period and hence not met over the expected economic life of the assets at the time of investment.

The CRG considers that this perspective is well supported by advice prepared by Professor Lally for the AER[2] and ERA[3]. The AER also presents extensive consideration of this issue in its recent Draft Explanatory Statement and is proposing to move from a 10-year term to a term that matches the regulatory period.[4]

To be clear the preference for a term that matches the regulatory period 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

[1] ERA 2021, p. 22.
[2] AER 2021.
[3] ERA 2022a and Lally 2022a.
[4] AER 2022.

just equal to **expected** costs in present value terms. It does not require certainty of recovery of relevant costs just that over a series of regulatory periods investors can expect prices to be reset consistent with demand and cost conditions to ensure they can expect to recover their efficient costs.

Detailed discussion of the issue and the ERA and CRG positions is presented below.

2.2 ERA POSITION

The ERA reviewed various material relating to an appropriate term for the return on equity and has defined two approaches as follows:[5]

> "590. The ERA considers that the term for equity depends on what rate a regulator is setting:
>
> • A regulatory rate – A rate that provides required returns according to regulatory settings and principles, and recognises resets for every regulatory period. Application of such a rate reflects one view of efficient costs under a resetting regulatory framework.
>
> • A competitive market rate – A rate that provides the expected returns of equity investors according to market conditions and practices for infrastructure assets, which is generally a long-term rate with a term exceeding the length of the regulatory period. Application of such a rate reflects one view that regulated assets have long lives and investors are concerned with cashflows over the life of the asset. This rate also uses the longest term generally available (10 years) for a proxy that investors would use to discount cashflows."

The ERA also noted:[6]

> • "Dr Lally's theorem cannot identify the expected rate of return that investors actually need. It identifies that NPV=0 is met when the allowed return incorporated into regulatory revenues is equal to the discount rate used by investors. However, this would support that an indeterminate number of allowed returns exist, from which the regulator must select the rate that it considers is the true discount rate.
>
> . . .
>
> • Dr Lally relies on the assumption of investor expectations of certainty that the market value of the assets will equal the RAB at the end of the regulatory period. However, equity investors are unlikely to assume that the market value of the network is equal to the regulated asset base at the end of a regulatory period.

[5] ERA 2022a, p. 95.
[6] ERA 2022, pp. 96-98.

> • Unlike bonds, residual value is not returned in cash at the end of the period, but rather comprises a value whose recovery remains at risk from future regulatory decisions and changes in the market (both technological changes and changes to customer preferences). The market value of equity in the business is not certain to equal the equity's share of the ending RAB value at the end of the regulatory period, but will instead reflect the present value (at that time) of all expected future cashflows."
>
> . . .

"598. Having assessed both approaches, the ERA now considers that the weight of the evidence requires that it change its approach to match common market practice for long-lived assets and support a longer-term market rate when setting the return on equity.

599. The ERA considers that a 10-year term for equity reflects the following advantages:

> • It recognises that efficient and prudent infrastructure companies require a long-term rate to reflect the long-term cashflows of their networks.
>
> • It is consistent with standard practice adopted by market investors, valuation professionals, academics and practitioner textbooks.
>
> • Recognises the reality of regulatory cashflows and returns being realised by equity investors over the life of the asset.
>
> • Does not disadvantage regulated assets which have to compete for funding with unregulated infrastructure with similar risk. Regulated infrastructure investments must compete for equity capital with similar unregulated investments, for which the required return is typically based on a 10-year term for equity.
>
> • Meets the NPV=0 principle. If the goal is to match the regulatory allowance to the market cost of capital (i.e., the return that investors require) the term should be set to match the practices of investors. A 10-year term for equity supports efficient financing costs over multiple regulatory periods.
>
> • The use of a 10-year term for equity is widely applied by Australian and international regulators. Regulators have generally accepted the argument that the term of equity should be a proxy for the life of the regulated asset. Given the long-term nature of infrastructure asset investment, regulators generally consider that a long-term rate better reflects the expectations of investors rather than a shorter term.

600. Therefore, the ERA considers that investors consider long-term cash flows across multiple regulatory periods and expect to receive returns consistent with this perspective."

2.3 ERA INDEPENDENT PANEL

The ERA Independent Panel, in one place, did not express a preference on the choice between 5 and 10 year terms but considered that evidence of consistency in process should be more carefully explained and reconciled on an holistic basis, including in relation to the principle of targeting NPV=0 holistically.[7]

However, in relation to the term for equity the Panel claims that several weaknesses have been identified in Dr Lally's mathematical proof (see below) but that in the absence of a stronger rebuttal of Dr Lally's proof or a competing proof supporting the notion that a 10-year term can achieve NPV=0, the finding that a 5-year term better achieves NPV=0 also remains open to debate. The Panel concludes that in the presence of uncertainty, reasonable people can draw different conclusions from the same arguments. On balance, the Panel considers that the ERA's proposal to use a ten-year term is appropriate and based on sound reasoning.[8]

The CRG notes that while the Independent Panel has expressed the view that the reasoning for the 10-year term is reasonable it has not addressed various specific reasoning as set out in the following section.

2.4 CRG VIEW

The CRG disagrees with the interpretation presented by the ERA in changing its position including many of the specific concerns it has raised in relation to the advice provided by Lally. Details of the CRG view are set out below.

2.4.1 The Lally mathematical proof of the NPV=0 principle

To aid in understanding, this sub-section sets out the Lally proof of the NPV=0 condition.[9] It should be recognised that the Lally framework is in fact a standard finance theory framework for valuing assets and was well documented in a seminal paper by Schmalensee as discussed below.[10]

Consider a two-year regulatory period where prices are set at the start of the year and by convention received at the end of the year and there is no debt, opex, capex or taxes.

Consider first the position at the end of year 1 or start of year 2.

The value of the (regulatory) asset base at the end of year 1 is defined as the expected revenues to be earned at the end the second year discounted by a one-year cost of equity discount rate defined at the start of the second year. The expected revenues for year 2 need to be specified to provide a return on the depreciated asset base valued at the start of year 2 plus recover the depreciated value of the asset base as measured at the start of year 2.

Thus Lally defines the value of the asset base at the end of year 1 or start of year 2 (time 1) as:

[7] Independent Panel (ERA), 2022, p. 14 and p. 17.
[8] Ibid p. 38.
[9] Lally 2022a, pp. 4-5).
[10] Schmalensee 1989.

$$V_1 = \frac{E(REV_2)}{1 + k_{e12}} = \frac{(A - DEP_1)\, k_1 + (A - DEP_1)}{1 + k_{e12}} \qquad (1)$$

Where

A is starting value of assets.
$E(REV_2)$ is the expected revenue for year 2.
k_{e12} is the one-year cost of equity prevailing at the start of year 2 (time 1).
DEP_1 is the regulatory depreciation for year 1.
k_1 is the allowed cost of equity prevailing at the start of year 2.

Note that in this two-period model all of the capital is expected **to be recovered** over the two-year period.

Now consider the position at the start of year 1 (time 0). The value of the asset base at time 0 will be the discounted value of the sum of expected revenues for year 1 plus the expected value of the asset base at the end of year 1. (This is the second panel in expression 2 below.)

The expected revenues for year 1 need to be specified to provide a return on the depreciated asset base valued at the start of year 1 plus recover the depreciated value of the asset base for year 1. This is the term $Ak_0 + Dep_1$ in the third panel of (2) below.
Thus:

$$V_0 = \frac{E(REV_1 + E(V_1)}{1 + k_{e01}} = \frac{(Ak_0 + DEP_1) + E(V_1)}{1 + k_{e01}} \qquad (2)$$

Where

$E(REV_1)$ is the expected revenue for year 1.
k_{e01} is the one-year (true) cost of equity prevailing at the start of year 1.
$k_{0\,is}$ the allowed cost of equity prevailing at the start of year 1.

The NPV =0 principle requires $V_0 = A$. This can only occur if the allowed cost of equity k_1 prevailing at the start of year 2 in equation (1) matches the discount rate k_{e12} in that equation (which is the one-year cost of equity at that time) and the allowed cost of capital k_0 in equation 2 matches the discount rate k_{e01} in that equation.

In this case equation 1 becomes:

$$V_1 = \frac{(A - DEP_1)\, k_{e12} + (A - DEP_1)}{1 + k_{e12}} = A - DEP_1 \qquad (3)$$

And equation 2 becomes:

$$V_0 = \frac{(Ak_{e01} + DEP_1) + (A - DEP_1)}{1 + k_{e01}} = A \qquad (4)$$

This shows the NPV=0 condition holds if the allowed rate of return matches the one-year equity discount rate.

Note also that equation (4) says that the value now of all future cash flows equals the initial investment meaning that the NPV=0 condition is satisfied over the entire life of the assets[11] i.e., investors can expect on an ex-ante basis to earn an allowed return consistent with the pay-off period and achieve the return of their capital in the form of allowed depreciation.

In application annual rates of return are not used but rather returns that relate to the regulatory period or a longer period. However, as explained below in the seminal paper of Schmalensee[12] (which Lally bases his approach on) annual returns are justified provided the regulator sets the allowed return for one year equal to the true cost of capital for one year.

Note that **although it is the case that the NPV=0 condition will hold for any rate of return provided the allowed return matches the discount rate** (as noted by the ERA and other stakeholders), **the discount rate must match the pay-off period and pay-off period is defined by the time period for which prices are set.** For example, one would not use a 10-year discount rate to value a five-year government bond.

As Lally notes:[13]

> "In regulatory decisions, the primary consideration should be that the NPV = 0 test be satisfied, or else regulated businesses are over or under compensated. As shown in section 2.1, this requires matching the term of the regulatory allowance for the cost of equity to the term of the discount rate, and the term of the discount rate must match the term of the payoffs being discounted (five years) by definition of a discount rate."

This proposition has also been expressed by the AER as follows:[14]

> "By definition, the expected return is linked to the period over which it is expected to be received."

In support of the proposition that the term of the allowed equity return should match the period of the regulatory cycle, the AER also referred to previous advice of Professor Davis[15] and noted a submission by the Network Shareholders Group[16] suggesting that "any estimate of costs expected to be incurred in future periods is irrelevant for the estimate of efficient costs over the regulatory period, since the costs and revenue are reset in the next regulatory period."

In regulatory practice the depreciated asset base is rolled forward across regulatory periods reflecting deprecation that is recovered in previous periods 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 based on the new forthcoming regulatory period. With this approach the NPV=0 condition is achieved for each regulatory period, based on the allowed rate of return matching the true cost of capital for the relevant 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

[11] Lally 2022b, pp. 4-6.
[12] Schmalensee 1989.
[13] Lally 2022, p. 28.
[14] AER 2022, p. 105.
[15] AER 2022, p. 101 and Davis 2003, p. 10.
[16] Ibid, p. 102.

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.

Another point justifying a 5-year rate is that, with a regulatory period of 5 years, the discounted value of the last period will have the predominant influence in terms of contribution to a present value of the asset base because it will not only cover the cash flow for allowed revenues for that year but also the residual value of the asset base. As Lally expresses it:[17]

> "Because this valuation involves future benefits that extends only five years into the future, and the payoff in five years is the principal one, the appropriate discount rate here (k) is the five-year rate."

In summary, if prices are reset every 5 years and the regulatory arrangements are such that investors can expect to recover their depreciated asset values into the future, as well as their other future costs, and earn their return on those assets, the rate of return must be based on a 5-year term for consistency with the NPV=0 condition.

2.4.2 The Schmalensee proof

Lally's demonstration of the NPV=0 principles is based on a seminal academic paper of Schmalensee. Schmalensee's paper establishes an 'Invariance Proposition' for deprecation with a simple methodology that can be adapted as Lally has done to support his propositions about the relevance of a rate of return matching the regulatory period.

Schmalensee summarises his paper as follows:[18]

> "This note provides a simple, general proof that if a regulated firm is allowed to earn its actual (nominal) one-period cost of capital on the depreciated original cost of its investments, and if actual earnings equal allowed earnings, then the net present value of all investments is zero for any method of computing depreciation."

Schmalensee also notes:[19]

> "The Invariance Proposition rests on the assumption that the regulated firm's actual rate of return on the book value of its assets is adjusted each period to equal the current one-period interest rate. But regulators rarely look at short-term interest rates in practice."

Schmalensee also notes that as long as regulators adjust the accounting rate of return to equal the expected cost of capital in each period and depreciation deductions eventually add up to the asset's initial cost the Invariance Proposition does not require the assumption that future is known perfectly – "all that is need to be know for certain is the behaviour of regulators, not future capital market conditions".[20]

2.4.3 AER example of violation of the NPV=0 condition for a 10-year term

The AER has presented extensive material in support of adopting a term for return on equity matching the regulatory period. This includes a stylised example using modelling assumptions consistent with the valuation practices described in stakeholder submissions. The example is

[17] Lally 2021, p. 19.
[18] Schmalensee 1989, p. 293.
[19] Schmalensee 1989, p. 296.
[20] Ibid.

reproduced below and shows that even under those assumptions, setting the allowed rate of return on equity to the expected return required by investors over a longer period than the time between resets would not generally satisfy the NPV=0 condition.[21]

The AER's stylised example assumes:

- The regulatory asset has an opening value of $100.
- It fully depreciates over 2 periods with $50 depreciation in each period.
- There is no new capital expenditure, no operating expenditure, no tax and no revenue adjustments, no inflation or expected inflation.
- The business is financed by 40% equity and 60% debt.
- Investors use a common valuation practice of evaluating discounted levered free cashflows to equity holders.
- Investors discount all cashflows using the same long-term discount rate, which is the required return on equity over 2 periods.194 This rate is 5% at the start of the first period.
- Regulatory return on debt allowance completely offsets the debt servicing costs.
- Under the above assumptions, for the NPV=0 principle to be satisfied at the start of the first period, the market value of equity ($40) should be equal to the present value of the expected future levered cashflows. Given the above assumptions, the only net cashflows are the equity portion of the allowed return on and return of capital. The latter is $20 in each period and the former is the product of the allowed return on equity ($k1$ and $k2$) and the equity portion of the RAB, so that:

$$40 = \frac{40 * k_1 + 20}{1.05} + \frac{20 * E[k_2] + 20}{(1.05)^2}$$

If the allowed return on equity is never reset, that is $k_1 = k_2 = k$, then it is straightforward to demonstrate that setting $k = 5\%$ would result in NPV=0 at the beginning of the first period:

$$40 = \frac{40 * 0.05 + 20}{1.05} + \frac{20 * 0.05 + 20}{(1.05)^2}$$

Assume instead that the allowed return on equity is originally set to match the long-term return on equity of 5% – that is $k_1 = 5\%$ – but then it is reset at the beginning of the second period to be equal to the long-term return on equity at that point of time. Then the NPV=0 condition at the beginning of the first period is as follows:

$$40 = \frac{40 * 0.05 + 20}{1.05} + \frac{20 * E[k_2] + 20}{(1.05)^2}$$

[21] AER 2022, pp. 109-110.

Rearranging:

$$20 = \frac{20 * E[k_2] + 20}{1.05}$$

Clearly, the above condition would only hold if the second period allowed return on equity is expected to be reset at 5% – that is, the long-term return on equity at the start of the first period. Therefore, if the long-term required return on equity changes over time, resetting the allowed return on equity equal to the prevailing long-term required return would not result in NPV=0 at period 0.

Note that because the NPV is calculated at time zero the discount rate of 5% is the ten-year discount rate at that time. If when the second period starts the prices are reset with a new discount rate the NPV is not preserved as it was with the original calculation, if the discount rate changes from time zero.

Advocates of 10-year term have not addressed this point. Some have argued that if cash flows are constructed with a 10-year allowed rate of return, then the use of a ten-year discount rate will ensure NPV=0. This is true for the cash flows for a defined period at a point in time but it is not true if prices are reset with a different discount rate after a resetting period of 10 years. Advocates of a 10-year term have not provided a mathematical proof that shows the NPV=0 condition is preserved if a 10-year rate is changed after 5 years and in contradiction of the claim that NPV=0 holds the AER stylised example shows NPV=0 does not generally hold if resetting occurs for a regulatory period of less than 10 years

Note also that consistency is not achieved when a five year term is used to calculate estimated inflation and the risk free rate component of the cost of debt while a ten year return is used for the cost of equity.

2.4.4 Certainty not required

Schmalensee shows that certainty in relation to capital market conditions is not required and that all that is required to ensure the NPV=0 condition is for the regulator to adjust the allowed return to reflect the true cost of capital for each period.

Lally also explains that because the analysis is performed in terms of expected revenues and that this does not require an assumption that next period asset values are known with certainty.[22]

2.4.5 The market value of the business ≠ the value of the RAB

It is important to recognise that the Lally analysis does not assume that the market value of the regulated firm equals the value of regulatory asset base when other factors that affect the value of the business are recognised. The market value could differ because cost efficiency could be higher than reflected in allowed costs, there could be regulatory error, demand and cost forecasts could also be in error and the regulated businesses may have other significant unregulated activities.

Thus, the NPV=0 is satisfied provided the regulatory arrangements are otherwise effective and one abstracts from other relevant developments that affect the value of the regulated business.

[22] Lally 2021, pp. 8-10.

The Lally analysis just shows that with a term that matches the regulatory period the NPV=0 condition is met and a return on and return of capital is achieved provided consistent resetting of prices is put in place over the life of the assets.

2.4.6 Non-diversifiable risks should be reflected in beta

The ERA noted that residual value:[23] "comprises a value whose recovery remains at risk from future regulatory decisions and changes in the market (both technological changes and changes to customer preferences). The market value of equity in the business is not certain to equal the equity's share of the ending RAB value at the end of the regulatory period, but will instead reflect the present value (at that time) of all expected future cashflows."

This is true but the risks referred to are not relevant to the setting of an appropriate equity return if they are diversifiable as per a central assumption of the CAPM. In addition, if they are not diversifiable the risks should be taken account of in an appropriate estimate of beta and not by choosing a long-term estimate for the return. The treatment of these risks is a separate issue to the selection of an appropriate term if the CAPM model is being used to set an appropriate return on equity.[24]

In this respect, it is also important to emphasise that if there is a risk of a change in the regulatory arrangements then that risk should be reflected in the estimate of beta if the risk is non-diversifiable.

2.4.7 Commercial and regulatory practice

Advocates of a 10-year term, including the ERA, claim that a 5-year term is not generally consistent with commercial and regulatory practice.

Lally has responded to arguments from those who value regulated businesses using a 10-year rate in recent advice for the AER concurrent evidence session for its current review of the rate of return for regulated entities and in advice to the ERA for its current rate of return review.[25] The AER has also examined market practice and the academic literature on the issue.[26]

In discussing valuation practitioners tending to use a ten year or longer rate Lally argues that the use of a discount rate of 10 years is an approximation when the true discount rates may change over a longer period and the approximation may mean only a slight error because the cash flow valuation is only one input into a negotiation exercise.[27]

This interpretation is also made by the AER as follows:[28]

> "Market practitioners and valuation professionals may use the same discount rate to discount all cashflows, regardless of the timing of the cashflows. This appears to suggest that infrastructure investors expect to receive the same (10-year) rate of return, independently of the holding period of the investment. However, the 10-year rate is used as a proxy, rather than because investors are indifferent between investing for a

[23] ERA 2022, p. 96.
[24] See also Lally 2022a, p. 23.
[25] Lally 2022b, pp.7-8 and 2022a. pp. 18-32.
[26] AER 2022, pp. 85-109.
[27] Lally 2022a, p. 19.
[28] AER 2022, p. 107.

shorter or a longer period. A more theoretically correct approach would be to match the discount rates to the period in which cashflows arise. As pointed out by one of our concurrent evidence session experts, Dr Glenn Boyle:[187]

> ... the anecdotal observation that some practitioners claim to use the 10-year rate in their CAPM applications isn't very persuasive at all; corporate finance research has repeatedly demonstrated that firms regularly use simplified heuristics as an approximation to a more complex approach. So even if the claims are to be taken at face value, all it tells us is that practitioners sometimes apply a 10-year rate to all future cashflows (including those off in the distant future) as an approximation to using (mostly unobservable) matched-year rates. It certainly doesn't imply that a set of year 1-5 cashflows alone should be discounted at a 10-year rate."

The AER also notes that valuation professionals also recognise the 10-year rate is used only as a proxy, referring to a recent valuation expert report by Grant Samuel:[29]

> "Theoretically, the risk-free rate used should be an estimate of the risk-free rate in each future period (i.e., the one-year spot rate in that year if annual cash flows are used). . . . In practice, the long-term Australian Commonwealth Government Bond rate is used as the most practical estimate . . . . However, it should be recognised that the yield to maturity of a long-term bond is only an average rate and where the yield curve is strongly positive (i.e., longer term rates are significantly above short-term rates) the adoption of a single long term bond rate has the effect of reducing the net present value where the major positive cash flows are in the initial years. The long-term bond rate is therefore only an approximation."

Lally notes that while valuers may be forecasting well beyond a 5-year regulatory period, regulators are not, as they do not need to, given the methodology they are using. Thus he explains:[30]

> "However, if regulators are doing their job, the present value of the future cash flows for the regulated assets will be equal to the current Regulatory Asset Base (RAB), subject only to the possibility that the regulated business in question is expected to outperform the regulatory allowances. If the expected degree of outperformance is 10% on average per regulatory cycle, the regulated business would be worth 10% more than the RAB. This approach requires no forecasting of future cash flows in dollar terms and therefore no need for a discount rate.

As further explained:[31]

> "However, as argued in section 2.1, the values appearing in equations (1) to (4) purposely do not account for this, otherwise regulators would be anticipating (and thereby neutralizing) the opportunity for firms to be rewarded for this outperformance. Expressed equivalently, regulators set prices to satisfy the NPV = 0 test using benchmark expectations that purposely ignore the possibility that firms will outperform

[29] AER 2022 p. 108 and Grant Samuel 2021, Appendix 3, p. 4.
[30] Lally 2022a. pp. 18-19 and 2022b, p. 7.
[31] Lally, 2022a, pp. 21-22

> these benchmarks, so as to allow firms to be rewarded for such outperformance (at least for one regulatory cycle)."

Lally also argues that precision in the regulatory exercise is far more important than in the exercises carried out by valuers and regulators are only concerned with the discount rate for the next five years. Another way to put it is that valuers may have a long time horizon but the horizon for regulation is five years and in the fifth year the contribution to the present value of the asset base is the implied future cash flow to cover allowed costs and a return on capital as well as the undepreciated value of the regulatory asset base.[32] So one cannot make an apples with apples comparison of the practice of valuers and regulatory practices.

As to arguments that regulatory practice, in other jurisdictions, tends to favour longer term rates this may well be the case but regulatory practice is always evolving and the CRG considers there is persuasive logic for the case for an allowed rate of return on equity to match the regulatory period.

2.4.8 ERA independent panel

The CRG considers that the ERA independent panel's assessment of an appropriate term is very limited and importantly does not appear to have specifically considered the material outlined in the foregoing sections from 2.4.1 to 2.4.7; in particular the AER example of the violation of the NPV=0 principle, if the 10-year discount rate changes across different regulatory periods, and the fundamental principle that the term must match the pay-off period which in effect is a series of linked 5-year periods.

2.4.9 Responses to specific ERA interpretations

The ERA has described the two approaches to setting the term of the equity return as: A regulatory rate and A competitive market rate. However, the CRG considers the labelling and descriptions are misleading. We consider that appropriate regulatory settings and principles reflect efficient financing costs consistent with a competitive market so that an appropriate regulatory rate would also be a competitive rate. The long lives of assets under the 'regulatory rate' approach are taken account of by recognising the value of the RAB at the end of each period which is indexed by a suitable measure of inflation and carried forward to the next period. The rolling forward of the RAB in effect captures the cash flows over the life of the assets. At each point of time when prices are set the RAB is the present value which is expected to be recovered by setting prices consistent with prevailing demand and cost conditions.

As explained above the term of the equity return needs to be consistent with the pay-off period as this a fundamental requirement when calculating a present value. As expressed by the AER:[33]

> "By definition, the expected return is linked to the period over which it is expected to be received."

This approach assumes that the regulator will continue to reset prices such that investors can expect an appropriate return on and return of capital will continue over the life of the assets.

[32] Lally(2021, pp. 18-21.
[33] AER 2022, p. 105.

And where there is a risk that this would not continue it should be addressed in the CAPM through an appropriate beta provided the risk is not diversifiable.

Table 1 summarises a number of concerns raised by the ERA about the arguments for a term for the equity return matching the regulatory period when prices are reset and the CRG response with page references referring to the Explanatory Statement.

Table 1: ERA concerns about term of return issues and CRG response

ERA concern	CRG response
Dr Lally's theorem cannot identify the expected rate of return that investors actually need. It identifies that NPV=0 is met when the allowed return incorporated into regulatory revenues is equal to the discount rate used by investors. However, this would support that an indeterminate number of allowed returns exist, from which the regulator must select the rate that it considers is the true discount rate. (p. 96)	Dr Lally's analysis requires the term of the return to match the payoff period which is the regulatory period under the assumption that resets would be expected to continue in a similar manner to the current regulatory period. The discount rate is determined separately by selection of relevant parameters but the regulatory period defines the period of the term. This is standard financial theory and practice when valuing assets for a defined period.
Dr Lally relies on the assumption of investor expectations of certainty that the market value of the assets will equal the RAB at the end of the regulatory period. However, equity investors are unlikely to assume that the market value of the network is equal to the regulated asset base at the end of a regulatory period. (p. 96)	Dr Lally's framework does not require investor expectations of certainty that the RAB at the end of the regulatory period will be recovered in the future. When it comes to resetting prices in the next period the end of period RAB for the previous period is the value that used to set prices given prevailing demand and cost conditions at the time. The framework assumes that the value of the RAB at the end of the regulatory period is consistent with a residual value after allowing for an appropriate return on and return of capital during the regulatory period. The value of the RAB may not equal the market value of the firm because of the realisation of efficiencies, forecast error for costs and demand and regulatory error.
Unlike bonds, residual value is not returned in cash at the end of the period, but rather comprises a value whose recovery remains at risk from future regulatory decisions and changes in the market (both technological changes and changes to customer preferences). The market value of	Uncertainty about technology, preferences and regulatory arrangements needs to be reflected in the equity beta and not the term, and only where such a risk is non-diversifiable.

equity in the business is not certain to equal the equity's share of the ending RAB value at the end of the regulatory period, but will instead reflect the present value (at that time) of all expected future cashflows. (p. 96)	
Cash returns received by equity investors are the proceeds from the real WACC minus the nominal cost of debt. These cash returns deliver equity investors with residual returns which are lower than the real return on equity. Non-cash returns are received in the form of an escalation of the RAB. Equity investors then recover the increased RAB over multiple regulatory periods. (p. 97)	In order to ensure NPV=0 and that there is no double counting of inflation, a real WACC is applied to a nominal RAB indexed by inflation. If a nominal WACC was applied to a RAB indexed by inflation there would be double counting. The inflation component for the rate of return is in effect recognised in the indexation of the RAB and there should be an associated cash component realised with that application.
As equity investors do not sell the energy network at the end of each regulatory period, equity investors are only able to realise their expected returns over the long-run. (p. 97)	Equity investors can sell their asset base prior to the expiry of the economic life of the asset. The regulatory arrangements and use of a term reflecting the regulatory period provide an ex-ante expectation of realisation of a return commensurate with the regulatory period and recovery of investment capital over the allowed depreciation period.
If regulated revenues are set with reference to a 10-year term for equity and equity investors discount cashflows with a 10-year term this ensures that NPV=0 is maintained. However, if regulated revenues are set with reference to a five-year term of equity and equity investors require a 10-year term, this will produce negative NPV outcomes. (p. 97)	These statements are both true but it does not mean that it is appropriate for investors to use a discount rate with a 10 year term where the pay-off period is 5 years. By definition, the expected return is linked to the period over which it is expected to be received.
Efficient and prudent infrastructure companies require a long-term rate to reflect the long-term cashflows of their networks (p. 98)	The long-term cash flows are recognised in the continuation of the regulatory arrangements in a substantially similar fashion with a similar overall objective. Uncertainty about technology, preferences and regulatory arrangements needs to be reflected in the equity beta and not the term, and only where such a risk is non-diversifiable.
A ten year term is consistent with standard practice adopted by market investors, valuation professionals, academics and practitioner textbooks. (p. 98)	Standard practice is to adopt a discount rate suitable to the purpose and reflecting the relevant pay-off period. The common or standard use of a ten year term is a simplification adopted by many practitioners

	for a range of purposes and is not subject to the exacting standards in regulatory applications.
A ten year term recognises the reality of regulatory cashflows and returns being realised by equity investors over the life of the asset. (p. 98)	The regulatory arrangements and use of a term reflecting the regulatory period provide an ex-ante expectation of realisation of a return commensurate with the regulatory period and recovery of investment capital over the allowed depreciation period.
A ten year term does not disadvantage regulated assets which have to compete for funding with unregulated infrastructure with similar risk. Regulated infrastructure investments must compete for equity capital with similar unregulated investments, for which the required return is typically based on a 10-year term for equity. (p. 98)	Given the regulated entities are natural monopolies that require regulation and given that it is reasonable to conclude this feature and regulatory arrangements effectively give strong assurance of efficient cost recovery it is very unlikely to be able to identify unregulated infrastructure with similar risk. Further, the resetting arrangements at five yearly intervals reduce long term risk by taking account of demand and cost changes and changes in beta where relevant.
Meets the NPV=0 principle. If the goal is to match the regulatory allowance to the market cost of capital (i.e. the return that investors require) the term should be set to match the practices of investors. A 10-year term for equity supports efficient financing costs over multiple regulatory periods.(p. 98)	The market cost of capital needs to correspond to the pay-off period which is effectively the regulatory period assuming that prices will continue to be reset as demand and cost conditions change over time and the RAB is rolled forward in a similar manner as is currently the practice.
The use of a 10-year term for equity is widely applied by Australian and international regulators. Regulators have generally accepted the argument that the term of equity should be a proxy for the life of the regulated asset. Given the long-term nature of infrastructure asset investment, regulators generally consider that a long-term rate better reflects the expectations of investors rather than a shorter term. (p. 98)	This is not a merits-based argument and regulatory practice evolves as regulators develop a better understanding of effective regulation.

2.5 ASSESSMENT CRITERIA

The ERA uses five 'general guiding principles' in determining the various parameters required to set an appropriate rate of return.[34] The CRG discussed the ERA's general guiding principles

34 ERA 2022a, pp. 18-19.

in its "Review of the meaning of 'the long term interests of consumers', economic efficiency and assessment criteria for the ERA 2022 gas rate of return instrument,"[35] The CRG suggested the principles could be expanded and described as 'assessment criteria'. The ERA reviewed the CRG suggestions and explained that the additional assessment criteria are general factors that it considers when exercising discretion.[36]

The ERA has explained that its reasoning with respect to exercising regulatory discretion for the 2022 draft gas instrument has had regard to a range of evidence but it has not described how it has specifically applied its guiding principles or addressed the CRG additional assessment criteria for key parameters for the allowed rate of return.

Table 2 below sets out the CRG assessment criteria and summarises CRG assessments of the information and analysis provided in the ERA explanatory statement for the draft gas rate of return instrument, in relation to the term of return for equity. It should be reviewed in conjunction with the information provide in the previous sub-section and Table 1.

Note that the first five criteria are the same as the existing general guiding principles used by the ERA. Criterion 6 has been added to ensure the efficient use objective is given more explicit attention. Criterion 7 is considered as more meaningful and appropriate than 'a high bar for change' as recommended by the AER CRG and captures the AER criteria of materiality and longevity. Criterion 8 is included to ensure other relevant aspects of the regulatory arrangements are considered where they are likely to impact on risk, return and the realisation of the economic efficiency criteria. Criterion 9 needs to be considered with reference to the application of all the other criteria.

Table 2: CRG assessment criteria for the term of the return

CRG assessment criteria	CRG assessment
1. Reflective of economic and finance principles and market information	The CRG considers that adopting a 10 year term is not consistent with economic and finance principles when the pay-off period is the regulatory period. The pay-off period is the regulatory period because investors can expect to recover their efficient costs incurred over the current regulatory period plus allowances for the return on capital over the regulatory period and a provision for depreciation and the balance of their capital can be expected to be recovered over future regulatory periods provided the regulator continues to use effectively the same methodology for determining the return on and of capital. The use of a longer term for the return on capital for valuation purposes is a simplification that is not appropriate for regulatory purposes if the NPV=0 condition is to be met at the time of investment given regulatory price resets reflecting updated economic parameters. This interpretation is explained in more detail in the foregoing section.

35 CRG 2022d, pp. 7-11.
36 ERA 2022d, pp. 18-19.

	And to reiterate; uncertainty about technology, preferences and regulatory arrangements needs to be reflected in the equity beta and not the term, and only where such a risk is non-diversifiable.
2. Fit for purpose	The CRG considers that the use of a term for the return that differs from the regulatory period is not fit for the purpose of calculating a regulatory allowance for the return on capital given the price resetting arrangements.
3. Transparent	By using a term that differs from the regulatory period it is not clear to what extent the NPV=0 condition will be met.
4. Implementable and replicable	Both methods are equally implementable and replicable.
5. Sufficiently flexible as to allow for changing market conditions.	Using a term that differs from the regulatory period in effect means that relevant market conditions are not reflected in the regulatory allowance for the return on capital given the price resetting arrangements.
6. Test against the price and service impacts on consumers to ensure efficient use.	Efficient use is not achieved if the NPV=0 condition is not met.
7. Ensure there is sufficient information to support change.	The CRG considers there is not sufficient information to support a change in the ERA position. The full reasoning is provided in the foregoing section.
8. Consider how the rate of return methodology in conjunction with other aspects of the regulatory arrangements is likely to impact on risk, return and the realisation of the economic efficiency criteria.	This is a general criterion where the CRG considers consumers would like a better understanding of how collectively the regulatory arrangements including various incentive mechanisms impact on risk and return.
9. Ensure the decision process engenders confidence of all stakeholders in the regulatory arrangements.	The CRG considers that the ERA reasoning for changing its position has not effectively addressed the CRG concerns explained in the foregoing section and this is not conducive to engendering the confidence of consumers in the regulatory arrangements.

3 EQUITY BETA

3.1 THE CAPM AND EQUITY RISK

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 model was explained in the CRG submission to the ERA December 2021 Discussion Paper.[37]

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. The main components of the WACC, where the CRG has a different view to the ERA, relates to parameters relating to the return on equity.

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 that applies to the particular investment.

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 market portfolio has a beta of one.

The CAPM can be defined as follows:

(1) 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.

[37] See CRG 2022c.

The CAPM is a single period model but the period is not defined. However, regulators and finance practitioners use the model over various periods. Regulators decide on parameters for the CAPM that relate to the regulatory period or in some cases a longer investment period.

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, in the form of a WACC, 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 at the start of the regulatory period. 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.

3.2 REGULATION AND EQUITY RISK

The CRG notes that the regulated entities are natural monopolies which in conjunction with the regulatory arrangements is likely to mean they have very strong assurance that they will receive cash flows sufficient to recover all their efficient costs over the regulatory period. This should in turn be reflected in the observed equity beta when measured over a longer period than reflected in weekly or even monthly data.

In other words, there are fundamental economic characteristics that suggest that the betas for the regulated gas pipelines should be relatively low. The most fundamental economic characteristic is that the regulated entities are natural monopolies facing relatively assured demand for their services.

The ERA considers that it is the monopoly status of a regulated business that increases the certainty of its revenue stream, not necessarily regulation and that a regulated monopoly business will be exposed to less risk than a business that services a competitive market.[38]

The ERA notes the impact of the regulatory framework as follows:

> "87. The ERA considers that the following characteristics of the regulatory framework applying to Western Australia's gas pipelines affect their risk relative to firms operating in the competitive market:
>
> • Periodic resets of allowed revenue, which provides some revenue certainty.

[38] ERA 2022a, p. 20.

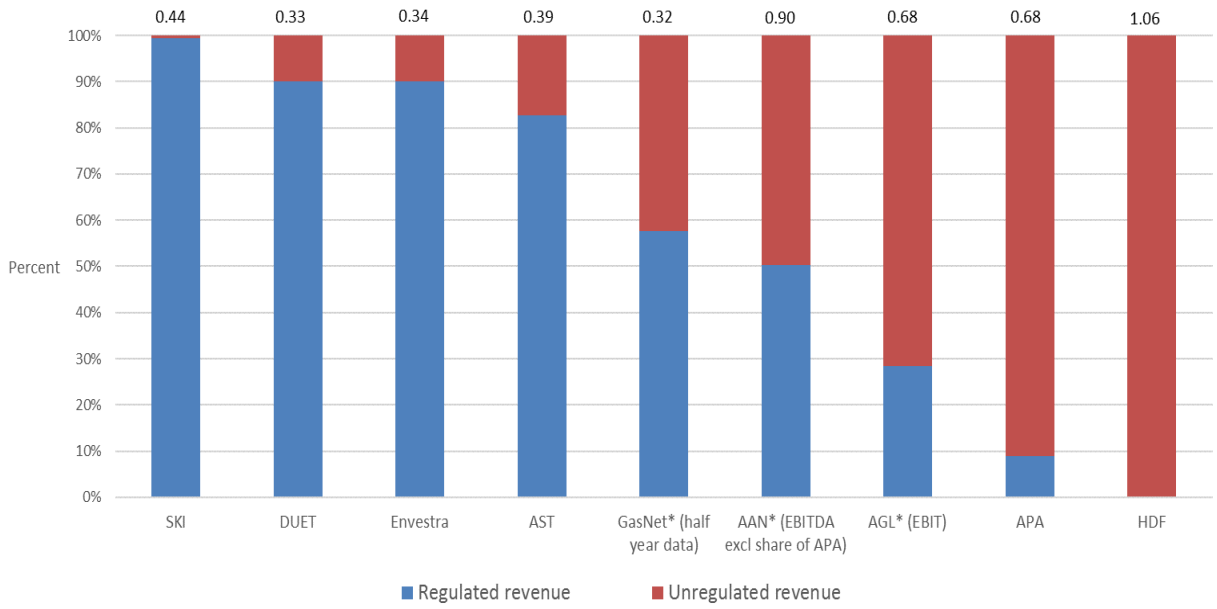
> • Consumer Price Index tariff adjustment mechanisms to reflect actual inflation, which mitigate inflation risk.
>
> • Recovery of capital expenditure once the asset base has been approved. Assets are not typically written off, rather firms can often accelerate depreciation.
>
> • Fixed principles where if the regulator approves a fixed principle the regulator must abide by that principle.
>
> • Inclusion of pass-through of costs related to tax or law changes.
>
> • The hybrid trailing average approach to estimating the cost of debt, which mitigates interest rate risk.
>
> • Allowance for debt hedging instruments and costs, which helps reduce interest rate risk.
>
> • Treatment of material unexpected adverse events."
>
> . . .
>
> 90. The regulatory framework does limit a monopoly's ability to maximise profit. However, incentive mechanisms built into the regulatory framework provide regulated businesses with incentives, often over the short term, to increase efficiency.
>
> . . .
>
> 92. This combination of limited downside risk and potential for short-term upside benefit explains the risk-reward trade-off of a regulated monopoly business. These risk-reward characteristics are incorporated into credit ratings and equity market valuations. Relative to competitive businesses, lower levels of risk for regulated monopolies are reflected in higher credit ratings from ratings agencies and lower betas from market valuations."

These features are common to the energy network businesses regulated by the AER and which are used to help develop benchmarks for measuring the cost of equity and debt.[39] Given these features together with empirical evidence on the betas for entities with a high proportion of their total revenue being regulated, the CRG considers it is reasonable to draw the conclusion that the equity betas for the regulated gas pipelines would be well below the average for the market as a whole where by definition the equity beta for the market as a whole averages one.

[39] AER 2022, p. 173.

In this respect, as noted in the CRG submission to the ERA's focussed consultation,[40] there is evidence that the betas for benchmark Australian comparators, as used by the AER, show a general trend of decreasing beta estimates as the proportion of regulated revenue increases, as shown by the AER in its 2018 rate of return explanatory statement as per Figure 14 below.[41]

Figure 14 Regulated revenue percentage and beta estimates



Source: AER, Rate of return instrument. Explanatory statement, December 2018, p. 174

Further evidence is provided in Table 3 which is drawn from the AER Draft 2022 Rate of Return Instrument Explanatory Report. The average estimates for the two recently de-listed firms, 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 and recently delisted firms for all estimation periods.

[40] CRG 2022b, pp. 11-12.
[41] AER 2018, p. 174

Table 3: AER equity beta estimates for domestic energy network business comparators (OLS estimates for weekly data to September 2018/February 2022)

Equal and value weighted portfolio estimates	Whole comparator set (9 firms and different combinations)	Still listed and recently delisted firms (APA Group, Spark Infrastructure, AusNet Services)	Recently delisted majority regulated firms (Spark Infrastructure, AusNet Services)
Longest period			
2018 review	0.42 – 0.67	0.52 – 0.55	0.42 – 0.43
2022 draft instrument	0.39 – 0.68	0.51 – 0.55	0.39 – 0.40
Post tech boom and excluding GFC			
2018 review	0.50 – 0.67	0.64 – 0.67	0.52 – 0.53
2021 update	0.46 – 0.69	0.57 – 0.62	0.46 – 0.46
Recent 5 years			
2018 review	0.49 – 0.88	0.81 – 0.88	0.70 – 0.72
2022 draft instrument	0.34 – 0.57	0.51 – 0.57	0.34 – 0.37

Source AER 2022 p.170.

Note also that the estimates indicate considerable stability for the longest period when comparing the 2018 and 2022 estimates and this stability has been confirmed by the AER for its annual updates. Some further discussion of Table 2, and in particular in relation to changes for the five-year estimate, is provided in Section 3.3.4 below.

3.3 ERA EQUITY BETA BENCHMARK

3.3.1 Use of international data

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. The ERA 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's sample of listed Australian energy networks has been reduced, with DUET already being delisted and Spark Infrastructure and AusNet having been delisted in 2022. However, while it is recognised that the current sample may still provide a sufficient number of observations there is a concern that at some stage the sample may have to be expanded to help ensure a reliable statistical estimate for the equity beta. The ERA also noted that acquisition announcements and completions may have influenced equity betas for the existing domestic sample.[42]

In discussing the AER's February 2022 concurrent evidence sessions, the ERA noted that:[43]

> "There appeared to be some agreement amongst experts that using the longest period and largest list of domestic energy networks could be used one last time for the AER's 2022 Instrument. However, the problem of the comparator sample will need to be resolved at the next review and discussions should start early."

The ERA has also noted:[44]

- As the delistings of Spark Infrastructure and AusNet are very recent, estimating their equity beta with the last available information would still result in meaningful estimates.
- If the systematic risk of network service providers is relatively static or time invariant, then examining historical betas can still reliably provide estimates of the expected equity beta.
- Other regulators have chosen to use small domestic samples (AER, Ofgem and Ofwat).

And that the one listed firm in the domestic sample, APA Group, includes unregulated businesses, along with continuing efforts to diversify its operations.[45]

The ERA December 2021 discussion paper discussed and sought views on expanding the domestic sample to include other domestic infrastructure firms and international energy networks. The CRG[46] and other parties made submissions on the Discussion Paper.

The issue of expanding the sample for the equity beta and market risk premium issues were also the subject of a Focussed Consultation[47] in April 2022 where the CRG made a submission and a supplementary submission.[48]

The ERA has noted its previous reservations about the use of international comparators, including differences in market structure, regulation and economic factors that affect the

[42] ERA 2022a, p.156.
[43] ERA 2022a. p. 158.
[44] ERA 2022a, pp. 162-163.
[45] ERA 2022a, p. 163.
[46] CRG 2022c.
[47] ERA 2022b.
[48] CRG 2022a, b.

estimated beta but that market circumstances necessitate the examination of international energy networks in the benchmark sample.[49]

The ERA has formed a sample comprising 8 Canadian firms, 2 United Kingdom firms, 1 New Zealand firm and 47 United States firms for a total of 58 firms, based on similar regulatory and market characteristics. The ERA also noted that as a result of stakeholder feedback, it adopted:[50]

> "an additional filter of only including international energy network businesses if they have materially similar regulated activities. To determine materiality, the ERA has analysed public information such as proportion of regulated revenues/income, assets and other disclosures."

However, the ERA has not specified the quantitative threshold for determining materiality of regulated activities. The CRG considers that the benchmark needs to specify that regulated activities have to constitute a dominant proportion of total revenue e.g., around 90 per cent and not merely a majority of total revenue.

The CRG submission to the ERA December 2021 Discussion Paper raised concerns that the sample of international firms was insufficiently comparable because most of the firms were vertically integrated into unregulated activities and it was not clear that the proportion of regulated revenues was sufficiently high to ensure reasonable comparability.[51]

The issue was raised again at the focussed consultation in April 2022 where the CRG noted:[52]

> "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:[53]
>
> - US energy utilities are generally vertically integrated businesses that often include construction, energy retailing, electricity generation and/or natural gas wholesaling; and are not just providers of electricity network or gas pipeline access. The upstream and downstream activities that they are engaged in are riskier than the provision of natural monopoly infrastructure services i.e., the energy transport functions.
>
> - 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 is also a wholesaler of gas and provides broadband services."
>
> The CRG also notes that the ERA has made no adjustments to its sample, at this stage, to account for the existence of non-regulated or non-network energy services in its international sample."

[49] ERA 2022a, p. 168.
[50] ERA 2022a, p. 167.
[51] CRG 2022c, p. 67.
[52] CRG 2022b, p. 10.
[53] ERA 2021, Appendix 4.

And:[54]

> "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, leverage differences 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 AER in its draft 2022 Rate of Return Instrument Explanatory Statement has similarly noted for its sample of 56 US firms:[55]

> "Our review of the international energy firms' financial data suggests that many have non- energy-related operations (such as telecommunications, water, construction and real estate), with most firms being vertically integrated with energy generation and/or retail activities."
>
> . . .
>
> We have considered ways in which less comparable firms may be systematically identified. TDB Advisory undertook a process to refine NZCC's comparator set in 2016. It concluded that only 8 of the 74 firms in NZCC's comparator set can be considered 'pure play' firms, including 3 Australian firms that are already in our domestic comparator set. We note that of the 5 non-Australian 'pure play' firms, 3 (Spire, Northwest Natural Gas and Unitil) still appear to be vertically integrated with energy retail operations.

In responding to stakeholder feedback, the ERA removed 10 firms from the December 2021 sample and added two. Very brief reasons for the removed firms were summarised in Table 19 of Appendix 4 of the ERA Draft Explanatory Statement including: "low exposure to regulated activities", "will not use propane companies", "will use the Canadian listing" and "significant other business lines". For the additions, the explanation was to replace US firms.

The ERA 2021 discussion paper contained a helpful description of all the international companies used in the benchmark sample. Inspection of those descriptions suggests that at least half of the US firms were involved in generation activities, which are understood to be unregulated and most were vertically integrated or involved in other unregulated activities. The CRG is concerned that the international sample is not appropriate because of the presence of unregulated activities for most of the comparator firms. The CRG is also concerned that the ERA has not specified the exact criteria it has used for justifying retention of firms in the sample, despite recognising the relevance of regulated revenues.

3.3.2 ERA estimate for beta

The ERA has noted the high market volatility in recent years including the impact of COVID-19 in early 2020 and the conflict in the Ukraine from March 2022 and the likelihood that these shocks may have affected measured betas.[56]

[54] CRG 2022b. p. 8.
[55] AER 2022, pp. 181-182.
[56] ERA 2022a, ibid.

The ERA has also noted that five year rolling estimates of beta for the four domestic firms show that the estimates have generally not been stable for the last decade and in particular rising substantially from about 2014 to 2020 before declining abruptly following the impact of COVID-19.[57]

Reflecting these developments, the ERA's approach for the 2022 draft gas instrument is to retain the use of a five-year estimation window with weekly data, and to also estimate 10-year betas but with a balance in favour of five-year estimates, noting the preferences of international regulators and the use of robust estimators to moderate the impact of market shocks.[58]

The ERA also proposes to estimate the equity beta using a domestic and international energy network sample.[59] The domestic component would be the four firms used in the 2018 gas instrument. The ERA considered that an expanded domestic sample is not appropriate largely because of concerns about comparability to domestic energy networks.[60]

To arrive at an estimate of equity beta, the ERA has used its discretion informed by the estimates from all examined countries and time frames of five and ten years with weekly estimates and both OLS and LAD estimators. The international sample amounts to 58 firms. The ERA proposes to pool beta estimates by country rather than pool all estimates equally. The ERA considers this will better allow for country-specific effects.

The ERA reports:[61]

> "1082. The Australian energy network sample produces a range of individual firm beta estimates from 0.3 to 0.9. The average beta estimate from the Australian energy network sample is 0.5."
>
> "1084. The ERA considers that the domestic energy sample provides a range of equity beta estimates from 0.5 to 0.6. When international comparators are examined, this provides a range of estimates from 0.5 to 1.1. The average beta estimate across all countries is 0.77."

And concludes:

> "1085. To select a point estimate for equity beta, the ERA considers all available information and uses its discretion to select a point estimate. Given the imprecision in the estimation process the ERA will continue its practice of rounding to the nearest first decimal place.
>
> 1086. The ERA considers 0.7 as the best estimate for equity beta for the benchmark network. This number has been selected as being below the international estimates to recognise that Australian equity beta estimates are generally lower than international estimates.

[57] ERA 2022a, p. 164.
[58] ERA 2022a, p. 159.
[59] ERA 2022a, p. 162.
[60] ERA 2022a, p. 166.
[61] ERA 2022a, p. 175.

> 1087. For the purposes of the 2022 draft gas instrument, the ERA applies an equity beta of 0.7. The equity beta will remain fixed for the life of the gas instrument."

The ERA's draft approach for the 2022 gas instrument will use an equity beta of 0.7 and fixed for the term of the gas instrument.[62]

3.3.3 CRG concerns about international comparators

The CRG has raised its concerns about the potential bias in using an international sample where most of the firms are vertically integrated into various unregulated energy activities and also diversified into other unregulated activities in each of the submissions it has made to date.[63]

Key points are:

- There is no point having a low standard error with a materially biased estimate. This is well expressed by Partington and Satchell:[64]

  > "The current problem of a small sample size and therefore a potentially high standard error, or sensitivity of the results to a particular observation, is not solved by collecting data from a different population."

- In forming its international sample, the ERA needs to present evidence demonstrating sufficient comparability of international energy equity betas. The CRG considers there is a lack of transparency in the selection process which undermines confidence in the relevance of the sample and is concerned that the sample does not adequately represent a regulated benchmark given the presence of unregulated activities.

- A finding of no formal statistical difference between domestic and foreign comparators does not prove that domestic and foreign betas are the same based on the standard interpretation of hypothesis testing. The correct interpretation, when the null hypothesis cannot be rejected, is that there is insufficient statistical evidence from the specific test to confirm a statistical difference.

- Furthermore, observed difference in the means could be consistent with prior theoretical evidence and be economically important.

- It is also not clear that there is a need to expand the domestic sample, at this stage, as increased observations could be available by using a longer period of estimation than the five years proposed by the ERA.

- In addition, the AER estimates of beta for its 9 firm domestic sample show reasonable stability when using the longest period available. The long term stability of equity beta estimates justifies using data for delisted firms..

- The ERA has not specified formal criteria for an acceptable sample size. In this respect Ofgem and Ofwat in the United Kingdom also use a small number of domestic listed

[62] ERA 2022a, p. 155.
[63] ERA 2022a, b, c.
[64] Partington and Satchell 2018, p. 24.

> entities to estimate beta and it is common commercial practice to use five years of monthly data.

Further evidence of concerns about comparability of international and domestic comparators is the contrast between the increase in the AER's international estimates for 5-year estimates since 2020 and the decrease in the domestic estimates in the same period.[65] The AER notes:

> "This divergence in trends between the domestic and international data could be a statistical anomaly, or it could reflect a difference in risk profile between domestic and international energy firms. Our network performance monitoring shows that networks maintained stable revenue profiles during the pandemic period. Domestic networks were largely insulated from the instability observed across the broader economy, which may explain the decrease in their equity beta estimates."

In summary, 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.

3.3.4 CRG view on equity beta benchmark

The CRG considers that it is not appropriate at this stage to use international comparators unless it can be clearly demonstrated that they relate predominantly to regulated energy networks with minimal vertical integration and involvement in unregulated activities. Based on observations of the apparent impact of economic regulation in Australia on equity betas and the long-term stability of estimated equity betas, demonstrated by AER estimates, the CRG considers that the best estimate of beta can be obtained by giving most weight to the domestic estimates of the AER and in particular the estimates for the recently delisted majority regulated firms (Spark Infrastructure, AusNet Services).

As explained above, Table 2 is drawn from the AER Draft 2022 Rate of Return Instrument Explanatory Report. Based on the estimates in this table, ERA estimates and reasoning presented in this section the CRG considers that an equity beta of 0.5 is most reasonable.

It is;

- slightly less than the average for the AER's whole comparator set for the longest period (0.54) (Table 1);
- consistent with the clustering of estimates around 0.5-0.6 as reported by the AER;[66]
- above the average for the AER estimates for the recently delisted majority regulated firms (Spark Infrastructure, AusNet Services) for the longest period (0.4) (Table 1);

[65] AER 2022, p. 171.
[66] AER 2022, p. 171.

- slightly less than the 5 and 10 averages for the ERA's 5- and 10-year domestic sample to December 2021 (0.56 and 0.54)[67] and:

- more than the average for the two recently delisted majority regulated firms as estimated by the ERA for the five-year estimates to December 2021 (0.4);[68] and

- consistent with the a priori conceptual position that the regulatory arrangements provide considerable reduction in systematic risks.

As noted above, the ERA has also noted that five year rolling estimates of beta for the four domestic firms show that the estimates have generally not been stable for the last decade and in particular rising substantially from about 2014 to 2020 before declining abruptly following the impact of COVID-19.[69]

However, just because the rolling five-year estimates show considerable variability does not mean that estimates for longer periods are unstable. In this respect note the comparability for the longest period estimates for the 2018 review and 2022 draft instrument shown in Table 2 in section 3.2 above for each of the different data sets. The same stability is evident with various updates reported by the AER.[70]

In relation to the variability for the 5 year estimates, in its 2018 Explanatory Statement, the AER noted that because the comparator firms could be considered bond proxies (where there is likely to be an inverse relation between bond prices and interest rates) they would tend to outperform the market during times of interest rate decreases leading to an increase in short term equity beta estimates.[71] In contrast, for the 2021 update the AER noted that this period included data from the Covid pandemic and that this more recent data has also highlighted the stability of the businesses that the AER regulates, in times of material disturbances.[72] For the most recent 5 years the AER has also noted that the estimates show a substantial decrease from August 2021 to February 2022 because of the removal of one category (P6) from the estimates.[73]

To sum up, 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.

- longer term estimates reduce the impact of one-off events and are likely to lead to more robust and reliable equity beta estimates;

[67] ERA 2022a, p. 175.
[68] ERA 2022a, p. 174.
[69] ERA 2022a, p. 164.
[70] AER 2022, p. 164 and 170.
[71] AER 2018, p.166.
[72] AER 2021, p. 107.
[73] ERA 2022, p. 170.

- the likely impact of the regulatory arrangements in insulating the regulated entities from systematic risk suggest and equity beta well below the average for the market as a whole i.e., well below an equity beta of 1.

3.4 ERA INDEPENDENT PANEL

The ERA independent panel considered that ERA's approach to incorporating international sample firms, as well as the country and entity selection, is appropriate and based on sound reasoning but recommended the ERA more fully develop and explain their selection approach. However, it noted: reasonable arguments can be made in favour of and against inclusion of international firms,; the economic significance of the decision (noting the choice of comparator firms is arguably the most impactful single decision influence the final return); and the sensitivity of the beta to changes in sample and weighting methods. [74]

The CRG considers that the ERA independent panel did not appear to specifically consider many of the points outlined in Sections 3.2, 3.3.3 and 3.3.4 above.

3.5 ASSESSMENT CRITERIA

Table 4 below sets out the CRG assessment criteria and summarises CRG assessments of the information and analysis provided in the ERA explanatory statement for the draft gas rate of return instrument, in relation to the equity beta. It should be reviewed in conjunction with the information provide in the previous sub-section and Table 2.

Table 4: CRG assessment criteria for the equity beta

GRG assessment criteria	CRG assessment
1. Reflective of economic and finance principles and market information	The use of an international sample that is materially different to the regulated entities does not comply with the standard economic and finance approach for implementing the 'pure-play' technique.
2. Fit for purpose	The CRG remains unconvinced the proposed approach to determining equity beta achieves the criteria for benchmark efficient firms representing a 'pure play' network service provider. The CRG considers that an equity beta where there is significant recognition of estimates for international sample of firms that are materially different in terms of the nature and extent of economic regulation is not fit for the purpose of determining a regulatory allowance for the return on equity.
3. Transparent	The CRG considers that the extent to which international estimates have been used to determine an appropriate equity beta is not transparent.
4. Implementable and replicable	The use of international data is implementable but the current approach is not sufficiently transparent to be replicable by parties other than the ERA.

[74] Independent Panel (ERA) 2022, pp. 43-44.

5. Sufficiently flexible as to allow for changing market conditions.	The ERA approach is sufficiently flexible to allow for changing market conditions as the period can be changed but there is a concern about the relevance of an international sample as explained above.
6. Test against the price and service impacts on consumers to ensure efficient use.	Efficient use is not achieved if the equity beta does not reflect the risk of regulated natural monopolies for gas transmission and distribution in Western Australia. There is empirical evidence and principles that support the contention that the ERA proposed equity beta of 0.7 is higher than necessary to reasonably reflect risk and provide appropriate incentives for efficient investment to occur.
7. Ensure there is sufficient information to support change.	While current trends may impact use of domestic sample in the future, there is considerable agreement the current sample can be utilised for the 2022 instrument. The CRG does not consider it is necessary to extend the sample to include international firms at this stage and also that the ERA has not provided sufficient information to address concerns that many of the firms in the international sample are not appropriate given the existence of substantial unregulated revenues with different risk characteristics. The CRG also notes longer term estimates reduce the impact of one-off events and are likely to lead to more robust and reliable equity beta estimates than reliance on the latest five year period. Economic principles also suggest that the equity betas for the regulated gas pipelines in Western Australia are likely to be considerably lower than market average equity betas and international network energy betas given natural monopoly characteristics and the nature of regulation for the regulated gas pipelines.
8. Consider how the rate of return methodology in conjunction with other aspects of the regulatory arrangements is likely to impact on risk, return and the realisation of the economic efficiency criteria.	This is a general criterion where the CRG considers consumers would like a better understanding of how collectively the regulatory arrangements including various incentive mechanisms impact on risk and return.
9. Ensure the decision process engenders confidence of all stakeholders in the regulatory arrangements.	The CRG considers that the ERA reasoning for changing its position has not effectively addressed the CRG concerns explained in the foregoing section and this is not conducive to engendering the confidence of consumers in the regulatory arrangements.

4 MARKET RISK PREMIUM

4.1 ERA POSITION

The market risk premium reflects the risk relating to the market for risky investments as a whole relative to the risk-free rate. The market risk premium is the price of risk or compensation for risk that cannot be effectively eliminated in a fully diversified portfolio. The amount of risk for an equity investor is measured by the equity beta and product of the market risk premium and equity beta is a measure of the risk premium that investors require to be added to the risk-free rate to compensate for undiversifiable risk for a specific investment.

The 2018 gas instrument applied a market risk premium of 6.0 per cent, which was fixed over the period of the instrument. The ERA determined an estimate of the market risk premium using the historic market risk premium, the dividend growth model (DGM) and conditioning variables (default spreads, five-year interest rate swap spread, dividend yields and a stock market volatility index). More reliance was placed on the market risk premium relative to the DGM and a final point estimate was determined by using regulatory judgement, including considering conditioning variables. A simple (equally weighted) average of the lowest arithmetic and highest geometric means for five overlapping periods was used to estimate the historic market risk premium.

For the 2022 draft gas instrument review the ERA has:

- largely maintained the approach to estimating the historic market risk premium detailed in the 2018 gas rate of return instrument;
- used only post-1958 data given concerns about the relevance of earlier data;
- made some simplifications to its historic averaging method that were largely supported by stakeholders;
- continued to support the proposition that an unbiased estimate of the historic market risk premium is likely to be somewhere between the geometric average and the arithmetic average and proposes changing from a simple average to weights of 60 per cent for the arithmetic mean and 40 per cent for the geometric mean, based on its interpretation of the evidence;
- incorporated all the data to calculate arithmetic and geometric means for four overlapping time periods (1958-2022, 1980-2022, 1988-2022, 2000-2022) rather than relying on the lowest arithmetic mean and highest geometric mean;
- estimated an average historic market risk premium of 6 per cent using a 10-year term for equity;
- estimated a preferred DGM market risk premium of 6.9 per cent but noted a number of concerns about the DGM, including sensitivity to input assumptions and upward bias

that mean it is unreliable on its own and did not place a large reliance on the model's market risk premium estimate;

- also preferred not to use a calibrated DGM based on a number of concerns about variability in the market risk premium, including recent high estimates which if used would be biased given previous low estimates, sensitivity to the calibration period with some estimates of the dividend growth rate being implausible and that calibration to a historical target reduces the usefulness of the calibrated DGM as a forward-looking model;

- continued to consider the current levels of conditioning variables relative to their historic averages and how these market conditions affect the market risk premium; and on balance considered that the conditioning variables were currently at their historic averages and supported a market risk premium at the midpoint of its range;

- considered that there is likely some relationship between the market risk premium and the risk-free rate but this relationship cannot be quantified in terms of the direction or magnitude and did not propose to make adjustments to the market risk premium based on statistical analysis;

- in specifying a preferred estimate of the market risk premium: placed more emphasis on the historic market risk premium relative to the DGM estimate and determined a final point estimate based on regulatory judgement, including considering conditioning variables;

- estimated a market risk premium for the 2022 gas instrument of 6.2 per cent (rounded to one decimal place), and fixed for the term of the gas instrument.

4.2 ERA INDEPENDENT PANEL

The ERA Independent Panel considered that the ERA's approach to estimating the market risk premium is appropriate and based on sound reasoning.

In relation to averaging it considered that a weighting in favour of the arithmetic mean is justifiable based on the mathematical principles on which the two methods are built and the purpose of the Instrument being to estimate the probability weighted average future return which it claims is better achieved with the arithmetic mean but also noted the risk of changes in the absence of strong empirical or theoretical support.[75]

The CRG does not agree with the Independent Panel's reasoning in relation to the arithmetic mean as discussed below.

4.3 CRG VIEW

The CRG agrees with all of the reasoning and methods presented in the estimation of a market risk premium with the exception of the change in weights for averaging the arithmetic and geometric means.

[75] Independent Panel ERA 2022, p. 40.

The CRG considers that equal weights should continue to apply. This is based on the recognition that when calculating the arithmetic average return, **the return in each period is in effect assumed to be realised,** so that if the period is a year the return for that year is assumed to be realised by the investor and not compounded over a longer period. To be clear there is no compounding effect when calculating an arithmetic average and the returns for each period are assumed to be fully realised. The same amount is also assumed to be invested in each period.[76] This was discussed in more detail in the CRG submission to the ERA focussed consultation.[77]

However, if returns are not fully or predominantly realised in each annual period because the preferred investment time horizon for investors is much longer than a year, as is advocated by those who claim the appropriate term of the return is 10 years or more, then the assumption of annual realisation of returns is not representative and creates a bias.

The ERA notes:[78]

> "– When compounding the arithmetic averages over time, sampling error can cause an upward bias.
> – Geometric averages can understate returns as it is based on a constant compounding, which does not account for actual variability of returns over time."

However, when the holding period is longer than the one-year estimation period it is not sampling error that causes an upward bias but rather the assumption that the return is realised which is not the case if the holding period is longer than a year.

This perspective has been supported by Partington and Satchell in their report to the AER for the allowed rate of return 2018 Guideline Review.[79]

> "The estimation of the market risk premium is for the purpose of determining investors' required rate of return. This return is equal to their expected rate of return if prices are in equilibrium. Investors compound returns and whether or not the AER compounds returns is not relevant to the return that investors require/expect. It is well established that the arithmetic average of annual returns will overestimate expected returns if the holding period is more than one year. The holding period of investors is likely to be more than one year. For example, in the expert evidence session it was suggested that some investors in the regulated businesses had investment horizons of 20 years. Given investor holding periods of more than one year it is appropriate for the AER to have regard to the geometric average for returns. It is also appropriate for the AER to consider return periods of more than one year."

In addition, the justification for an arithmetic mean based on annual data being the best estimate of the expected cost of capital, consistent with the NPV=0 condition being satisfied, depends

[76] Patterson 1995, p.133.
[77] CRG 2022b.
[78] ERA 2022a, p. 128.
[79] Partington and Satchell 2018, p. 34.

on annual returns being independent and drawn from the same distribution.[80] The ERA has recognised this point in its Draft Explanatory Statement noting that:[81]

> "Findings on serial correlation may depend on the frequency of returns, whether it is long or short term, and may be present in some periods, but not in others. This issue is also a matter of debate in financial economics, most recently in the literature regarding time series momentum."

Both these perspectives have also been recognised by Damodaran:[82]

> "Many estimation services and academics argue for the arithmetic average as the best estimate of the equity risk premium. In fact, if annual returns are uncorrelated over time, and our objective was to estimate the risk premium for the next year, the arithmetic average is the best and most unbiased estimate of the premium. There are, however, strong arguments that can be made for the use of geometric averages. First, empirical studies seem to indicate that returns on stocks are negatively correlated[83] over time. Consequently, the arithmetic average return is likely to overstate the premium. Second, while asset pricing models may be single period models, the use of these models to get expected returns over long periods (such as five or ten years) suggests that the estimation period may be much longer than a year. In this context, the argument for geometric average premiums becomes stronger. Indro and Lee (1997) compare arithmetic and geometric premiums, find them both wanting, and argue for a weighted average, with the weight on the geometric premium increasing with the time horizon.[84]

In relation to the ERA Independent Panel preference and reasoning (noted above), there is no specific consideration of the point that the relevance of the arithmetic mean depends on the return being realised each year and this will not be the case if investments are held for longer periods without taking annual returns.

The ERA historic market risk premium for the Draft instrument was a 60 per cent weight to an arithmetic mean of 6.75 and a 40 per cent weight to a geometric mean of 4.93 to arrive at an estimate of 6.0 per cent rounded to one decimal place.[85] If equal weights were used the estimate would be 5.84. The ERA considers that its consideration of the DGM and conditioning variables justifies the addition of a further 0.2 per cent to the historic average. Adding this estimate to the estimate of 5.84 would therefore mean a market risk premium of 6.04, while still assuming a 10-year term for the return on equity.

[80] Lally 2012, p. 31 and CRG 2022b, p. 24.
[81] ERA 2022a, p. 127.
[82] Damodaran 2021, pp. 34-35.
[83] In other words, good years are more likely to be followed by poor years, and vice versa. The evidence on negative serial correlation in stock returns over time is extensive and can be found in Fama and French 1988. While they find that the one-year correlations are low, the five-year serial correlations are strongly negative for all size classes. Fama, E.F. and K.R. French, 1992, The Cross-Section of Expected Returns, Journal of Finance, Vol 47, 427-466.
[84] Indro, D.C. and W. Y. Lee, 1997, Biases in Arithmetic and Geometric Averages as Estimates of Long-run Expected Returns and Risk Premium, Financial Management, v26, 81-90.
[85] As per the
ERA 2022, Table 10, p. 129.

However, the CRG prefers a period for the risk-free rate and return on equity more closely matching the regulatory period as discussed in Section 2. Since the market risk premium entails deducting the relevant risk-free rate from overall equity market returns a lower risk-free rate would imply a higher market risk premium (note the total impact on the equity return is the direct effect on the risk-free rate plus the product of the beta and the market risk premium).

The ERA noted that for illustrative purposes, the 10- year Commonwealth Government bond was 3.01 per cent for the 20 trading days to 29 April 2022.[86] If a 5-year term is chosen the 5-year Commonwealth Government bond monthly rate as reported by the RBA[87] was 2.77 per cent for April 2022. The difference for that time period was therefore 0.24 percentage points. This would have the effect of **lowering the risk-free rate and raising the market risk premium by about 0.24 percentage points.**

If one adds the difference of 0.24 percentage points to a CRG preferred estimate of the market risk premium of 6.04 per cent the estimate of the market risk premium is 6.28. The impacts of choosing a market risk premium with equal weighting for the arithmetic and geometric means and a term for the risk-free rate of five years rather than ten years have partially offsetting effects but the CRG's preferred estimate of the market risk premium is 6.28 per cent compared with 6.20 per cent for the ERA.

The impacts on the WACC are presented in Section 6.

4.4 ASSESSMENT CRITERIA

As noted the CRG agrees with all of the reasoning and methods presented in the estimation of a market risk premium with the exception of the change in weights for averaging the arithmetic and geometric means.

The main assessment criterion that the ERA considers has not been met relates to ensuring there is sufficient information to support change. As noted, the proposed change in methodology is to move from equal weighting of the arithmetic and geometric means to a 60:40 weighting respectively. As explained above the arithmetic mean assumes annual realisation of returns whereas the geometric mean assumes retention of funds in the investment and compounding over the measurement period. Given the nature of the investment and the proposition that most investors are likely to have a much longer time horizon than a one year period the CRG considers that it is more likely that higher weight for a geometric average is justified and so it is unreasonable to move from the current practice of equal weighting. To the extent that more weight is justified but not recognised for the geometric mean the allowance for the rate of return will not be economically efficient and this will be adverse to the long term interest of consumers and their confidence in the regulatory arrangements.

[86] ERA 2022, p. 103.
[87] RBA 2022.

5 OTHER

5.1 AVERAGING PROCESS

The CRG supports the standardised averaging period process for the risk-free rate, base rate for the return on debt, debt risk premium and expected inflation forecast.

5.2 GEARING

The CRG agrees with the ERA's proposed gearing level 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.

The ERA's approach to estimating gearing adjusts debt and equity to recognise the nature of hybrid securities, based on publicly available information. The ERA's approach removes hybrid securities that have predominantly equity characteristics from debt. The ERA undertook scenario analysis showing that for AusNet's new debt issuances there was little material difference in removing hybrid securities from the gearing estimate our applying a 50/50 allocation between debt and equity.

The CRG considers the ERA approach is reasonable.

5.3 RETURN ON DEBT

The CRG agrees that the ERA's 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.

In its submission to the ERA December 2021 Discussion Paper, the CRG noted 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 (in mid-2021) rather than 10 years and this has meant a lower debt risk premium than assuming a 10 year tenor.[88] The CRG suggested 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.

The ERA investigated the AER findings and requested information about the debt portfolios of regulated pipelines to inform its view. The ERA has noted that the term of the debt is an aspect being actively managed by gas pipelines but changing the 10-year benchmark would be difficult and maintain the 10-year term supports the stability of the regulatory arrangements.[89] The ERA also noted that the EICSI could not be used to cross check the ERA estimates as the index is not replicable but that it could be a useful cross check on the term of the debt.

The CRG supports the ERA position on the return on debt.

[88] CRG 2022c, p. 9.
[89] ERA 2022a, p. 66.

5.4 BENCHMARK CREDIT RATING

The ERA considered that the benchmark credit rating should be determined from observations of the gearing levels of firms in a benchmark sample of Australian energy networks and that its analysis supported a benchmark credit rating of BBB+.[90]

The ERA's 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.[91] The ERA considers that there should be no elevation of the credit rating from the benchmark sample due to parental ownership.

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

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, as per its submission, 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 ERA responded to the concern about excluding the impact of foreign ownership noting that

> "416. "Without parental ownership" is intended to recognise that some risks associated with the provision of reference services cannot be eliminated, and thus must be compensated. In this event, "without parental ownership" allows for explicit recognition of those risks, to ensure that these risks are not simply transferred to the parent, in a way that is not transparent and accountable.
>
> 417. The ERA considers that when determining the benchmark credit rating, the financial risks associated with a regulated entity should not be transferred or linked to its foreign-owned entities. Foreign parental entities are unlikely to be aligned with a benchmark efficient entity for Australian regulated networks with a similar degree of risk in the provision of regulated energy services. Foreign entities are also subject to different regulatory and policy environments, which have evolved in their individual ways over time. Therefore, this is not reflective of the current Australian regulatory environment or its evolution over time."

The CRG does not find these points to be persuasive in addressing the concern. The ERA argument appears to the CRG to be essentially that foreign entities may face circumstances that allow them to cover debt financing risks more efficiently than an entity without foreign

[90] ERA 2022a, p. 68.
[91] ERA 2022a, p. 70.

ownership could achieve, or be willing to assume more subsidiary credit risks, but this is not appropriate given the different regulatory and policy environments and the need to compensate for risks in Australia. The CRG still considers that precluding the impact of foreign ownership would in effect be contrary to recognition of efficient financing arrangements. It is as if the benchmark precludes reflecting that entities with foreign ownership that are able to secure lower debt funding are precluded from being included in the benchmark. Also, it is not a matter of eliminating risks but rather reflecting the pricing of those risks.

However, the CRG recognises it may be very difficult to make appropriate adjustments for the impact of parental ownership and for practical reasons accepts that a BBB+ credit rating is reasonable although likely to be at the low end if foreign ownership was recognised.

5.5 DEBT RISK PREMIUM

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 debt risk premium is estimated with the revised bond yield approach which constructs a sample of domestic and international bonds with the same credit rating as that of the benchmark efficient entity, with the country of risk specified Australia, and expressed in Australian dollar equivalent terms. 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.

As explained, it its submission to the ERA December 2021 discussion paper [92]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.

The CRA suggested that the ERA 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. The ERA's response to this suggestion was discussed above in Section 5.3.

5.6 DEBT AND EQUITY RAISING COSTS

Debt and equity raising costs and debt hedging costs are the administrative costs and other charges incurred by businesses when obtaining and hedging finance.

The 2018 gas instrument set out that the rate of return included:

- a debt-raising cost allowance of 0.100 per cent per annum
- a debt-hedging cost allowance of 0.114 per cent per annum.

The ERA provided an allowance for equity raising transaction costs in the capital expenditure building block, and so equity raising costs did not form part of the rate of return.

[92] ERA 2022a, p. 51

The ERA maintained the same allowances for debt raising and hedging costs in its December 2021 discussion paper and engaged Chairmont Consulting to review debt issuing and hedging costs for a regulated benchmark energy network.

Following review of the Chairmont Consulting report and submissions from stakeholders, the 2022 draft gas instrument has proposed the following allowances:

- a debt-raising cost allowance of 0.165 per cent per annum
- a debt-hedging cost allowance of 0.123 per cent per annum.

Chairmont considered that an increase was needed to reflect higher offshore issuance costs and the inclusion of costs for a second credit rating and annual surveillance and proposed a debt-raising cost allowance of 0.155 per cent per annum. Stakeholder submissions sought consideration of additional area that could contributed to debt issuing costs. On the basis of various analysis, the ERA has proposed to increase the debt raising cost allowance by 1 basis point to reflect a higher arranger fee but does not consider any other debt issuing costs can be justified.

For debt hedging costs the allowance was increased from 0.114 per cent per annum to 0.123 per cent per annum as a result of the addition of an allowance for the costs involved in negotiating an international Swaps Dealers Agreement

In addition, the ERA will continue to provide an allowance for equity raising transaction cost in the capital expenditure building block, and so these costs do not form part of the rate of return.

The CRG considers that the ERA has provided sufficient information to support its proposed increases for debt raising and debt. Hedging costs and supports the changes.

5.7 INFLATION

Various aspects of the regulatory framework require an estimate of expected inflation. This includes indexation of the regulatory asset base so that annual depreciation allowances can be determined and backing out expected inflation allowances to allow for accounting of actual inflation. The regulatory arrangements ensure that investors receive an actual real return consistent with actual inflation and the regulatory asset base is maintained in real terms after allowing for inflation.

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 i.e., five years. The treasury bond approach users the Fisher equation linking nominal rates of return to an estimate of expected inflation and a real rate of return for a risk-free asset (Commonwealth Government Securities).

The ERA has proposed to maintain the same approach for the 2022 draft gas rate of return estimate as for the 2018 gas instrument.

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, as noted in CRG's submission to the ERA December 2021 discussion paper,[93] 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.

The CRG agrees with the ERA 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 also agrees with the ERA[94] that recent increases in inflation and current inflation uncertainty underscore the need for a method for estimating expected inflation that is responsive to shifting and potentially volatile economic conditions and market expectation.

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).

The CRG also supports the use of a term for inflation that matches the term of the access arrangement period as this will help ensure the NPV=0 condition is met.

5.8 VALUE OF IMPUTATION CREDITS (GAMMA)

The gamma parameter accounts for the reduction in the effective corporate taxation that is generated by the distribution of franking credits to investors. Generally, investors who can use franking credits will accept a lower required rate of return, before personal tax, on an investment that has franking credits, compared with an investment that has similar risk and no franking credits.[95]

The value of imputation credits is an estimate of the proportion of company tax which is expected to be returned to investors through franking credits. Gamma varies from 0 to 1 and is the product of the rate of distribution of franking credits by firms and the ability to use the franking credits by investors. Franking credits cannot be used by foreign investors and they would have a utilisation rate of 0. The overall utilisation is a weighted average of the utilisation rates of individual investors. The ERA considers that the distribution rate is a firm-specific parameter and the utilisation rate is a market-wide parameter.

For the 2018 instrument the ERA used an estimate of 0.9 for the distribution rate (based on financial reports of the 50 largest ASX listed firms and 0.6 for the utilisation rate based on national accounts data, identifying equity ownership, from the Australian Bureau of Statistics. The estimate of gamma was 0.5.

[93] CRG 2022c, p. 72
[94] ERA 2022a, pp. 198-199.
[95] ERA 2022a, p. 202.

The CRG supports the methodology and data used by the ERA to estimate gamma and the proposed estimate of 0.5.

5.9 CROSS CHECKS ON THE RATE OF RETURN AND THE TOTALITIY OF THE REGULATORY ARRANGEMENTS

5.9.1 ERA and AER positions

The term 'cross checks' refers to information sources that are used as a basis for comparing and evaluating the reasonableness of the overall regulatory rate of return or its individual parameter estimates.[96] Cross checks may help indicate the 'efficacy' of the collective impact of the regulatory arrangements including the allowance for the rate of return in contributing to the National Gas Objective and in particular the promotion of efficient investment for the long term interests of consumers.

Stakeholders have suggested cross checks could be made, for example in particular, by: applying financeability analysis; reviewing RAB multiples (showing market values relative to RAB values) and reviewing actual financial performance. The ERA has considered these potential cross checks but noted significant practical issues with their use and does not propose to use them as a cross check to inform the overall rate of return.

The ERA position on cross checks contrasts with the AER position where cross checks are used "as a sense check on our overall allowed rate of return and to assist in identifying potential issues".[97] The AER also considers that RAB multiples, financeability tests and scenario testing are the most useful cross checks.[98]

It is also relevant to note that the AER Independent Panel Report on the AER Draft Rate of Return Explanatory Instrument noted the difficulties in using cross checks but one of its central recommendations was for the AER to undertake a more conclusive analysis of the efficacy of the 2018 RORI by for example:[99]

a. Expediting the process of consulting on the decomposition of the RAB multiple, which is a central part of its cross checks analysis.

b. Assessing the incentive the RORI provides for investment by analysing regulated companies' applications for approval of capital expenditure that is discretionary e.g. increases reliability above minimum quality standards. Since such expenditure is not mandatory, applications to undertake it are evidence that the allowed rate of return on it is attractive.

c. Examining other regulators' ways of addressing this issue.

The AER Independent Panel explained its position as follows:[100]

[96] ERA 2022a, p. 26.
[97] AER 2022, p. 259.
[98] AER 2022, p. 260.
[99] Independent Panel (AER), 2022, p. 6.
[100] Ibid.

> "The Panel recognises that assessing the efficacy of the RORI is a complex and challenging task. However, this assessment should provide an important anchor to help inform the AER's thinking when exercising judgement. The Panel urges the AER to take the next step and provide an assessment of the effectiveness of the RORI process in delivering the 'right' level of investment and a level of investment that avoids contributing to excess returns and unnecessarily high prices."

The CRG agrees with the foregoing thinking of the AER Independent Panel. The CRG also emphasised the relevance of taking account of the totality of the regulatory arrangements in assessing the overall allowance for an appropriate rate of return in its February submission.[101] This included consideration of RAB multiples and investment outcomes.

Another issue is the extent to which there may be persistent under estimation of demand when price cap regulation applies. To the extent that actual demand has turned out to be materially higher than forecast demand, profits would be correspondingly higher with the implication that it is relevant to check demand and profit outcomes to confirm whether realised returns are consistent with the National Gas Objective with respect to the economic efficiency objectives in the long term interests of consumers. The ERA has advised that while it currently does not have the actual demand information for the service providers this is expected to change in the future with the issuance of Regulatory Information Notices.[102]

The CRG suggests that the ERA should consider how it could investigate the efficacy of the 2018 gas instrument in terms of investment and profit outcomes for the current review given the importance of the issue as highlighted by both the AER and ERA independent expert reports. Examination of actual demand outcomes relative to forecast demand outcomes would be relevant for an effective review.

5.9.2 ERA independent panel

The CRG notes that, in contrast to the AER Independent Panel, the ERA Independent Panel report did not support the use of cross checks given its concerns about the reliability of linkages and the impact of other factors.[103]

However, the ERA Independent Panel has also noted the following:

> "The Panel's principal recommendation is that the ERA present a self-contained analysis of its views relating to the overall effect of the Instrument."[104]

> ". . . we do raise in Chapter 4 the need for the ERA to make more clear how it has directly engaged with an argument raised by the Consumer Reference Group (CRG) that the ERA need to consider how the rate of return methodology in conjunction with other aspects of the regulatory arrangements are likely to impact on risk, return and the realisation of the economic efficiency criteria." [105]

[101] CRG 2022c, pp. 39-40.
[102] ERA 2022c, p. 6.
[103] Independent Panel (ERA) 2022, pp. 29-30.
[104] Ibid, p. 7.
[105] Ibid, p. 6.

The CRG considers that if one is to present a self-contained analysis of the overall effect of the instrument then it is important to consider the impact in terms of investment and profitability. This is also a recommendation of the AER panel as noted in the preceding section. The cross checks may be imperfect but they can still provide relevant information along with considerations of actual demand versus forecast demand and the associated impacts on returns and investment outcomes. Furthermore, as highlighted by the ERA Independent Panel, it is reasonable for the ERA to give more attention to the impact of the totality of regulatory arrangements on decisions made about particular parameters in the cost of capital methodology.

6 IMPACT OF CRG VIEWS ON THE WACC

Table 3 shows the impact on the WACC of CRG views on the cost of equity parameters. The estimates are based on data as of April 2022. The debt, gearing, tax and inflation parameters are the same as reported in the ERA's 2022 draft instrument.

The second column of the table shows the ERA's draft calculations. Column 3 shows the impact of using the CRG's preferred estimate of the market risk premium based on equal weighting of the arithmetic and geometric means and incorporating the ERA's assessment of consideration of the dividend growth model and conditioning variables. Column 4 shows the impact of using the CRG's preferred estimate of term for the equity return (5 years), with a further adjustment to the market risk premium reflecting the impact of a lower risk-free rate (that increases the market risk premium by 0.24%). Column 5 makes the further change of using the CRG's preferred estimate of an equity beta of no more than 0.5.

Considering the change to the market risk premium in column 3, the overall impact is relatively small comprising a reduction in the nominal after tax cost of equity from 7.35% to 7.24% and a reduction in the WACC from 6.42% to 6.37%.

Considering the change to the term in column 4, for the chosen data period, currently there is only a small difference between the nominal risk-free rate for a 5-year and a 10-year term. In addition, using a 5-year term leads to a partially offsetting effect of increasing the market risk premium. The effect is partially offsetting rather than fully offsetting because the market risk premium is multiplied by the equity beta to obtain the total impact on the cost of equity. However, the CRG considers the reasoning for using a 5-year term is valid in terms of complying with the NPV=0 principle and the difference could be important over time. Thus, the total impact of choosing a 5-year term, along with the CRG estimate of the market risk premium is to reduce the nominal after tax return on equity from 7.35% to 7.17% and the nominal after tax WACC from 6.42% to 6.34%.

Considering the changes to adopt the CRG's preferred estimate of the equity beta, in addition to the other changes already considered, the total impact is to reduce the nominal after tax return on equity from 7.35% to 5.91% and the nominal after tax WACC from 6.42% to 5.78%.

Table 3: Impact of CRG views on the cost of equity on the WACC

	ERA 2022 Draft	CRG MRP	CRG term & MRP	CRG term, mrp & equity beta
Cost of equity parameters				
Nominal risk-free rate	3.01%	3.01%	2.77%	2.77%
Equity beta	0.7	0.7	0.7	0.5
Market risk premium	6.20%	6.04%	6.28%	6.28%
Nominal after-tax return on equity	**7.35%**	**7.24%**	**7.17%**	**5.91%**
Other parameters				
Debt proportion	55.0%	55.0%	55.0%	55.0%
Nominal return on debt	5.67%	5.67%	5.67%	5.67%
WACC				
Nominal after-tax WACC	**6.42%**	**6.37%**	**6.34%**	**5.78%**

Source: ERA 2022 draft gas rate of return instrument and CRG calculations based on data as of April 2022

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