Economic Regulation Authority

Explanatory statement for the 2022 final gas rate of return instrument

16 December 2022

D255160

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About this instrument and review

The Economic Regulation Authority has reviewed the gas rate of return instrument.

The gas instrument is required under the National Gas Law (NGL) as implemented in Western Australia by the *National Gas Access (WA) Act 2009*. The gas instrument sets out the methods the ERA will use to estimate the allowed rate of return and value of imputation credits for gas transmission and distribution service providers. These regulated gas pipelines include the Dampier to Bunbury Natural Gas Pipeline, the Goldfields Gas Pipeline and the Mid-West and South-West Gas Distribution Systems.

The rate of return is an important factor used in determining regulated revenues and provides a business with funds to service the interest on its loans and give a return to shareholders.

This document details the ERA's 2022 final gas instrument and its development. In developing the final gas instrument, the ERA has taken into account all available information, including current regulatory practices, submissions from the Customer Reference Group and stakeholders, expert views and opinions, and the Independent Panel's Report.

The ERA is required to complete a review of the gas instrument every four years, and to produce a final version of this document by 18 December 2022.

Over the course of its review the ERA published an engagement document, discussion papers and focused consultation documents over 2021 and 2022. Stakeholders and the public had the opportunity to contribute at each of these stages.

The ERA published the 2022 draft gas instrument, and accompanying explanatory statement, on 17 June 2022 to allow stakeholders to provide feedback on the ERA's proposed approach.

The ERA established an Independent Panel to review its 2022 draft gas instrument. The ERA released the report provided by Independent Panel on 24 August 2022.

The stakeholder submission period closed on 6 September 2022. The ERA sought submissions on the 2022 draft gas instrument, the explanatory statement to the 2022 draft gas instrument and the Independent Panel's Report.

The ERA published its 2022 final gas instrument, and accompanying explanatory statement (this document), on 16 December 2022.

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List of appendices

Executive summary

The ERA has reviewed the 2018 gas rate of return instrument. The gas instrument sets out the approach to determining the rate of return on capital investment for gas transmission and distribution service providers in Western Australia.

The 2022 final gas instrument will apply to all regulatory determinations made while the 2022 gas instrument is in force.

This document is the explanatory statement for the 2022 final gas instrument. It outlines how the ERA has reached the positions detailed in the 2022 final gas instrument.

The gas instrument review provided an opportunity to comprehensively assess approaches for determining the allowed rate of return on capital used to determine revenue for reference services provided on the gas pipelines regulated by the ERA.

The ERA's review of the gas instrument included multiple rounds of consultation including a discussion paper, focused consultations and the release of a 2022 draft gas instrument with an accompanying explanatory statement. The ERA considered expert views, academic literature, market data, and stakeholder submissions.

A Consumer Reference Group (CRG) was established to provide a consumers' perspective on the rate of return. The CRG has been an active participant throughout the ERA's consultation.

In June 2022 the ERA released its 2022 draft gas instrument with an accompanying explanatory statement. The 2022 draft gas instrument represented the ERA's draft determination based on the information available to it at the time. In making the draft instrument the ERA's consideration included stakeholder feedback on the discussion paper, stakeholder feedback on the focused consultations, and expert views.

The ERA established an Independent Panel. The Independent Panel review process is an important legislative requirement which has given the ERA the benefit of an independent critical assessment of the 2022 draft instrument. The Panel has reviewed the individual rate of return components and the overall draft instrument. The Panel found that the 2022 draft instrument was appropriate and based on sound reasoning, and can achieve the national gas objective.

The ERA sought further stakeholder feedback on the 2022 draft instrument, accompanying explanatory statement, and the Independent Panel's report.

Having fully considered all information gathered through this process, the ERA's 2022 final gas instrument largely maintains or refines many of the approaches set out in the 2018 gas instrument.

However, new market and regulatory developments have meant that the ERA has decided to change some of its approaches to the return on equity to ensure that the 2022 final gas instrument continues to deliver efficient forward-looking rates of return. These parameters are the term for equity, market risk premium and equity beta.

The term for equity has been changed from five years to 10 years. This change has been made to align the assumed term for equity with common investor practice, where investors in long-lived assets consider cash flows over a long time horizon exceeding the regulatory period. A 10-year term for equity still allows efficient rates of return and is consistent with private market practice.

The ERA has updated the market risk premium estimate to 6.1 per cent. The ERA has simplified and refined the approach to calculating the market risk premium set out in the 2018 gas instrument and updated the market risk premium for current market information.

While the equity beta estimate is unchanged, the delisting of some of the remaining Australian energy networks and current market volatility has meant that the ERA has had to refine its approach to estimating equity beta. The ERA now considers both domestic and international comparator firms and different timeframes.

Table 1 summarises the positions adopted by the ERA in the 2022 final gas instrument with reference to the 2018 final gas instrument and 2022 draft gas instrument.

Table 1: Summary of 2022 final gas instrument positions versus 2018 final gas instrument and 2022 draft gas instrument

WACC component	Comparison of positions	Explanatory statement chapter
The rate of return framework	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach is to adopt a nominal vanilla weighted average cost of capital (WACC).	Chapter 5
Cross-checks on the rate of return	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach does not adopt cross-checks on the rate of return.	Chapter 6
Averaging period process	Changed from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach adopts an averaging window for the annual debt risk premium update that will be between seven and three months before the start of the regulatory year. Otherwise the averaging period process under the 2022 final approach is unchanged from the 2018 final instrument.	Chapter 7
Gearing	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach adopts a 55% gearing level.	Chapter 8
Return on debt – Estimation method	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach adopts a hybrid trailing average method for estimating the return on debt.	Chapter 9.1

WACC component	Comparison of positions	Explanatory statement chapter
Return on debt – Debt risk free rate	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach adopts the prevailing five-year interest rate swap rate as the estimate of the risk free rate for the return on debt.	Chapter 9.2
Return on debt – Term of debt	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach applies a benchmark efficient debt strategy which assumes a portfolio of 10-year fixed-rate debt, with 10 per cent refinanced each year.	Chapter 9.3
Return on debt – Benchmark credit rating	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach applies a benchmark credit rating of BBB+.	Chapter 9.4
Return on debt – Debt risk premium	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach applies the revised bond yield approach to determine the debt risk premium.	Chapter 9.5
Return on equity - Return on equity model, including the term for equity	Changed from the 2018 final instrument. *Unchanged from the 2022 draft instrument.* The 2022 final approach continues to apply the Sharpe-Lintner Capital Asset Pricing model to estimate the return on equity. However, the assumed term for equity has been revised to ten years.	Chapter 10.1
Return on equity – Equity risk free rate	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach will maintain the same proxy instrument (Commonwealth Government Security bonds) as the 2018 gas instrument. However, the term for equity will use ten-year rather than five-year bonds.	Chapter 10.2

WACC component	Comparison of positions	Explanatory statement chapter
Return on equity – Market risk premium (MRP)	Changed from the 2018 final instrument which had a 6.0 per cent MRP (refined and simplified methodology). *Changed from the 2022 draft instrument which had a 6.2 per cent MRP (updated for market conditions).* The 2022 final approach applies a value of 6.1 per cent for the MRP. This has been estimated by applying some weight on both dividend growth model and historical excess returns estimates of the MRP, and some weight on both arithmetic and geometric estimates.	Chapter 10.3
Return on equity – Equity beta	Changed from the 2018 final instrument which had an equity beta of 0.7 (simplified methodology and includes international firms, though 0.7 is maintained). *Unchanged from the 2022 draft instrument which had an equity beta of 0.7.* The 2022 final approach applies an equity beta of 0.7. This has been estimated based on domestic and international comparators.	Chapter 10.4
Debt and equity raising costs and debt hedging costs	Changed from the 2018 final instrument (updated for current market conditions). *Unchanged from the 2022 draft instrument.* The 2022 final approach will include allowances for: * Debt raising costs of 0.165 per cent per year * Debt hedging costs of 0.123 per cent per year * Equity raising costs in the capital expenditure building block (these costs do not form part of the rate of return).	Chapter 11
Inflation	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach applies the Treasury bond implied inflation approach with a five-year term to estimate inflation.	Chapter 12
Value of imputation credits (gamma)	Unchanged from the 2018 final instrument. *Unchanged from 2022 draft instrument.* The 2022 final approach will apply a value of gamma of 0.5. Gamma has been derived by applying the Monkhouse formula and a value of 0.9 for the distribution rate (based on listed Australian equities) and a value of 0.6 for the utilisation rate (based on all Australian equity from the national accounts of the Australian Bureau of Statistics).	Chapter 13

The 2022 final gas instrument establishes a methodology for calculating an efficient forward-looking rate of return, which is consistent with the risks involved in providing regulated gas pipeline services. The ERA targets the setting of an efficient rate of return to promote efficient investment in, and operation of, regulated gas pipelines, and the efficient use of gas pipelines. An efficient rate of return thereby supports the long-term interests of consumers.

The ERA considers that the estimation method set out in the 2022 final gas instrument will provide the best estimate of the rate of return over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation method and parameter values that provide the best estimate of the rate of return, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree. Chapter 14 details why the ERA considers the 2022 final gas instrument will satisfy the National Gas Objective.

Table 2 summarises comparative numbers for the rate of return and its parameters as at the end of September 2022. Market parameters are calculated at the beginning of each access arrangement review. For illustrative purposes market parameters for the 2018 gas instrument and 2022 final gas instrument are both calculated using the same period. If the 2018 instrument is applied now, a nominal WACC of 7.02 per cent is calculated. This compares to 7.2 per cent for the 2022 final gas instrument. These numbers are subject to market changes at the time of individual access arrangement determinations.

Table 2: Comparative rate of return for the 2018 gas instrument and 2022 gas instrument, both as at September 2022

	2018 gas instrument	2022 final gas instrument
Return on debt		
5-year interest rate swap (%)*	4.070%	4.070%
Debt risk premium (%)^	2.140%	2.140%
Debt issuing + hedging cost (%)	**0.214%**	**0.288%**
Nominal return on debt	**6.42%**	**6.50%**
Cost of equity parameters		
Nominal risk free rate*	3.54%	3.78%
Equity beta	0.70	0.70
Market risk premium	6.00%	6.10%
Nominal after tax return on equity	**7.74%**	**8.05%**
Other parameters		
Debt proportion (gearing)	55%	55%
Forecast inflation rate*	2.51%	2.51%
Forecast credits (gamma)	0.50	0.50
Corporate tax rate	30%	30%
Weighted Average Cost of Capital		
Nominal after-tax WACC	**7.02%**	**7.20%**
Real after-tax WACC	4.40%	4.57%

** Market parameter that will be updated at the time of an access arrangement.*

^ This number represents the latest 10-year trailing average debt risk premia reported in DBP's access arrangement, the DRP annual updates and the DRP estimate as at the end of September 2022. The trailing average DRP is influenced by the historic DRPs allowed for each gas pipeline. The trailing average DRP is updated annually.

1. Introduction

1. The ERA is responsible for approving third party access arrangements in Western Australia for services on gas transmission and distribution pipelines. These pipelines are currently the Dampier to Bunbury Natural Gas Pipeline, the Goldfields Gas Pipeline and the Mid-West and South-West Gas Distribution Systems. The ERA's responsibilities are established under the National Gas Law (NGL) and National Gas Rules (NGR) as applied in Western Australia.[1]

2. As part of the ERA's regulatory responsibility to determine revenues for gas network service providers, the ERA must set a rate of return to be applied on regulated assets. Investors expect to receive a return above their investment to cover financing costs. The expected rate of return provides a business with funds to service the interest on its loans and give a return to shareholders.

3. The NGL requires the ERA to produce a gas rate of return instrument, which sets out the rate of return on capital. This rate of return must include a weighted average of an allowed return on equity and an allowed return on debt. The NGL also requires the ERA to state the value of the imputation credits.

4. The ERA is required to review the instrument every four years.

5. The ERA is required to review the 2018 gas instrument and publish the 2022 gas instrument by 18 December 2022.

6. The gas instrument reviews provide an opportunity to comprehensively review approaches for determining the allowed rate of return on capital used for determining revenue for reference services provided on the gas pipelines regulated by the ERA.

[1] All references to National Gas Law (NGL) and National Gas Rules (NGR) referred to throughout this document are references to the NGL and NGR which apply in Western Australia.

2. 2022 gas rate of return instrument review process

7. This review allowed the ERA to assess its approach to setting the rate of return for covered gas pipelines and network access arrangements.

8. During the review process, the ERA has considered a range of information, including stakeholder and Consumer Reference Group submissions, academic literature, expert views, market data and developments, information arising from the review consultation processes and other relevant information.

9. The ERA's approach to the 2022 gas instrument review was to:

   - Take the 2018 gas instrument as the starting point.
   - Review all rate of return components for possible change.
   - Assess the relative merits of any new evidence, considering any new matters raised by stakeholders.

10. The ERA considers that the 2018 gas instrument is a good starting point for the 2022 gas instrument review as it was developed with significant analysis and past stakeholder consultation. The 2018 gas instrument is transparent, implementable and has applied to the ERA's three gas pipeline access arrangement decisions since its publication in December 2018. Further, the ERA considers that regulatory consistency is important, where a change from established methods is only considered in the presence of new information or an improved approach.

11. The National Gas Law prescribes several consultation requirements that the ERA must fulfil to develop the 2022 gas instrument. These requirements include that the ERA must consider the advice, recommendations or submissions from:

    - A Consumer Reference Group
    - An Independent Panel review of the draft instrument
    - Expert evidence
    - Other persons invited to make written submissions about the proposed draft instrument.

12. The ERA published a paper setting out the engagement process for the review. This engagement document did not discuss substantive technical rate of return matters.[2]

13. The Consumer Reference Group provided direct and ongoing feedback to the ERA during the review to represent broad consumer perspectives. The Consumer Reference Group has provided submissions at the different stages of consultation, which the ERA has considered.

14. The ERA commissioned an Independent Panel to review the 2022 draft gas instrument and its explanatory statement. The Independent Panel review process was intended to give the ERA the benefit of an independent review, support transparency, and to promote confidence among stakeholders that the ERA's proposed approach for the gas instrument is robust.

[2] ERA, *Engagement process for 2022 gas rate of return instrument*, July 2021.

15. Throughout the review, the ERA considered the views of experts, including as part of concurrent expert evidence which involved experts providing advice on specific rate of return matters. This evidence assisted the ERA in making decisions to ensure the gas instrument will, or is most likely to, contribute to the achievement of the national gas objective. The ERA's expert evidence included evidence gathered at the Australian Energy Regulator's (AER) concurrent evidence sessions, conducted in February 2022.

16. In December 2021, the ERA released a discussion paper for the review. The discussion paper set out the ERA's working views on the method for calculating the allowed rate of return, and its components, for the 2022 gas rate of return instrument. The ERA received submissions on the discussion paper in February 2022.

17. In March 2022, the ERA undertook additional consultation on debt raising and hedging costs. The ERA received submissions in April 2022.

18. Following the receipt of stakeholder submissions on the discussion paper and the AER's concurrent expert sessions, the ERA considered that there was value to be gained through further focused consultation on the equity beta and the market risk premium. The ERA conducted this consultation in April and May 2022:

    - In April 2022, the ERA published a paper, Focused consultation for the 2022 gas rate of return instrument review Discussion paper, outlining these questions and relevant background to these questions.[3]
    - In April 2022, the ERA conducted an online session with interested stakeholders on the questions addressed by the focused consultation.
    - In May 2022, the ERA received written stakeholder submissions.

19. In June 2022, the ERA published the 2022 draft gas instrument and the associated explanatory statement. The draft gas instrument set out the ERA's position on determining the allowed rate of return on capital for regulated gas network service providers in Western Australia. In developing the 2022 draft gas instrument, the ERA considered a broad range of information from its review and consultation processes.

20. In August 2022, the ERA published the Independent Panel's report on the review of the 2022 draft instrument and its explanatory statement. The Panel considered that the ERA had undertaken an extensive consultation process culminating in the production of the 2022 draft gas instrument and explanatory statement. The Panel's overall assessment found that the evidence and reasons provided by the ERA supported the draft instrument and that the rate of return methodology was within a range of reasonable outcomes based on the available information. Taken separately, the Panel considered that each of the individual decisions on approach or methodology appeared logical.[4] The Independent Panel also provided recommendations on the draft instrument and some areas of consideration for the next review process.

21. In September 2022, the ERA received stakeholder submissions on the 2022 draft gas instrument, explanatory statement for 2022 draft gas instrument and the Independent Panel's Report.

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3 The paper on the focused consultation is available online.

4 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument,* August 2022, p. 6.

22. In December 2022, the ERA published its 2022 final gas instrument and this explanatory statement. The above process helped the ERA in its development of a final gas instrument. In developing the 2022 final gas instrument, the ERA considered a broad range of information, including stakeholder submissions, academic literature, market data and developments, information arising from the review consultation processes, expert views and the Independent Panel's report.

23. Milestones for the 2022 gas instrument review are shown in Table 3.

Table 3: Milestones for the 2022 gas rate of return instrument review

Milestone	Description of milestone	Date
Engagement process position paper	This paper detailed the process for the 2022 gas instrument review and sought nominations for the bodies that the ERA must establish under the National Gas Law consultation requirements.	July 2021
ERA discussion paper	This paper outlined the ERA's working positions on the method for calculating the allowed rate of return for the 2022 gas instrument and invited public submissions.	December 2021
Public submissions on discussion paper	The ERA received written submissions in response to the discussion paper.	February 2022
Concurrent evidence	The ERA gathered expert evidence from the concurrent evidence sessions conducted by the AER in February 2022.	February 2022
Focused consultation	The ERA conducted a focused consultation to gather stakeholder views on specific questions regarding equity beta and the market risk premium.	April and May 2022
2022 draft gas instrument and explanatory statement	The ERA published a draft gas rate of return instrument and explanatory statement.	June 2022
Independent Panel report	The Independent Panel provided a report, published on the ERA's website. The Panel reviewed the evidence and reasons supporting the 2022 draft gas instrument.	August 2022
Public submissions on 2022 draft gas instrument and Independent Panel report	The ERA received written submissions in response to the draft gas instrument and the Independent Panel report.	September 2022
2022 final gas instrument and explanatory statement	The ERA published a final gas rate of return instrument (which this document accompanies) and explanatory statement (this document). The 2022 gas instrument is a binding instrument, applying to all regulatory determinations made while it is in force.	December 2022

24. Recognising the above detailed consultation process undertaken for the 2022 final gas instrument, this explanatory statement is structured as follows:

- The ERA's regulatory framework and general approach to determining a rate of return is laid out in Chapter 3 and Chapter 4.
- For each of the individual rate of return components, the ERA lays out the:
  - 2018 opening position and the 2022 draft position for the parameter.
  - The Independent Panel's review of the parameter.
  - Feedback received from stakeholders, including the Consumer Reference Group, on the parameter in response to the 2022 draft position and the Independent Panel's review.
  - The 2022 final approach.
  - The detailed reasoning on why the ERA considers the final approach for the parameter best contributes to estimating an efficient rate of return.
- Lastly, Chapter 14 details why the ERA considers that the 2022 final gas instrument will satisfy the National Gas Objective to the greatest degree.

3. The regulatory framework

25. The ERA's responsibilities for gas transmission and distribution services are established under the National Gas Law (NGL) and National Gas Rules (NGR) as applied in Western Australia.

26. The national gas framework provides for a legislated, uniform national framework governing access to monopoly gas infrastructure, and arrangements for price oversight.

27. This chapter sets out the requirements of the NGL and NGR, which establish the regulatory framework for the rate of return decision making process and for the 2022 gas instrument review.

3.1. The National Gas Law

3.1.1. Rate of return

28. The NGL states that a gas instrument must set out the way to calculate the rate of return and value of imputation credits that will be applied by the ERA when performing or exercising its economic regulatory functions:

30D [ERA] to make rate of return instrument

(1) This section applies if a rate of return on capital or the value of imputation credits is required for performing or exercising an [ERA] economic regulatory function or power.

(2) The [ERA] must make an instrument (a rate of return instrument) stating—

(a) for a rate of return on capital—the way to calculate the rate; and

(b) for the value of imputation credits—the value or the way to calculate the value.

(3) The [ERA] may make an instrument only if satisfied the instrument will, or is most likely to, contribute to the achievement of the national gas objective to the greatest degree.

(4) Subject to subsection (3), the way to calculate a rate of return on capital must include a weighted average of an allowed return on equity and an allowed return on debt.

(5) In making an Instrument, the [ERA] must have regard to -

(a) the revenue and pricing principles; and

(b) other information the [ERA] considers appropriate.

29. The NGL sets out the content of a gas instrument, stating that the instrument may also include other matters the ERA considers appropriate:

30E Content of rate of return instrument

(1) If a rate of return instrument states the value of imputation credits, the instrument must state a single value to apply in relation to all covered pipeline service providers.

(2) If a rate of return instrument states a way to calculate the rate of return on capital or the value of imputation credits, the instrument must—

(a) provide for the same methodology to apply in relation to all covered pipeline service providers in calculating the rate or value; and

(b) provide for the methodology to apply automatically without the exercise of any discretion by the [ERA]

Example for paragraph (b)—

The instrument cannot include different methodologies or a band of values from which the [ERA] could choose in applying the instrument.

(3) Subject to subsections (1) and (2), the instrument may include other matters the [ERA] considers appropriate.

Example—

Matters to help a covered pipeline service provider calculate a rate of return or the value of imputation credits.

30. The ERA must publish a gas instrument:

30N Publication of rate of return instrument

After making a rate of return instrument, the [ERA] must publish the instrument on its website.

31. This document, the Explanatory Statement for the 2022 Final Gas Rate of Return Instrument provides the ERA's reasoning supporting the positions set out in the 2022 final gas instrument. The ERA's reasoning, which is detailed in this explanatory statement, considers a range of evidence including academic literature, market data and developments, submissions during the review, expert views and other relevant information.

32. Section 30A of the NGL sets out the content to be included in the explanatory statement:

30A – Definitions

explanatory information, for a rate of return instrument, means information about the content of the instrument, including (but not limited to) information explaining—

(a) the reasons for the rate of return on capital or the value of imputation credits under the instrument; and

(b) how the stated value, or the way to calculate the rate or value, was decided; and

(c) if the instrument replaces another instrument -

(i) the differences (if any) between the instrument and the replaced instrument; and

(ii) the reasons for any differences; and

(d) why the [ERA] is satisfied the instrument will, or is most likely to, contribute to the achievement of the national gas objective to the greatest degree; and

(e) how the [ERA] had regard to the following in making the instrument:

(i) the revenue and pricing principles;

(ii) the matters mentioned in section 30G;

(iii) estimation methods, financial models, market data and other evidence relevant to making the instrument;

(iv) prevailing conditions in the market for equity funds;

(v) the interrelationships between financial parameters used, or to be used, in relation to deciding the rate or value.

33. Section 30G of the NGL requires the ERA to have regard to stakeholder submissions, including from the Consumer Reference Group, and the report given by the Independent Panel.

34. The NGL requires the ERA to review each instrument within four years of the last gas instrument:

> **30P Review and replacement of instrument**
>
> (1) The [ERA] must -
>
> (a) review each rate of return instrument; and
>
> (b) make a new rate of return instrument under this Division to replace the reviewed instrument.
>
> (2) The [ERA] must replace the reviewed instrument by publishing the new instrument on its website on the day that is –
>
> (a) the fourth anniversary of the day the reviewed instrument was published; or
>
> (b) if the day mentioned in paragraph (a) is not a business day the first business day after that day.

3.1.2. Objectives under National Gas Law

35. In setting the allowed rate of return, Section 30D of the NGL states that the ERA must have regard to the national gas objective and revenue and pricing principles.

36. The national gas objective sets out the aim of the NGL:[5]

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

37. The NGL and the national gas objective are intended to promote economic efficiency:[6]

> The national gas objective is an economic concept and should be interpreted as such.
>
> The long term interest of consumers of gas requires the economic welfare of consumers, over the long term, to be maximised. If gas markets and access to pipeline services are efficient in an economic sense, the long term economic interests of consumers in respect of price, quality, reliability, safety and security of natural gas services will be maximised. By the promotion of an economic efficiency objective in access to pipeline services, competition will be promoted in upstream and downstream markets.

38. The discussion of the promotion of efficiency is further detailed in the findings of the Federal Court of Australia – Full Court in the 2017 *Australian Energy Regulator v Australian Competition Tribunal* case.[7]

> The provisions proceed on the legislative premise that their long term interests are served through the promotion of efficient investments in, and efficient operation and use of gas services. The promotion is to be done 'for' the long term interests of consumers. It does not involve a balance as between efficient investment, operation and use on the one hand and the long term interests on the other. Rather, the necessary legislative premise is that the long term interest will be served by regulation that advances economic efficiency.

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5 NGL, chapter 1, part 3, cl. 23.

6 Holloway, P., *Second Reading Speech: National Gas (South Australia) Bill 2008, Parliamentary Debates (SA),* Legislative Council, 30 April 2008.

7 *Australian Energy Regulator v Australian Competition Tribunal (No 2)* [2017] FCAFC 79 (24 May 2017), paragraphs 491- 496.

39. The revenue and pricing principles in the NGL give effect to the national gas objective.[8] The revenue and pricing principles establish that the national gas objective is to be promoted by targeting economically efficient outcomes, through effective incentives.[9] The revenue and pricing principles are detailed in section 24 of the NGL.

> **24—Revenue and pricing principles**
>
> (1) The revenue and pricing principles are the principles set out in subsections (2) to (7).
>
> (2) A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in—
>
> (a) providing reference services; and
>
> (b) complying with a regulatory obligation or requirement or making a regulatory payment.
>
> (3) A service provider should be provided with effective incentives in order to promote economic efficiency with respect to reference services the service provider provides. The economic efficiency that should be promoted includes—
>
> (a) efficient investment in, or in connection with, a pipeline with which the service provider provides reference services; and
>
> (b) the efficient provision of pipeline services; and
>
> (c) the efficient use of the pipeline.
>
> (4) Regard should be had to the capital base with respect to a pipeline adopted—
>
> (a) in any previous—
>
> (i) full access arrangement decision; or
>
> (ii) decision of a relevant Regulator under section 2 of the Gas Code;
>
> (b) in the [NGR].
>
> (5) A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.
>
> (6) Regard should be had to the economic costs and risks of the potential for under and over investment by a service provider in a pipeline with which the service provider provides pipeline services.
>
> (7) Regard should be had to the economic costs and risks of the potential for under and over utilisation of a pipeline with which a service provider provides pipeline services.

40. This specification of "effective incentives in order to promote economic efficiency" in the revenue and pricing principles is consistent with an incentive regulation approach.

41. Incentive regulation is the use of rewards and penalties to induce a utility to achieve desired goals where the utility is afforded some discretion in achieving those goals.[10] The regulatory arrangements and associated rate of return framework constitute one form of regulation that has been developed to provide incentives to achieve economic efficiency.

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8 Holloway, P., *Second Reading Speech: National Gas (South Australia) Bill 2008, Parliamentary Debates (SA),* Legislative Council, 30 April 2008.

9 NGL, chapter 1, part 3, cl. 24.

10 Lewis, T., and Garmon, C., *Fundamentals of Incentive Regulation,* PURC/World Bank International Training Program of Utility Regulation and Strategy, June 1997.

3.2. The National Gas Rules

42. The NGR details how the rate of return is applied when determining regulated revenues.

43. The rate of return is detailed in section 87 of the NGR:

87—Rate of return

The return on the projected capital base for a service provider for a regulatory year of an access arrangement period for an applicable access arrangement ($RPCB_t$) is to be calculated using the following formula:

$RPCB_t = a_t \times v_t$

where:

a_t is the allowed rate of return for the regulatory year; and

v_t is the value, as at the beginning of the regulatory year, of the projected capital base for the regulatory year (as established under rule 78 and subject to rule 82(3)).

44. The estimated cost of corporate income tax is detailed in section 87A of the NGR, including the use of allowed imputation credits:

87A—Estimated cost of corporate income tax

The estimated cost of corporate income tax of a service provider for each regulatory year of an access arrangement period (ETC_t) is to be estimated in accordance with the following formula:

$$ETC_t = (ETI_t \times r_t)(1 - \gamma)$$

where:

ETI_t is an estimate of the taxable income for that regulatory year that would be earned by a benchmark efficient entity as a result of the provision of reference services if such an entity, rather than the service provider, operated the business of the service provider;

r_t is the expected statutory income tax rate for that regulatory year as determined by the [ERA]; and

γ is the allowed imputation credits for the regulatory year.

45. Section 3 of the NGR defines the allowed imputation credits must be calculated as detailed in the gas instrument:

3—Interpretation

In these rules:

…

allowed imputation credits for a regulatory year of an access arrangement period for an applicable access arrangement means the value of imputation credits stated, or calculated in the way stated, in the applicable rate of return instrument;

3.3. Application of gas instrument

46. Clause 30Q of the NGL sets out the application of a rate of return instrument:

> **30Q Application of instrument**
>
> (1) A rate of return instrument-
>
> (a) Applies for the purposes of an [ERA] economic regulatory decision made after the commencement of the instrument; and
>
> (b) Does not affect an [ERA] economic regulatory decision made before the commencement of the instrument.
>
> (2) To remove any doubt, it is declared that the application of the instrument under this Law, including, for example, in making a full access arrangement decision, is an [ERA] economic regulatory function or power.

47. Section 30C of the NGL establishes that the instrument is binding on both the ERA and covered pipeline service providers. The binding gas instrument will set out how the rate of return is automatically applied in each regulatory determination, without the exercise of any discretion.

> **30C Rate of return instrument is binding on [ERA] and covered pipeline service providers**
>
> A rate of return instrument is binding on—
>
> (a) the [ERA] in relation to the performance or exercise of an [ERA] economic regulatory function or power; and
>
> (b) each covered pipeline service provider in relation to a matter relevant to the performance or exercise of an [ERA] economic regulatory function or power.

48. The 2022 final gas instrument is required for the next round of gas access arrangements:

- The Mid-West and South-West Gas Distribution Systems proposal assessment commences in September 2023 (access period commencement date is 1 January 2025).
- The Goldfields Gas Pipeline proposal assessment commences in January 2024 (access period commencement date is 1 January 2025).
- The Dampier to Bunbury Natural Gas Pipeline proposal assessment commences in January 2025 (access period commencement date is 1 January 2026).

49. Where relevant, as a means of illustration, the ERA has set out current indicative estimates of the rate of return parameters. However, the specific values for estimating the rate of return arising from the application of the 2022 final gas instrument will be determined at each subsequent access arrangement review.

4. The ERA's approach to determining a rate of return

50. To make a regulatory decision, the ERA must determine the regulatory approach that best delivers the requirements of the NGL and NGR, including the national gas objective, and the revenue and pricing principles.

51. To support the long term interests of consumers, the ERA aims to promote efficient investment in, and operation of, regulated gas pipelines, and the efficient use of gas pipelines.

52. The national gas objective specifically focuses on the long term interests of consumers:[11]

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

53. While stakeholders may focus on the short term implications of tariffs it is the role of the regulator to consider the long term and support efficient outcomes in terms of both efficient operation and use of natural gas services. For example, while it may be tempting to support prices that are below costs in the present, such prices send signals to both a regulated entity and consumers that may distort efficient outcomes. Prices may not incentivise investors to undertake necessary investments and maintenance, and consumers may therefore wear the risk of adverse outcomes for quality, reliability, safety and/or security of supply of energy services. In addition, consumers may be encouraged to consume more or invest more capital to increase consumption than would be efficient.

54. The ERA estimates an efficient rate of return to promote the efficient investment in and use of gas network services. The long term interests of consumers are met when consumers are supplied with safe, reliable services as required by current and future consumers which are provided at efficient costs. The rate of return is one mechanism in the regulatory framework that promotes the long term interests of consumers by providing sufficient revenue for the operation and maintenance of regulated assets today, along with providing for future investments sufficient to meet future demand as and when required. Accordingly, an efficient rate of return ensures that consumers pay no more than what is necessary for the services they need now and into the future.

55. If the allowed rate of return deviates from an efficient market rate of return, then the allowable rate of return will either be too high or too low compared to the market's expected rate of return. This would not promote efficient investment in, and use of, service providers' gas pipelines. These inefficient outcomes would not be in the long term interests of consumers.

56. The allowed rate of return must not be set too high because:

- Investors will be overcompensated for the risk involved in supplying capital to service providers compared to other investments.
- Service providers will have an incentive to over-invest in regulated assets.

[11] NGL cl 23.

- Consumers will pay higher prices than is efficient, which may distort downstream and upstream investment decisions.

57. The allowed rate of return must not be set too low because:

- Investors will be undercompensated for the risk involved in supplying capital to service providers compared to other investments.
- Service providers will be discouraged from investing in regulated assets and there may be under-investment.
- Consumers will pay lower prices than is efficient, which may distort downstream and upstream investment decisions.

58. Section 30D(3) of the NGL states that the ERA may make a gas instrument only if it is satisfied that the instrument will, or is most likely to contribute to, the achievement of the national gas objective to the greatest degree.

59. The ERA must also have regard to the revenue and pricing principles and other information that the ERA considers appropriate. The revenue and pricing principles give effect to the national gas objective and establish that the national gas objective is to be promoted by targeting economically efficient outcomes, through effective incentives.[12]

60. While the explicit term “benchmark efficient entity” has been removed from the NGR, the ERA considers that the principles of benchmarking and economic efficiency are central to the national gas objective.

61. It is common regulatory practice to use a benchmark efficient entity to inform the weighted average cost of capital (WACC) parameters for a regulated entity. This is consistent with incentive regulation and ensures that a regulator does not compensate a regulated service provider for its actual costs but compensates it as if it were operating and financed efficiently.

62. For the 2022 gas instrument, the ERA has selected the methods for calculating rate of return parameters that provide an estimate that is consistent with the efficient financing costs of a benchmark efficient entity with a similar degree of risk in the provision of reference services. The best possible estimate of the expected rate of return will promote efficient investment in, and efficient operation and use of, gas network services in the long term interests of consumers. The ERA considers that the promotion of the long term interests of consumers and the efficiency objectives of the national gas objective and the revenue and pricing principles are best achieved through this approach.

63. The ERA has estimated the returns required by investors in view of the risks associated with regulated gas pipelines compared to their other investment opportunities. The appropriate risk compensation is an important part of the rate of return regulatory framework and is important in achieving legislative objectives. The ERA considered the degree of risk involved in providing regulated gas pipeline services when estimating the expected rate of return.

64. The ERA has estimated an expected rate of return that is applied to a benchmark efficient entity. The ERA does not determine the returns of a specific gas network service provider based on all its individual circumstances.

[12] NGL, chapter 1, part 3, cl. 24.

65. 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.

66. The revenue and pricing principles require gas network service providers to be provided with a reasonable opportunity to recover at least the efficient costs they incur. The rate of return must remunerate the efficient financing costs of the service provider over the lives of the assets, in terms of net present value.[13]

67. The ERA has determined its best estimate of an efficient rate of return, consistent with the risks involved in providing regulated gas pipeline services. This is a best possible rate of return estimate. The ERA considers that the best approach to estimating the efficient cost of capital is to base estimates of the parameters of the WACC on observations of market data where possible, because market data is transparent, changes with market conditions over time and reflects the aggregate expectations of investors.

68. The ERA considers that this approach supports efficient investment in regulated gas pipelines and the efficient use of gas pipelines, which is consistent with:

- The national gas objective by promoting the efficient investment in, and operation and use of, natural gas services for the long-term interests of consumers.
- The revenue and pricing principles through having regard to:
  - The economic costs and risks of the potential under-investment and over-investment by a service provider.
  - The economic costs and risks of the potential under-use and over-use of a pipeline.
  - Allowing for a return commensurate with the regulatory and commercial risks involved in providing regulated services.

4.1. Determining a rate of return and the use of regulatory judgement

69. The national gas framework does not prescribe the method for estimating the rate of return, or its various components.

70. The ERA is the decision maker in the gas instrument review process. As an independent regulator, it is the ERA's responsibility to ensure that its decisions are well reasoned and based on robust and transparent consultation.

71. The market cost of capital for gas network service providers cannot be directly observed and must instead be estimated. This creates a degree of uncertainty.

72. Rate of return decisions are made in an environment of uncertainty and therefore the ERA, as a regulator, must exercise judgement when considering evidence.

[13] This is consistent with the 'NPV=0', or present value condition. The NPV=0 principle means that the ex-ante expectation is that over the life of an investment the expected cash flow from the investment meets all the operating costs and taxes on the investment, repays capital invested and covers investors' required return on capital invested. This allows the present value of regulatory cash inflows to equal the present value of the cash outflows from the benchmark efficient entity.

73. The ERA may only make an instrument if it is satisfied the instrument will, or is most likely to, contribute to the achievement of the national gas objective to the greatest degree.

74. The ERA therefore has applied its regulatory judgement in accordance with the NGL in developing the 2022 gas instrument and its estimates for rate of return parameters. In applying regulatory judgement and making decisions, the ERA has examined a broad range of evidence including financial market data, financial models, expert views, investment practices and stakeholder views.

75. The ERA's aim is to set the best possible estimate of an efficient rate of return, consistent with the risks involved in providing regulated gas services.

76. The explanatory statement to the 2022 draft gas instrument detailed a set of guiding principles to help inform the ERA's decisions on rate of return matters.[14]

77. The Consumer Reference Group (CRG) for the 2022 gas rate of return instrument review made a submission to the ERA in which it recommended the ERA use the following assessment criteria for determining an allowed rate of return:[15]

> "1. Reflective of economic and finance principles and market information
>
> 2. Fit for purpose
>
> 3. Transparent
>
> 4. Implementable and replicable
>
> 5. Sufficiently flexible as to allow for changing market conditions
>
> 6. Test against the price and service impacts on consumers to ensure efficient use.
>
> 7. Ensure there is sufficient information to support change.
>
> 8. 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.
>
> 9. Ensure the decision process engenders confidence of all stakeholders in the regulatory arrangements."

78. The first five of the assessment criteria recommended by the CRG are the same as the general guiding principles the ERA outlined in the draft instrument and below.

79. The sixth to ninth assessment criteria proposed by the CRG are embedded in the ERA's consideration processes.

80. The Independent Panel questioned whether the ERA may want to consider an additional stability principle. The Independent Panel viewed that both producers and users discussed the importance of stability in promoting investment certainty and consumer confidence.[16]

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14 ERA, *Explanatory statement for the 2022 draft gas rate of return instrument,* June 2022, p. 18.

15 CRG, *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*, March 2022, p. 10.

16 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument,* August 2022, p. 12.

81. While the ERA recognises that there may be some benefit in the stability of estimation methods, the ERA considers that it is important to not anchor to any one method, but rather consider all information including new evidence when making a determination. Therefore, the ERA does not adopt stability of estimation method as a guiding principle. Rather, the long term interests of consumers are served through the ERA's transparent and robust review processes that involve detailed consultation.

82. The Independent Panel and CRG in their submissions to the 2022 draft gas instrument considered that the ERA could provide further detail of guiding principles and how they are used when making its rate of return determination.[17, 18,]

83. In response to the Independent Panel and the CRG the ERA has expanded on the guiding principles and their application to the rate of return components as set out below.

84. When making decisions on rate of return matters, the ERA's decisions were informed by the following set of guiding principles. The ERA has selected rate of return estimation methods that are:

- Reflective of economic and finance principles and market information – Estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.
- Fit for purpose – Use of estimation methods, financial models, market data and other evidence that are consistent with the original purpose for which it was compiled and having regard to the limitations of that purpose.
- Transparent – The method is clear and supported by robust and transparent analysis.
- Implementable and replicable – Use of estimation methods that can be implemented by stakeholders and results replicated.
- Sufficiently flexible as to allow for changing market conditions – The estimation method allows for changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.

85. These guiding principles provide a framework through which the ERA was able to inform its regulatory judgement of the evidence before it. Where relevant, the ERA details its consideration of guiding principles when considering the rate of return components.

86. However, irrespective of the guiding principles, the ERA's primary rate of return objective is to meet the regulatory obligations under the NGL and NGR, particularly to achieve the national gas objective and revenue and pricing principles. As discussed above, the ERA seeks to determine its best estimate of an efficient rate of return, consistent with the risks involved in providing regulated gas pipeline services.

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17 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument,* August 2022, p. 11.

18 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 18.

87. The ERA notes that the Independent Panel has reviewed the 2022 draft gas instrument, and accompanying explanatory statement, and found that it is supported by sound reasoning based on the available information such that it is capable of promoting achievement of the national gas objective.[19]

4.2. The impact of regulatory framework on risk

88. The regulatory framework that the ERA operates under is largely an ex-ante allowance regime, where forecasts are set and businesses have a financial incentive to beat these forecasts. This equally applies when setting an efficient forward looking rate of return.

89. When estimating the efficient benchmark rate of return a regulator has to consider the degree of risk involved in providing regulated services. This is consistent with the revenue and pricing principles, which state that a price or charge should allow for a return that matches the regulatory and commercial risks involved in providing the regulated service to which that charge relates. It also contributes to the achievement of the legislative objectives by promoting efficiency as it would not be efficient to determine an allowed return that is not commensurate with the risks involved.

90. The CRG's submission to the 2022 draft instrument emphasised the relevance of taking account the totality of gas network service providers' regulatory arrangement in assessing the overall allowance for an appropriate rate of return.[20]

91. The ERA notes the main issue for the long term interests of consumers is in ensuring that the allowed rate of return does not entail excess profits and does not provide more compensation for risk than is necessary to ensure efficient investment occurs.

92. The ERA notes the CRG's comments on the need to consider the implications of the regulatory arrangements on the rate of return and its parameters. The ERA establishes the gas rate of return to reflect the risk of a regulated gas network.

93. The determination of the allowed rate of return is one element of the regulatory arrangements for gas network service providers. In developing a view on the risks of a benchmark gas network service provider the ERA must consider the whole regulatory framework. Setting an efficient benchmark rate of return is consistent with the regulatory incentive framework to meet these efficient financing costs.

94. However, it is important that in setting an efficient rate of return for the regulatory framework a regulator does not compromise the regulatory framework's other incentive mechanisms. That is, it is not in consumers' long-term interest to adjust the allowed rate of return for incentives provided elsewhere in the regulatory framework. Furthermore, past gains or losses from regulatory incentive measures may not be achievable going forward.

[19] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument,* August 2022, p. 6.

[20] CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 45.

95. For example, a regulated business is financially rewarded when it increases operating efficiencies so that expenditure levels are below those approved over its access arrangement period. In this case, the entity gets to retain the reduction in operating expenditure (through short term profit) over a fixed period. These reductions in operating expenditure flow to consumers over time through reductions in required revenue and therefore tariffs. Adjusting the rate of return to account for a short term profit from the delivery of lower operating expenditure, would mean giving revenue with one hand (through operating expenditure incentive rewards) and taking away revenue with the other hand (through a lower rate of return). Linking the rate of return with other regulatory incentives would reduce the signals provided to networks to increase productivity.

96. The ERA recognises that the consideration of risk and its application to a forward looking rate of return is an essential part of developing an allowed rate of return that represents efficient financing costs.

97. Central to this approach is the estimation of certain rate of return parameters based on a benchmark sample including Australian comparable firms having a similar degree of risk to that which applies to the service provider in providing reference services.

98. The ERA has determined the positions in the 2022 final gas instrument by selecting and applying the estimation methods for the WACC parameters that the ERA considers provide the best estimate of the efficient financing costs of a benchmark efficient entity.

99. In doing so the ERA has considered the regulatory framework applying to gas network service providers, including the associated risk characteristics.

100. The ERA considers that it is the monopoly status of a regulated business that increases the certainty of the revenue stream, not necessarily regulation. In general, monopolies face a low degree of risk.[21] Regulation has the effect of capping the potential monopoly revenue stream and therefore its level of profit.

101. A regulated monopoly is still exposed to some risk, although that risk may be lower than it otherwise would be due to its monopoly status and the operation of the regulatory framework. For example, demand risk may still exist if volumes fall to a level that makes pricing unsustainable and therefore there is no lessening of this risk relative to an unregulated monopoly.

102. However, a regulated monopoly business will be exposed to less risk than a business that services a competitive market.

103. 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 a competitive market:

- Periodic resets of allowed revenue, which provides some revenue certainty.
- Consumer Price Index tariff adjustment mechanisms to reflect actual inflation, which mitigate inflation risk.

[21] Monopolies generally have the following characteristics: a lack of substitutes for its products; there are significant barriers to entry; there are no close competitors in the market; the business is a price maker; and the business can earn large profits.

- Recovery of capital expenditure once the asset base has been approved. Assets are not typically written off, rather firms can often accelerate depreciation. Though the possibility of non-recovery still exists.
- Fixed principles, where if the regulator approves a fixed principle the regulator must abide by that principle.[22]
- 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 and refinancing risk.
- Allowance for debt hedging instruments and costs, which helps reduce interest rate risk.
- Treatment of material unexpected adverse events.

104. The ERA notes that regulated network assets are not risk free assets. If this was the case investors would be incentivised to invest in Commonwealth bonds and solely receive a risk free rate of return. Rather the regulatory framework's incentive mechanisms mean that network service providers must work to achieve efficient benchmarks and are exposed to some risk.

105. In determining the approach to the individual rate of return parameters the ERA uses its regulatory discretion to determine a method that estimates the rate of return for a gas network service providers based on regulatory and commercial risks involved in providing the regulated service. Risk is a forward looking concept and inherently difficult to measure. Throughout its development of the 2022 final gas instrument the ERA utilises all available information to develop what it considers is the best rate of return for gas network service provider based on its regulatory and commercial risks. These considerations are detailed throughout the explanatory statement.

106. The natural monopoly characteristics typical of regulated businesses mean that a regulated entity has a lower risk of default, and higher credit rating, than a business providing a competitive, unregulated service. This contributes, among other factors, to the equity beta for a benchmark efficient entity being less than that across all firms in the market. The equity beta for all firms in the market is, by definition, one.

107. The ERA considers that regulated monopolies have lower risk than a competitive business. However, a regulated monopoly is exposed to some risk.

108. The regulatory framework does limit a monopoly's ability to maximise profit. However, the incentive nature of the regulatory framework provides regulated businesses with incentives, often over the short term, to increase efficiency.

109. This combination of limited downside risk and potential for short-term upside benefit (from incentive mechanisms) 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.

[22] An access arrangement may include a principle that is declared in the access arrangement to be fixed for a stated period – that is, a 'fixed principle' (rule 99). Once approved, the fixed principle is binding on both the ERA and the service provider over the stated period.

110. By adopting the estimation methods and parameter values that provide the best estimate of the value of an efficient forward looking rate of return commensurate with the inherent risks, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors. The ERA therefore considers that the estimation method set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

5. The rate of return framework

111. The rate of return on a service provider's capital base provides a return on the capital invested in the business.

112. The form of the rate of return sets out how the ERA will estimate the rate of return.

113. The National Gas Law states that the rate of return must include a weighted average of an allowed return on equity and an allowed return on debt:

> **30D [ERA] to make rate of return instrument**
>
> (3) The [ERA] may make an instrument only if satisfied the instrument will, or is most likely to, contribute to the achievement of the national gas objective to the greatest degree.
>
> (4) Subject to subsection (3), the way to calculate a rate of return on capital must include a weighted average of an allowed return on equity and an allowed return on debt.

114. The national gas framework sets out the revenue building blocks, which includes an allowance for taxes.[23]

5.1. Draft position

115. The 2018 gas instrument applied a nominal vanilla WACC to develop the rate of return for the benchmark efficient entity.[24]

116. The form of the WACC adopted in the 2018 gas instrument fulfilled the requirements of the NGR at the time the 2018 gas instrument was drafted, which required the ERA to adopt a nominal vanilla WACC.[25]

117. The ERA's position for the 2022 draft gas instrument was that the rate of return would take the form of a nominal vanilla WACC.

118. A vanilla WACC does not include any adjustment for tax effects, such as the effect of imputation credits on the rate of return. The effect of tax on the returns must be accounted for separately, as an explicit deduction from the relevant cash flows.

119. The nominal vanilla WACC provides for a simple weighted average of the nominal post-tax return on equity and the nominal return on debt.

[23] NGR version 59, 87(A).

[24] ERA, *Final Rate of Return Guidelines (2018),* December 2018, pp. 11-12.

[25] NGR version 41, 87(4). The requirement ceased to apply after 31 January 2019, when version 42 of the NGR became effective. The current NGR do not have this requirement.

120. The vanilla form of the WACC adopted was expressed as:[26]

$$WACC = E(r_e)\frac{E}{V} + E(r_d)\frac{D}{V}$$

Equation 1

where:

$E(r_e)$ was the expected return on equity

$E(r_d)$ was the expected return on debt

E/V was the proportion of equity in total financing (comprising equity and debt)

D/V was the proportion of debt in total financing.

5.2. Consultation

5.2.1. Independent Panel Report

121. The Independent Panel considered that the ERA's proposed rate of return framework was appropriate and based on sound reasoning.[27]

122. The Independent Panel noted that the WACC methodology was widely used in practice because it is theoretically sound, straightforward, can be intuitively explained, and can be replicated.[28]

5.2.2. Stakeholder submissions

123. Submissions received during the early consultation processes were supportive of the rate of return framework.[29]

124. Two of the submissions to the draft gas instrument provided shareholder comments on the rate of return framework. ATCO and GGT supported the rate of return framework.[30, 31]

125. In addition, ATCO acknowledged the ERA's position in the draft instrument that the application of the rate of return framework on a nominal basis in the revenue modelling framework is a matter for ATCO's upcoming AA6 submission.[32]

26 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 28.

27 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 28.

28 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 28.

29 ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, p. 23.

30 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 1.

31 Goldfields Gas Transmission Pty Ltd, *Submission to Draft Gas Instrument*, September 2022, p. 3.

32 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 1.

5.3. 2022 final approach

126. The 2022 final gas instrument estimates the rate of return as a nominal vanilla WACC.

127. The form of the WACC will be the same as Equation 1.

5.4. Reasoning

128. The ERA's approach for the rate of return framework for the 2022 final gas instrument applies the nominal vanilla WACC.

129. The ERA's approach maintains the nominal vanilla basis for the WACC because it is:

- Consistent with the requirements of section 30(D) of the National Gas Law.
- A transparent approach to estimating the rate of return that divides the cost of finance into debt and equity.
- Consistent with the proposed approach for the estimation of gamma.
- Recognises that the regulatory revenue building blocks separately account for taxation.
- Consistent with the ERA's long-standing approach, which stakeholders support, and the practice of other regulators, including the AER.

130. Based on the preceding reasoning, the ERA considers the nominal vanilla WACC approach set out in the 2022 final gas instrument is consistent with the national gas law, is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

6. Cross-checks on the rate of return

131. Cross-checks are 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.

132. This chapter outlines the ERA's final position on cross-checks and its reasoning for this position.

6.1. Draft position

133. For the 2018 gas instrument the ERA considered cross-checks during its review process. The 2018 gas instrument review considered cross-checks including financeability analysis, regulated asset base multiples, and actual profit performance. The 2018 gas instrument did not adjust the rate of return based on cross-checks.[33]

134. The 2022 draft gas instrument did not incorporate cross-checks to adjust the rate of return.[34]

135. In the 2022 draft instrument review the ERA considered the following broad cross-checks:

- Financeability - Financeability refers to a service provider's ability to meet its financing requirements and to efficiently raise new capital.
- Regulated asset base (RAB) multiples - Regulated asset base multiples are the enterprise value of a firm divided by its regulated asset base. A regulated asset base multiple of one indicates that the expected present value of the future stream of expected cashflows of the firm is equal to its regulated asset base.
- Historical profitability - Historical profitability is a backward-looking measure of actual returns.

136. The ERA considered that there are significant practical issues with the use and application of these cross-checks. The ERA was not satisfied that they should be applied formulaically or mechanistically to estimate any parameters of the allowed rate of return or used deterministically to set the rate of return.[35]

137. The ERA concluded that:

- Financeability does not provide an adequate cross-check of the rate of return or any of its parameters given that financeability issues can be significantly affected by factors other than the rate of return and the effects of these other factors cannot be reliably separated. Additionally, there is a high degree of subjectivity involved in implementing financeability testing. The application of financeability analysis would therefore likely involve considerable judgement and discretion.[36]

[33] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 21-22, p.35.

[34] ERA, *Explanatory statement for 2022 Gas Rate of Return Draft Instrument*, June 2022, p. 27.

[35] ERA, *Explanatory statement for 2022 Gas Rate of Return Draft Instrument*, June 2022, p. 27.

[36] ERA, *Explanatory statement for 2022 Gas Rate of Return Draft Instrument*, June 2022, p. 29.

- Regulated asset base multiples may also fluctuate overtime and according to factors idiosyncratic to an individual network business. There is no clear understanding of the links between an energy business's regulated asset base multiple and its allowed rate of return and that the effects of factors other than the rate of return on the multiples cannot be reliably adjusted for.[37]
- Actual financial performance of a firm is affected by many factors beyond the rate of return.[38]

138. In the 2022 draft gas instrument the ERA considered various information to best estimate the parameters of the rate of return. These information considerations are specific to the individual rate of return parameter and where applicable include cross-checks.

6.2. Consultation

6.2.1. Independent Panel Report

139. The Independent Panel considered that the ERA's proposal to not use cross-checks was appropriate and based on sound reasoning.[39]

140. The Independent Panel considered financeability, regulated asset base multiples and historic profitability. The Independent Panel noted:[40]

- That incorporating less defensible competing models into the rate of return setting process as cross-checks risks reducing the overall effectiveness of the gas instrument as application of cross-checks is either subjective, non-transparent or prone to gaming.
- The core challenge with cross-checks is the difficulty in decomposing the proposed metrics to determine the extent to which they have been affected by the rate of return instrument.

141. On a related matter, the Independent Panel submitted that as part of the ERA's framework for the next review, the ERA should consider the application of measures to determine the appropriateness of the previous Instrument as the starting point of the ERA's consideration. This relates to an ex-post analysis on the success of the past gas instrument in setting a rate of return that was neither too high nor too low.[41] The Independent Panel:

- Acknowledged that the ERA's approach of using the 2018 instrument as its starting point to determine whether changes in parameters are warranted has the benefit of simplicity and support of stakeholders.

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37 ERA, *Explanatory statement for 2022 Gas Rate of Return Draft Instrument*, June 2022, p. 31.

38 ERA, *Explanatory statement for 2022 Gas Rate of Return Draft Instrument*, June 2022, p. 32.

39 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 29.

40 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 29.

41 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 7, 10-11.

- Appreciated that many of the same considerations that sit behind the ERA's draft decision not to use cross-checks are likely to exist, particularly the difficulty of separating out the effect of the instrument from other parts of the regulatory scheme, and other market developments.

6.2.2. Stakeholder submissions

142. Four submissions to the draft gas instrument provided comments on cross checks on the rate of return.[42,43,44,45]

143. Stakeholder submissions provided mixed views on the use of cross-checks on the rate of return:

- AGIG submitted that:[46]
  - Whilst agreeing with the ERA's conclusions on profitability and RAB multiples, AGIG disagreed in respect of financeability. Although AGIG did not support any particular cross-checks, AGIG submitted that the ERA should do something objective and transparent to show if the rate of return instrument contributes to the achievement of the National Gas Objective.
  - Cross-checks on the return on equity should be used to ensure that the allowed return is reasonable.
  - As the ERA establishes a rate of return instrument that holds for four years and cannot be changed, regulators need to undertake scenario analysis which examines what the outcome of the rate of return instrument would be if conditions over the next four years were substantially different to those at the time the instrument is made.
- The CRG did not support the ERA's position in the 2022 draft instrument and considered that some use of cross-checks was needed:[47]
  - The CRG viewed that consideration should be given to RAB multiples.
  - The CRG suggested that the ERA should consider how it could investigate the efficacy of the 2018 gas instrument in relation to investment and profit outcomes for the current review.
  - The CRG considered that although cross-checks may be imperfect, they can still provide relevant information.
- While not discussing cross-checks directly, Energy Networks Australia (ENA) considered that the ERA should perform scenario analysis to ensure the proposed instrument is robust in a range of potential market conditions:[48]
  - The instrument is in place for four years and decisions made under it are each in place for five years. Therefore, it is important that the instrument is robust to the range of different market conditions that might be encountered while it is in force.

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42 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 15.

43 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 45-46.

44 ENA, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 29.

45 GGT, *Submission to 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 5.

46 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 15.

47 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 45-46.

48 ENA, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 29.

  - The ENA referred to its proposed scenario analysis in its submission to the AER. The ENA submitted that scenario testing should play a role similar to that of stress testing in the banking industry. The ENA was particularly concerned about the robustness of the allowed return on equity to a low rate scenario.[49]

- GGT submitted that the use of cross-checks should not be required in the 2022 final gas instrument:[50]
  - The cross-checks considered by the ERA are broad indicators. There is no clear logic linking these broad indicators with specific elements of the rate of return, or with the overall rate of return.
  - Cross-checks may provide "sense checks" on the rate of return parameter estimates and on the overall rate of return but beyond this, they cannot inform rate of return determination.

6.3. 2022 final approach

144. The 2022 final gas instrument does not incorporate the use of cross-checks.

6.4. Reasoning

145. The ERA considers that cross-checks may have some value in providing sense checks of estimates of the rate of return and its parameters.

146. However, there are significant practical issues with their use and application and the ERA is not satisfied that they should be applied formulaically or mechanistically to estimate any parameters of the allowed rate of return or used deterministically to set the rate of return.

147. The ERA considered various pieces of information to best estimate the various parameters of the rate of return. These considerations are specific to the individual rate of return parameter and include assessing relevant models, market information and other information.

148. The ERA considered the following matters:

- financeability
- regulated asset base multiples
- historical profitability
- general cross-checks and sensitivity analysis.

6.4.1. Financeability

149. Financeability refers to a service provider's ability to meet its financing requirements and to efficiently raise new capital. In the regulatory context, financeability often refers to the service provider's ability to achieve the benchmark credit rating applied in the estimation of the rate of return.

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[49] ENA, *Rate of Return Instrument Review: Response to AER's Draft Instrument and Explanatory Statement*, September 2022, p. 17.

[50] Goldfields Gas Transmission Pty Ltd, *Submission to 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 5.

150. At the AER's concurrent evidence session on cross-checks and the overall rate of return, the experts generally considered that financeability was not useful as a cross-check on the rate of return.[51]

151. The experts had diverging views on the use of financeability tests in a regulatory context. There did not seem to be a consensus amongst the experts on whether the financeability test is on the benchmark entity or the actual network business.

152. The reasons for concern cited by the experts were largely related to whether financeability issues are caused by the rate of return or the outcome of other decisions that affect revenues and costs.

153. For the regulatory financeability test, failing the financeability test using benchmark assumptions would mean that the benchmark entity is expected to be unable to generate cashflows to maintain the credit rating assumed by the benchmark entity or would earn a negative profit after tax. This outcome would only arise where depreciation and the equity rate of return are being set too low.

154. Regarding the application of a financeability test to an actual network business, the experts cited the following practical difficulties:

- Financeability issues may be driven by regulatory building blocks other than the rate of return (for example, depreciation).
- Financeability issues may be caused by a network business's actual financing decisions, that depart from the assumed benchmark debt strategy.
- Regulated businesses can encounter financeability issues based on their own discretionary decisions, but these issues should not necessarily be addressed through adjustment to the rate of return. The network can separately adjust their business to address financeability concerns.
- Financeability metrics are prone to manipulation and susceptible to gaming by regulated businesses.

155. The ERA notes the Independent Panel's view on the use of financeability as a cross-check. The Panel considered that the rate of return is just one of the many possible determinants of financeability issues. In practice, a network business will make financial and operational decisions that differ from the benchmark efficient firm. Adjusting the instrument to compensate for the effect of discretionary decisions risks the outcome either being opaque or prone to gaming.[52]

156. The ERA considers that financeability does not provide an adequate cross-check of the rate of return or any of its parameters given that financeability issues can be significantly affected by factors other than the rate of return and the effects of these other factors cannot be reliably separated. In practice, financial and operational decisions of a network business may differ from those of the benchmark firm.

157. In addition, there is a high degree of subjectivity involved in implementing financeability testing.

158. Based on the information above, the ERA has not used financeability metrics as a cross-check to inform the overall the rate of return for the 2022 final gas instrument.

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51 AER, *Rate of return instrument concurrent evidence session 4 of 4*, proofed transcript, February 2022.

52 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 30.

6.4.2. Regulated asset base multiples

159. Regulated asset base (RAB) multiples are the enterprise value of a firm divided by its regulated asset base. A regulated asset base multiple of one indicates that the expected present value of the future stream of expected cashflows of the firm is equal to its regulated asset base. This means that, at the current market value of the firm, investors are compensated exactly at a level to encourage efficient investment. When the multiple is more than one, it indicates that returns above the regulatory rate of return are being earned or are expected to be earned on the regulated asset base.

160. Regulators have diverging views on the use of regulated asset base multiples as a cross-check for the rate of return. For example, the New Zealand Commerce Commission (NZCC) acknowledged the limitations with using RAB multiples but considered that it provided a useful indicator of the overall reasonableness of the regulatory settings, including the allowed rate of return.[53] The AER considered that while regulated asset base multiples may be useful as a trigger for further investigation into the regulatory framework, they are unlikely to be able to provide conclusive information on the rate of return unless appropriate adjustments are made for the influence of other factors.[54]

161. While recognising the intent of using regulated asset base multiples as cross-checks on the rate of return, the ERA considers that there are many factors that can cause these multiples to be greater than one:[55,56]

- Buyers overpaying through their irrational exuberance or the "winner's curse".[57]
- Buyers expecting to achieve greater efficiency gains that would result in actual operating and capital expenditure being below the current regulatory operating and capital expenditure forecasts.
- Buyers expecting to increase revenue by increasing demand for regulated services.
- Buyers expecting to undertake future capital expenditure to increase the regulated asset base.
- Buyers benefiting from more efficient tax structures or financing than the benchmark assumption adopted by the regulator.
- Expectations that regulation may be relaxed, allowing higher future returns.
- Buyers paying for existing and/or potential unregulated revenue streams that are not captured in the regulated asset base.
- Buyers paying an option premium for the ability to undertake future value-adding activities.

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53 New Zealand Commerce Commission, *Input methodologies review decisions topic paper 4: Cost of capital issues*, December 2016, p. 206.

54 Biggar, D., *Understanding the role of RAB multiples in regulatory processes*, February 2018, p. 6, cited in AER, *Overall Rate of Return, Equity and Debt Omnibus: Final Working Paper*, December 2021, p. 130.

55 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 21.

56 Biggar, D., *Understanding the role of RAB multiples in regulatory processes*, February 2018.

57 The winner's curse is a phenomenon that may occur wherein the winner will tend to over pay due to emotional reasons or incomplete information. Accordingly, the winner will be 'cursed' in one of the two ways: either the winning bid will exceed the value of the auctioned asset making the winner worse off in absolute terms, or the value of the asset will be less than the bidder anticipated, so the bidder may garner a net gain but will be worse off than anticipated.

162. In the AER's 2022 concurrent evidence session on cross-checks, the experts expressed reservations on the use of regulated asset base multiples to inform the rate of return, including:[58]

- These multiples are influenced by many factors other than the rate of return, including other building blocks covered by access arrangements (for example operating expenditure), control premiums and embedded real options that are not captured within the framework of net present value analysis.
- Acquisitions cover a range of assets that might not be comparable to regulated assets. Therefore, regulated asset base multiples from market transactions may not be directly comparable to regulated assets.
- Adjustments could be made to strip out the unregulated component of the assets from comparable transactions, however, this would involve a level of judgement and subjectivity. The decomposition of an individual regulated asset base multiple would require many assumptions and these broad assumptions would then further increase the likely error and confidence intervals of the multiple estimates.

163. The AER engaged Cambridge Economic Policy Associates (CEPA) to analyse the RAB multiples of Spark Infrastructure and AusNet Services. Both these firms have now been acquired and delisted. CEPA's analysis involved disaggregation and adjustment of some debt and equity components implicit in the RAB multiples.[59]

- CEPA constructed a valuation model to reconcile to the enterprise value observed in the Spark Infrastructure and AusNet Services transactions.
- This valuation model was used to disaggregate the enterprise value among the various sources of value. The sources of value that are not relevant to the current RAB could then be deducted, providing a multiple whereby the market value of the existing RAB could be compared with the regulatory value of the existing RAB.
- CEPA's estimates of the RAB multiples for both Spark Infrastructure and AusNet Services were above one, with their respective estimation ranges dependent on the value of the non-regulated businesses.

164. ENA considered that the CEPA analysis of the RAB multiple was not a disaggregation that can be relied upon for the following reasons:[60]

- An aggregated RAB multiple is only informative if a reliable disaggregation can be performed.
- Before any conclusion can be drawn from RAB multiples, the additional items and any other factors that are embedded into the enterprise value must be subtracted.
  - Any additional present value arising from anticipated future increases in regulatory allowances (for example, towards those allowed by comparable regulators).

58 AER, *Rate of Return Instrument Concurrent Evidence Session 4 of 4*, February 2022.

59 CEPA, *EV/RAB Multiples: Final Report*, May 2022, pp. 12-18.

60 ENA, *Rate of Return Instrument Review: Response to AER's Draft Instrument and Explanatory Statement*, September 2022, p. 6, 16, 117-119.

  - The present value of anticipated incentive payments generated on current and future RAB assets or efficiencies from effective organisation and management within the firm.
  - The present value of revenue generated from unregulated assets.
  - The net present value of any forecast or planned future investments, plus the 'real option' value of potential future investments.
  - The net present value of any difference between the trailing average regulatory allowance for the return on debt and the spot borrowing rate to be paid by a potential purchaser.
  - Any tax benefits associated with a particular transaction.
- Cross-checks in this area should incorporate consideration of the direct evidence of investors expected long-term equity returns that are provided in the same independent expert valuation reports, rather than further undertaking this flawed exercise undertaken by CEPA.

165. Frontier Economics analysed the CEPA's report findings and identified errors, inconsistencies and uncertainties that highlighted the unreliability of disaggregating RAB multiples. These included:[61]

- CEPA's analysis of total debt included bank debt facilities for Spark Infrastructure but omitted bank debt facilities for AusNet.
- The assumption that all debts relate to the regulated entity, whereas a portion of that debt is likely to have been used to fund unregulated activities.
- CEPA's analysis relied heavily on the assumption that incentive payments and operating expenditure outperformance continue in the future according to the historical average rate, despite the considerable variability in past incentive payments and OPEX outperformance.
- CEPA's base-case analysis assumed no tax advantage available to AusNet – either now or in the future. However, CEPA noted that the independent expert report that was produced in relation to that transaction adopted a 'step-up' in the tax base. This 'step-up' was clearly a source of value that was a component of the transaction price.
- A key source of unregulated revenue for AusNet was identified as its Development and Future Networks (DFN) business. CEPA had estimated the value of this business at $370 million and deducted that figure from the aggregated enterprise value. In its independent expert report prepared for the AusNet transaction, the Grant Samuel estimate was more than eight times higher than the CEPA estimate. Making this one change for the DFN business valuation, Frontier Economics estimated that the disaggregated RAB multiple reduced from 1.74 to 1.06 for AusNet.

[61] Frontier Economics, *Analysis of RAB multiples: Responses to the May 2022 CEPA report*, May 2022, pp. 6-7, 9, 12-13.

166. ENA considered that the independent expert reports for AusNet Services and Spark Infrastructure provided direct evidence of the market's required cost of equity that were both materially higher than the AER's allowance. In the KPMG valuation report for Spark Infrastructure, KPMG estimated the market cost of capital between 7.17 per cent to 7.76 per cent. This compared to the AER's 2018 allowance of 5.39 per cent.[62] Similarly, Grant Samuel estimated the market cost of equity for AusNet Services at between 8.0 per cent and 8.3 per cent. This compared to the AER's 2018 allowance of 5.5 per cent.[63]

167. The AER engaged CEPA to undertake further analysis of the RAB multiples following the publication of its 2022 draft instrument. In response to stakeholder comments on decomposing the RAB multiples, CEPA submitted that:[64]

- Estimates of EV/RAB multiples are uncertain, as are estimates of the sources of EV/RAB premia or discounts. But it does not follow that conclusions about return expectations cannot be drawn.
- Examining alternative combinations of assumptions that are consistent with the evidence, and identifying when assumptions are implausible, does allow judgements to be made.
- While there was support for the disaggregation of RAB multiples, there is no agreement among the stakeholders about the inferences that can be drawn from this disaggregation.
- The approach adopted in CEPA's May 2022 report, with analysis and assumptions updated in CEPA's October 2022 report, provides a framework within which to assess what combinations of assumptions are consistent with the observed data, and through refining those assumptions identify what can be inferred from the disaggregated RAB multiples.
- Some adjustments and assumptions were applied to the October 2022 analysis in response to stakeholder feedback.

168. CEPA's updated analysis estimates that EV/RAB multiples are 1.61 for AusNet and 1.44 for Spark Infrastructure.[65] This compared to the CEPA's previous analysis of 1.74 for AusNet and 1.64 for Spark Infrastructure[66], or the Frontier's revised estimates of CEPA's May 2022 analysis, ranging from 0.87 to 1.06.[67] The degree of variation is subject to changes in assumptions on the value of unregulated revenue, tax benefits arising from the AusNet transaction or whether the aggregate RAB multiple would reduce over time.[68]

62 ENA, *Rate of Return Instrument Review: Response to AER's Draft Instrument and Explanatory Statement*, September 2022, pp. 122-123.

63 ENA, *Rate of Return Instrument Review: Response to AER's Draft Instrument and Explanatory Statement*, September 2022, p. 126.

64 CEPA, *EV/RAB Multiples: Final Report*, October 2022, pp. 5-6, 11-12.

65 CEPA, *EV/RAB Multiples: Final Report*, October 2022, p. 29.

66 CEPA, *EV/RAB Multiples: Final Report*, May 2022, p. 5.

67 Frontier Economics, *Analysis of RAB multiples: Responses to the May 2022 CEPA report*, May 2022, p. 7, 11.

68 Frontier Economics, *Analysis of RAB multiples: Responses to the May 2022 CEPA report*, May 2022, p. 7, 10.

169. The ERA notes the Independent Panel's view that not using RAB multiples is reasonable, given the complexity in decomposing the myriad drivers of a network operator's enterprise value.[69]

- Investor expectations are not uniform, and the enterprise value of a firm reflects these competing views which may include various factors (for example, expectations of superior operational performance, future net present value growth) and embedded real options (for example, the option to expand or adjust in the face of changing dynamics).
- Decomposing RAB multiples to exclude these other factors would require many assumptions and likely to be prone to more error than the framework used in the instrument.

170. RAB multiples may also fluctuate overtime and according to factors idiosyncratic to an individual network business and due to market conditions. McGrathNicol found that regulated asset base multiples were only relevant for a limited period following the transaction, becoming less relevant as time passes.[70]

171. The ERA considers that there is no clear understanding of the links between an energy business's RAB multiple and its allowed rate of return and that the effects of factors other than the rate of return on the multiples cannot be reliably adjusted for.

172. The ERA notes the complexity in decomposing the various factors that affect the enterprise value of a firm. Such decomposition to include or exclude certain factors would require many assumptions and therefore the final result is likely to be prone to error.

173. The ERA did not use RAB multiples as a cross-check to inform the overall the rate of return for the 2022 final gas instrument.

6.4.3. Historical profitability

174. Historical profitability is a backward-looking measure of actual returns.

175. In addition to the rate of return, other factors affect network business profitability. These factors include:

- Incentive schemes that offer service providers incentives to improve the efficiency of their services. Generally, these involve the network keeping some short term benefit and then consumer gaining this benefit.
- Regulatory, operational and environmental factors, including revenue smoothing, the timing of regulatory decisions, WACC parameters, pass through events and one-off type events.

176. In the AER's concurrent evidence session on cross-checks, the experts considered that actual profitability was not a useful cross-check for the rate of return for the following reasons:[71]

- Historical profitability does not provide useful information regarding expected profitability, which is the focus of the regulatory task in setting the rate of return.

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69 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 30.

70 McGrathNicol, Response to submissions on performance measures, April 2018, p. 16

71 AER, *Rate of Return Instrument Concurrent Evidence Session 4 of 4*, February 2022.

- Like RAB multiples, actual profitability is driven by many factors other than the rate of return. These factors may also be temporary.
- There are practical problems with using profitability to inform the reasonableness of the allowed rate of return in future periods, including the reliability of the profitability information and cost allocation that will go to calculating a measure of profitability for regulated services.
- Profitability measures based on accounting profits are prone to manipulation, with evidence indicating that monopolies adopt accounting practices to reduce the appearance of profitability.

177. The Independent Panel viewed that historical profitability has many of the same weaknesses identified for financeability and RAB multiples.[72]

- As with financeability and RAB multiples, many firm-specific factors drive actual performance and any attempt to decompose performance to isolate the factors that would have applied to a benchmark firm require numerous assumptions and would be prone to error.
- Any formal consideration of historical performance risks leading to regulated entities to game the outcome by engaging in earnings management.

178. Based on the information above, the ERA considers that profitability would not be a reliable cross-check of the overall rate of return. Profitability can be significantly affected by factors other than the rate of return, and the effects of these other factors cannot be reliably adjusted for. Furthermore, an efficient rate of return sets the forward looking rate of return expected by market investors at the time of an access arrangement, therefore the consideration of the past may not reflect investors' forward expectations.

179. A review of the financial performance on an ex-post basis and an adjustment to the rate of return may also be inconsistent with an incentive-based regulation framework, which would not be in the long-term interests of consumers.

180. The ERA therefore did not include historical profitability as a cross-check to inform the overall rate of return for the 2022 final gas instrument.

6.4.4. General cross checks and sensitivity analysis

181. In the 2022 final gas instrument the ERA has considered information from various sources to best estimate the parameters of the rate of return. These considerations are specific to the individual rate of return parameter and include assessing relevant models, market information and other information including stakeholder submissions and academic evidence.

182. When estimating different WACC parameters this information has included, where relevant, general cross checks such as the decisions and approaches of other economic regulators.

183. Furthermore, where relevant, the ERA has undertaken sensitivity analysis to inform the robustness of its method.

[72] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 30.

7. Averaging period process

184. Regulated gas network service providers are required to periodically submit access arrangements to the ERA for approval - typically every five years.

185. To establish the method for estimating the rate of return, the ERA must observe the market returns on proxy assets that are used to estimate the following parameters:

- the risk free rate, which is an input into calculating the return on equity
- the base rate, which is an input into calculating the return on debt
- the debt risk premium, which is an input into calculating the return on debt
- the expected inflation forecast.

186. During the access arrangement process, gas network service providers must propose averaging periods within a nomination window.

- Averaging periods are used when calculating the provider's returns on equity (the risk free component) and returns on debt (the base rate and debt risk premium components).
- The nomination window set out in the gas instrument is the period from which a gas network service provider can propose its specific averaging period.

187. This chapter outlines the ERA's reasoning for its current position on averaging periods outlined in the 2022 final gas instrument.

7.1. Draft position

188. The 2018 gas instrument set out:

- The averaging periods for the risk free rates used to estimate the return on debt and the return on equity.[73]
- That the ERA would estimate the expected inflation rate consistent with the estimate of the risk free rate by adopting an averaging period of 20 trading days.[74]
- The averaging period for annual update of the debt risk premium.[75]

189. The ERA's 2022 draft instrument implemented small adjustments to the averaging process to clarify and standardise the 2018 process. The adjustments included that averaging period window for the debt risk premium should be changed from between six months and two months prior to the end of the calendar year to between seven and three months prior.[76]

[73] ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 21.

[74] ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 38.

[75] ERA, *Final Rate of Return Guidelines (2018),* December 2018, pp. 24-25.

[76] ERA, *Explanatory statement for the 2022 Gas Rate of Return Draft Instrument*, June 2022, p. 37.

190. For clarity, the averaging process separately detailed:[77]

- The market rates that are fixed at the start of the regulatory period. The rates include the risk free rate for the return on equity, the interest rate swap for the return on debt and the expected inflation.
- The debt risk premium that is updated annually through the tariff variation mechanism.

7.2. Consultation

7.2.1. Independent Panel Report

191. The Independent Panel considered that the ERA's proposed averaging period process was appropriate and based on sound reasoning.[78]

192. The Independent Panel considered that averaging market observations over 20 days (effectively one trading month) was appropriate to smooth out volatility and the influence of extreme outliers. Using a relatively short averaging period ensures the observed rate is close to current market conditions, and it is unlikely that a longer period would have a significant impact.[79]

193. The Panel considered that the change in timing of the debt averaging window to be at least three months from the start of the regulatory year seemed appropriate.[80]

194. The Panel noted that ensuring that the averaging period is nominated in advance ensures that the regulated entities are not able to use hindsight to cherry-pick the best outcome.[81]

7.2.2. Stakeholder submissions

195. Four of the submissions to the draft gas instrument provided stakeholder comments on the averaging period process.

196. AGIG, the CRG and GGT provided support for the averaging period process.[82, 83, 84]

- AGIG proposed some refinements to the words on when the averaging periods must be nominated.[85]

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77 ERA, *2022 Gas Rate of Return Draft Instrument*, June 2022, pp. 5-6.

78 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 31.

79 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 31.

80 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 31.

81 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 31.

82 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, p. 16.

83 CRG, Submission to Draft Gas Instrument, September 2022, p. 39.

84 Goldfields Gas Transmission Pty Ltd, *Submission to Draft Gas Instrument*, September 2022, pp. 34-35.

85 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, p. 16.

- GGT agreed that shifting back the debt averaging period window one month will facilitate the annual update of the debt risk premium and allow more time for the subsequent annual reference tariff variation.[86]

197. ATCO did not support the amendment to the debt risk premium averaging period so that it concludes at least three months before the relevant regulatory year. Instead, ATCO supported the continued adoption of the averaging window concluding at least two months before each relevant regulatory year.[87]

- ATCO considered that the risk of delays to the tariff variation processes have already been mitigated by the debt risk premium's mechanistic calculation and the availability of CPI data dictating the critical time path for the tariff variation process.
- ATCO viewed that an averaging period closer to the relevant regulatory year enabled better estimates of debt costs.
- ATCO considered that service providers have the option to choose an earlier averaging period if they require it.

7.3. 2022 final approach

198. For the 2022 final gas instrument, gas network service providers will nominate the averaging periods subject to the requirements below.

199. For clarity, the averaging process separately details:

- The market rates that are fixed at the start of the regulatory period. The rates include the risk free rate for the return on equity, the interest rate swap for the return on debt and the expected inflation.
- The debt risk premium that is updated annually through the tariff variation mechanism.

7.3.1. Market rate for WACC parameters

200. The averaging period process for the market rates that will be fixed for the period of an access arrangement will be as follows:

- A gas network service provider will advise the ERA of their nominated averaging period for market rates for WACC parameters.
- An averaging period must be nominated prior to 30 business days following the release of an access arrangement draft decision.
- The averaging periods must be nominated prior to any of their dates taking place.
- The averaging period will have a duration of 20 consecutive trading days.[88]
- The averaging period must fall within a window at least two months, but no longer than six months, prior to the start date for the regulatory period.

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86 Goldfields Gas Transmission Pty Ltd, *Submission to Draft Gas Instrument*, September 2022, pp. 34-35.

87 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 3-4.

88 Trading days are defined as days that Australian Commonwealth Government Security mid-rate data is available in the RBA's F16 statistical table.

- If an averaging period is not nominated prior to 30 business days following an access arrangement draft decision, the ERA will use a default averaging period of the 20 consecutive trading days ending two months prior to the start of the regulatory period.
- The expected inflation forecast will use the same averaging period as is used for market rates of WACC parameters.
- The averaging periods for these market rates will remain confidential until the period has passed and will then be disclosed in the final decision.

7.3.2. Annual debt risk premium

201. The averaging period process for the annual debt risk premium update will be as follows:

- A gas network service provider will advise the ERA of their nominated debt risk premium averaging periods.
- An averaging period will be nominated for determining each debt risk premium for all years of an access arrangement's regulatory period.
- The first debt risk premium averaging period for an access arrangement must be nominated prior to 30 business days following an access arrangement draft decision.
- The remaining debt risk premium averaging periods must be nominated prior to the ERA's final decision for the regulatory period.
- The debt risk premium averaging periods must be nominated prior to any of their dates taking place.
- The averaging period will have a duration of 20 consecutive trading days.[89]
- The debt risk premium averaging periods for each of the years will not need to be identical.
- The averaging period must fall within a window of at least three months, but no longer than seven months, before the relevant regulatory year.
- In the event that a debt risk premium averaging period is not nominated on time, the ERA will use a default debt risk premium averaging period of the 20 consecutive trading days three months prior to the commencement of each regulatory year.
- The annual debt risk premium averaging periods will remain confidential so as not to adversely affect a regulated entity's ability to obtain finance.

[89] Trading days are defined as days that Australian Commonwealth Government Security mid-rate data is available in the RBA's F16 statistical table.

7.4. Reasoning

202. The ERA's final approach implements small adjustments to the averaging process to clarify and standardise the 2018 process.

203. Most elements of the final approach to the averaging period processes are unchanged from the 2018 gas instrument, including maintaining:

- The possibility for service providers to nominate, in advance, the averaging periods for market rates for WACC parameters and the debt risk premium.
- Averaging periods of 20 consecutive trading days.
- Confidentiality of the market rates for WACC parameters until the averaging period has passed and the averaging periods are subsequently disclosed in the ERA's final decision.
- Confidentiality of the annual debt risk premium averaging periods.

204. The ERA considers the ability for network service providers to nominate, in advance, the averaging periods allows them to best manage their financing arrangements and does not compromise their ability to obtain finance by signalling to the market.

205. Further, the ERA does not consider that allowing gas network service providers to select averaging periods raises a material risk of biasing the estimates favourably for the gas network service providers as the averaging periods will be nominated in advance of any of the dates in those periods. The Independent Panel supported this view in its report on the draft instrument.[90]

206. The ERA considers that a 20-day period provides estimates of these parameters that reflect the prevailing rates during the regulatory period while being robust to unnecessary volatility that may affect a shorter averaging period. Applying an averaging period of 20 consecutive trading days for these parameters will therefore provide reliable estimates of the efficient rates of return for gas network service providers. The Independent Panel supported this view in its report on the draft instrument.[91]

207. The ERA's final approach maintains the confidentiality of the averaging periods because the ERA considers that maintaining confidentiality of those averaging periods will mitigate the possibility of compromising a regulated entity's ability to obtain finance. The ERA recognises that confidentiality needs to be balanced with transparency and considers that averaging periods remain confidential until those periods have passed.

208. The averaging period for the debt risk premium must fall within a window of at least three months, but no longer than seven months, before the relevant regulatory year. This is a change from the 2018 gas instrument, which sets out that the averaging period can fall anywhere in the period between two months and six months before the relevant regulatory year.

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90 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 31.

91 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 31.

209. The ERA notes that ATCO supported maintaining the averaging window concluding at least two months before the end of the relevant regulatory year. ATCO considered that there were factors that mitigated the risks of delay to the tariff variation process including the debt risk premiums automated tools and the availability of CPI data dictating the timings for the finalisation of tariff variations. ATCO also submitted that an averaging window concluding two months before the start of the relevant regulatory year allows for the debt risk premium estimate to be undertaken closer to the relevant regulatory year.[92]

210. The ERA considers this change to the debt risk premium averaging window to at least three months will improve the implementation of regulatory processes by allowing sufficient time for finalising the calculation of gas network service providers' debt risk premiums before the annual reference tariff variation process.

211. Allowing an additional month for finalising the debt risk premium estimations is in the interests of consumers because it will allow more time for the calculation of annual reference tariff variations, and so ensure customers are advised well in advance of pricing changes. The ERA does not consider that the one-month change to the nomination window will impair the reliability of the estimates of the annual debt risk premiums.

212. The ERA considers that its proposed change to the averaging window is justified because it will provide a benefit to consumers by mitigating the risk of delays to tariff variation processes.

[92] ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 3-4.

8. Gearing

213. Gearing is the proportion of a business' assets financed by debt and equity. Gearing is defined as the ratio of the value of debt to total capital (that is, the sum of debt and equity) and is generally expressed as follows:

$$\text{Gearing} = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

Equation 2

214. The National Gas Law states that the approach for calculating a rate of return on capital must include a weighted average of an allowed return on equity and an allowed return on debt.

> **30D [ERA] to make rate of return instrument**
>
> …
>
> (3) The [ERA] may make an instrument only if satisfied the instrument will, or is most likely to, contribute to the achievement of the national gas objective to the greatest degree.
>
> (4) Subject to subsection (3), the way to calculate a rate of return on capital must include a weighted average of an allowed return on equity and an allowed return on debt.

215. The ERA uses the gearing ratio to weight the costs of debt and equity when the regulated WACC is determined.

216. In addition to being used to weight the expected returns on debt and equity, the gearing ratio is used:

- To re-lever asset betas for the purposes of estimating the equity beta of regulated firms.
- As a factor in determining an appropriate credit rating for deriving the debt risk premium.
- To determine interest and tax expenses in a post-tax revenue model.

217. This chapter outlines the ERA's reasoning for its current position on determining gearing outlined in the 2022 final gas instrument.

8.1. Draft position

218. The 2018 gas instrument applied a gearing of 55 per cent, which was fixed over the period of the instrument.[93]

219. The 2022 draft gas instrument maintained the gearing level of 55 per cent, which was fixed over the period of the instrument.[94]

220. The average gearing of a benchmark sample of energy networks informed the benchmark efficient level of gearing.[95]

[93] ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 15.

[94] ERA, *2022 draft gas rate of return instrument*, June 2022, p. 7.

[95] ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, p. 42.

221. The ERA observed the average gearing across various definitions of debt and equity and examined the drivers of the results. The ERA's analysis indicated a benchmark gearing level of 55 per cent debt.[96]

8.2. Consultation

8.2.1. Independent Panel Report

222. The Independent Panel considered that the ERA's proposed gearing level of 55 per cent was appropriate based on sound reasoning.[97]

223. The Independent Panel noted: [98]

- The proposed gearing level was consistent with observed levels from both the ERA and AER.
- The ERA uses a hybrid approach whereby book values are used for debt and market values are used for equity. As not all debt is marketable, and marketable corporate debt tends to be illiquid, the Panel considered that the use of book value for debt was appropriate and noted that this is a commonly used proxy.
- With respect to the treatment of hybrid securities for the gearing calculation, the ERA's approach of removing securities that exhibit more equity characteristics from debt was sensible.
- All submissions supported the continued use of a benchmark gearing level of 55 per cent.
- It may be reasonable to assume that gearing, which is relatively stable over time, would continue for some time into the future and not require a new benchmark sample.

8.2.2. Stakeholder submissions

224. Four submissions to the draft gas instrument provided stakeholder comments on gearing. All these submissions supported maintaining the use of a benchmark gearing level of 55 per cent. [99,100,101,102]

225. The Consumer Reference Group (CRG) considered that the ERA's gearing approach was reasonable:[103]

- A gearing level of 55 per cent is broadly similar for regulated energy networks and similar businesses.
- The capital structure of energy networks is relatively stable.

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96 ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, p. 40.

97 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 15, 32.

98 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 15, 32.

99 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 19.

100 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 5.

101 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

102 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 4.

103 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

226. While considering the ERA's treatment of hybrid securities as acceptable, AGIG provided some suggestions:[104]

- Despite the difficulty associated with understanding the nature of AusNet's recent hybrid securities, the ERA should adopt a perspective that these securities are treated as equity (and removed) unless there is clear, publicly available evidence to the contrary.
- It may also be useful to understand why regulated businesses are issuing complex hybrid instruments.

8.3. 2022 final approach

227. The 2022 final gas instrument applies a gearing level of 55 per cent debt.

228. The gearing level will be fixed for the term of the gas instrument.

8.4. Reasoning

8.4.1. Theoretical and practical considerations

229. A firm's capital structure affects the cost of debt and equity within the WACC independently. The optimal capital structure should minimise the cost of capital thereby maximising the value of the firm. Optimal capital structure choices differ across industries, as well as for different companies within the same industry.

230. While the firm's management knows the target capital structure, outside observers typically do not. Observed gearing at a given point in time can deviate from a company's target capital structure. This is because market values of outstanding securities used to measure gearing frequently change in value, market conditions change the feasibility of issuing capital or change the feasibility of issuing debt relative to equity, and issuance costs encourage infrequent but large capital raisings. Instead of assuming a static framework of capital structure, capital structure targeting does not seem to be equally important to all firms, as firms whose cost of equity is more sensitive to leverage deviation seemed to influence the speed to adjust their financial leverage toward the target leverage.[105]

231. Theoretically, market gearing should be used for equity beta derivation and the WACC calculation. However, in practice, the market value of debt is not observable, as it is not as frequently traded as market equity. Given the book value of debt is an acceptable proxy for market debt, the ERA prefers a hybrid approach in estimating market gearing by using the book value of debt and market values of equity averaged over five years.

232. The use of the market value of equity is consistent with Henry's approach to estimating equity beta.[106] This is because Henry's analysis used gearing based on the market value of equity to de-lever and re-lever between asset (unlevered) and equity (levered) beta estimates.

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104 AGIG, *Submission to 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 19.

105 Q, Zhou., K, Tan., R, Faff. & Y, Zhu. (2016), 'Deviation from target capital structure, cost of equity and speed of adjustment', *Journal of Corporate Finance*, volume 39, pp. 99-120.

106 Henry, O., *Estimating beta: An update*, April 2014, p. 4.

233. Partington and Satchell considered that market values should be used when estimating gearing where possible.[107]

234. The ERA places more reliance on the use of market value gearing estimates as they reflect the market's current information on the efficient financing of the benchmark entity. This can be used to inform the setting of efficient financing costs for the upcoming regulatory period.

235. The method of accounting for investments in associates can reduce the comparability of debt reported in firm's balance sheets. The method used depends on the investing firm's ability to control the investee where percentage of firm ownership in the investee is typically used as a proxy for firm control. This can complicate the estimation of the true target gearing level for each firm in the benchmark sample and thus, the benchmark firm. Adjustments should be made to ensure financial information in firms' balance sheets is comparable.

8.4.2. Other regulators' decisions

236. Recent decisions by Australian regulators on gearing are summarised in Table 4.

Table 4: Benchmark gearing in Australian regulatory decisions

Regulator	Year	Industry	Gearing (debt %)
AER[108]	2022	Gas and electricity	60
ERA[109]	2018	Gas	55
ESC[110]	2021	Water	60
ESCOSA[111]	2016	Water	60
IPART[112]	2020	Water	60
OTTER[113]	2022	Water	60

Source: Compiled by the ERA

237. Most Australian regulators have consistently used a gearing assumption of 60 per cent for the cost of capital in the provision of various utility network services. This figure has been arrived at through directly observing gearing data for a benchmark sample of energy and water utilities in Australia and overseas, considering other regulatory decisions and observing the gearing of comparator firms.

107 Partington, G. and Satchell, S., *Report to the AER: WACC and Leverage*, May 2021, p. 20.

108 AER, *Draft Rate of Return Instrument Explanatory Statement,* June 2022, p. 73.

109 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 15.

110 ESC, *2023 Water Price Review: Guidance Paper*, October 2021, p. 37.

111 ESCOSA, *SA Water Regulatory Determination 2016, Final Determination*, June 2016, p. 125.

112 IPART, *Review of prices for Water NSW Greater Sydney from 1 July 2020: Final Report*, June 2020, p. 169.

113 OTTER, *Investigation into TasWater's Prices and Services for the Period 1 July 2022 to 30 June 2026 Draft Report*, February 2022, p. 62.

238. Other regulators, such as the AER, Office of the Tasmanian Economic Regulator (OTTER) and Queensland Competition Authority (QCA), have used a longer term (10-year period) to estimate gearing levels.[114,115,116]

239. The AER has used 60 per cent in recent decisions but noted that its recent estimates of gearing were a few percentage points below the 60 per cent gearing used in the 2018 instrument.[117]

8.4.3. The ERA's estimation of the benchmark gearing

240. A regulatory gearing estimate contributes to a rate of return that reflects efficient financial costs for the next regulatory period.

8.4.3.1. Benchmark gearing

241. The ERA considers that the gearing should be determined from observations of the gearing levels of firms in a benchmark sample of Australian energy networks. The gearing levels of Australian energy networks will most closely reflect the regulatory and commercial risks involved in providing regulated services.

242. An implication of adopting the benchmark firm is that the actual decisions for a service provider may differ (and often will differ) from the benchmark firm. That is, the actual capital structure decisions of a service provider may differ from the benchmark firm. However, under incentive regulation the regulator does not compensate the regulated service provider for its actual decisions but compensates it as if it were operating efficiently.

243. The ERA does not consider it appropriate to compensate a regulated service provider for its actual decisions on gearing.

244. The ERA also recognises that, given current limitations of the regulatory accounts of its regulated entities, the ERA is not able to accurately measure actual gearing.

245. The ERA considers that the use of average gearing from the benchmark sample is appropriate. Using average gearing is a commonly applied approach that involves averaging performance measures across similar firms to infer an attainable benchmark.

[114] AER, *Rate of return instrument: Explanatory Statement*, December 2018, p. 65.

[115] OTTER, *Investigation into TasWater's Prices and Services for the Period 1 July 2022 to 30 June 2026 Draft Report*, February 2022, p. 65.

[116] QCA, *Rate of return review: Final report*, November 2021, p. 25.

[117] AER, *Draft Rate of Return Instrument Explanatory Statement,* June 2022, p. 73.

8.4.3.2. Treatment of hybrid securities

246. Hybrid securities are securities that have characteristics of both debt and equity.

247. In the 2018 gas instrument, the ERA adjusted debt and equity to recognise the nature of hybrid securities. For example, the ERA removed some of Spark Infrastructure's loan notes that were denoted as a debt product but had equity characteristics.

248. There has been increased use of hybrid securities by regulated businesses in 2020 and 2021. These hybrid issuances included:

- In September 2020, AusNet Services issued a $650 million, 60-year AUD denominated hybrid security in the form of non-convertible subordinated notes.
- In March 2021, AusNet Services issued a €700 million, 60-year EUR hybrid security in the form of non-convertible subordinated notes.
- In May 2021, Spark Infrastructure announced that TransGrid had secured a $295 million hybrid security instrument in the form of subordinated notes from the Clean Energy Finance Corporation. Spark Infrastructure has a 15 per cent ownership in TransGrid.

249. Given the increased use of hybrid securities and its potential implication on gearing, in its discussion paper and draft instrument the ERA sought stakeholder views on hybrid securities and what was a suitable method for allocating hybrid securities between debt and equity.

250. In its draft decision, the AER excluded hybrid securities from its empirical estimates of gearing. The AER previously considered that the main difficulty with including hybrid securities into gearing was the apportionment between debt and equity. However, the AER's sensitivity analysis on the treatment of hybrid securities showed that excluding hybrids from gearing estimation is almost equivalent to treating hybrids as 50 per cent debt and 50 per cent equity – a common approach used by credit rating agencies in their assessments.[118]

251. In its submission to the AER, Energy Networks Australia noted that there appears to be some confusion about AusNet's subordinated debts being "hybrid" debts in the sense that they can be converted into equity. These debts cannot be converted into equity. Energy Networks Australia advised that these debts are referred to as hybrids in AusNet publications because ratings agencies assign them a favourable treatment.[119]

252. The ERA notes the difficulty in properly understanding the characteristics of hybrid securities given the lack of publicly available information, and therefore the risk of misclassifying debt and equity levels.

253. The ERA's approach to estimating gearing adjusts debt and equity to recognise the nature of hybrid securities, based on publicly available information. Consistent with the 2018 gas instrument, the ERA's approach removes hybrid securities that have predominantly equity characteristics from debt, including the subordinated notes from Spark Infrastructure.

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[118] AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 81.

[119] ENA, *Submission to the ENA's Debt draft working paper*, September 2021, p. 24.

254. The ERA notes that the Energy Networks Australia's views that there has been some confusion about the characteristics of AusNet's new debt issues and that these do not have debt characteristics. This demonstrates the difficulty of properly understanding hybrid securities.

255. To understand the materiality on gearing of possible methods to classify AusNet's new debt issuances, the ERA has undertaken a scenario analysis on AusNet's hybrid securities based on the following approaches:

- Removed two AusNet hybrid securities issued in September 2020 and March 2021 from the gearing estimate.
- Applied a 50/50 allocation of the two hybrid securities between debt and equity.

256. While AusNet's five-year average gearing estimates vary under these two approaches, the ERA found that there is no material effect on the five-year average gearing estimate for the benchmark entities. These hybrid securities were only issued relatively recently.

257. In the absence of further information that would indicate that new hybrid security issuances have predominantly equity characteristics, the ERA did not remove these recent hybrid securities when estimating gearing.

258. Given the difficulty in first fully understanding the characteristics of hybrid securities and there being no simple method to adjust gearing for hybrid securities, the ERA applies regulatory judgement on recognising hybrid securities that have predominantly equity characteristics and then adjusting gearing estimates.

259. The ERA notes AGIG's view on the issuance of hybrid securities. Publicly available information shows that there are various reasons for this debt issuance, including the use of hybrid securities to refinance existing debt, fund capital expenditure or maintain a firm's credit rating. For example, AusNet previously issued hybrid securities that aimed to provide a competitive cost of funding and diversify its investor base.[120]

260. 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 uses publicly available information to inform these adjustments.

8.4.3.3. Gearing estimation method

261. The ERA's general gearing method involves observing gearing over the last five-year period.[121] The ERA does not forecast directional movements of debt relative to equity that may happen. For example, the ERA does not consider factors such as market capitalisation forecasts and debt issuance constraints.

262. To calculate gearing, the ERA uses the following method:

- Use comparator firms in its benchmark sample of firms.
- Use a market-based gearing level to reflect efficient financing.
- Gearing is observed over a five-year period.

[120] AusNet Services, *AusNet Services successfully prices USD 375M hybrid offer*, March 2016, p. 1.

[121] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement,* December 2018, p. 74.

- Gearing estimates are observed on an annual basis from financial statements and market data.
- The market value of equity is equal to a firm's market capitalisation, which is equal to the share price multiplied by volume of shares issued.
- As the availability of market value of debt is limited, the book value of debt is used as a proxy. The book value of debt is calculated from current and non-current borrowings from financial statements.
- Debt is taken at a gross level. That is, no deduction is made for cash or marketable securities. Gross debt is used as it is not possible to determine whether cash equivalents are used to repay debt or pay dividend.[122] In addition, an efficient network business would have some cash as part of its optimal asset mix.

8.4.3.4. Gearing estimates

263. The ERA has updated its gearing estimate using current data.

264. Table 5 details the gearing estimate for benchmark entities based on observable data from comparable firms.

Table 5: ERA market value gearing ratio estimates (%)

Year	APA Group (APA)	AusNet Services (AST)	DUET Group (DUE)	Spark Infrastructure Group (SKI)	Average
2012	47	59	72	59	59
2013	46	57	71	62	59
2014	45	58	64	55	55
2015	50	59	62	56	57
2016	49	57	51	54	52
2017	49	52	N/A	52	51
2018	46	56	N/A	57	53
2019	45	55	N/A	60	53
2020	45	59	N/A	60	55
2021	49	57	N/A	60	55
Five-year average	**47**	**56**	**N/A**	**58**	**53**
10 year average	**47**	**57**	**64**	**57**	**55**

Source: Annual reports, Bloomberg, ERA analysis.

265. The ERA's analysis estimates that the five year average gearing ratio for the energy network sample is 53 per cent, or 55 per cent over a 10 year average.

[122] Dr Lally, M., *Review of the AER's views on gearing and gamma*, May 2018, p. 4.

266. The ERA notes that three of the sample firms have been delisted, including AusNet Services and Spark Infrastructure in 2022. However, the ERA considers that past market information still provides a useful reference.

267. If the analysis is extended to include the last observable five years for DUET, where DUET's five year average gearing is 64 per cent, the five year average of the sample will increase to 56 per cent.

268. The AER's analysis has shown that gearing ratio levels based on market values are 52 per cent over a five year average or 55 per cent over a 10 year average.[123]

269. In its submission to the AER, Energy Networks Australia provided some cross-checks on the gearing levels from other comparable international regulators. Regulators including Federal Energy Regulatory Commission, Ofgem and Ofwat adopted gearing ratios between 54 and 60 per cent.[124]

270. The ERA notes the Independent Panel's report on the gearing over time and its stability. The ERA considers that gearing levels are relatively stable over time, particularly considering rounding, and that the existing benchmark sample provides information to inform a decision on a benchmark gearing level.

271. Based on the above information, for the 2022 final gas instrument the ERA uses a gearing ratio of 55 per cent.

272. In determining gearing the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles, and current market information. The gearing estimate is transparent. The use of a fixed gearing ratio is readily implementable over the term of the instrument. The ERA considers a gearing ratio of 55 per cent is fit for the purpose of the 2022 final gas instrument.

273. Based on the preceding reasoning, the ERA considers that the use of a gearing ratio of 55 per cent set out in the 2022 final gas instrument will provide the best estimate of a gearing ratio over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation methods that provide the best estimate of a gearing ratio in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the gearing ratio of 55 per cent as set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

123 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 75.

124 ENA, *Rate of Return Instrument Review: Response to AER's Draft Instrument and Explanatory Statement*, September 2022, p. 100.

9. Return on debt

274. The WACC includes a component for the return on debt. The return on debt is the return that debt holders require from a firm to compensate them for the risk they take in providing debt financing to the company.

275. This chapter outlines the ERA's reasoning for its final position on estimating the return on debt.

9.1. Method for estimating the return on debt

276. This section outlines the ERA's reasoning for its final position on the return on debt method outlined in the 2022 final gas instrument.

9.1.1. Draft position

277. The 2018 gas instrument implemented the hybrid trailing average approach for its debt approach.[125]

278. Under the hybrid trailing average approach:[126]

- The benchmark entity enters into the assumed benchmark efficient debt strategy. In this case, the strategy was assumed to be a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year.
- The benchmark entity uses derivative arrangements to adjust rates from the efficient debt portfolio to lock in five-year interest rate swap rates, set on the day at the start of the regulatory period.
- A 10-year trailing average debt risk premium is used as the credit risk of debt issuances cannot be hedged.
- A 10-year trailing average debt risk premium is updated annually through the tariff variation mechanism, which accommodates annual changes in the credit risk of new debt issuances.

279. The ERA considered that a hybrid trailing average approach best approximates the NPV=0 principle while also recognising interest rate risk, refinancing risk and the staggered nature of debt portfolios.

280. The 2018 gas instrument estimated the return on debt based on a risk premium above the risk free rate, plus an additional margin for administrative and hedging costs.[127]

281. The risk free rate is the rate of return of a hypothetical investment with no risk of financial loss, over a given period of time.

282. The debt risk premium is the margin above the risk free rate of return required to compensate holders of debt securities for the risk in providing debt finance. The debt risk premium is compensation for investors who tolerate the extra risk, compared to that of a risk free asset.

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125 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 16.

126 ERA, *Final Rate of Return Guidelines Explanatory Statement,* December 2018, p. 84.

127 ERA, *Final Rate of Return Guidelines Explanatory Statement,* December 2018, p. 83.

283. The return on debt estimated for the first year of an access arrangement contributes to the setting of the initial revenue path for the remaining years of the regulatory period (that is, for years two to five).[128]

284. The ERA revises the return on debt each year to incorporate an annual update of the estimate of the debt risk premium. Each year, the ERA estimates the latest on-the -day value of the debt risk premium over the specified averaging period. The value is then incorporated into the 10-year trailing average, replacing the estimate made 10 years prior.[129]

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

286. The 2022 draft gas instrument maintained the same return on debt method as described in the 2018 gas instrument to estimate the return on debt.[130]

9.1.2. Consultation

9.1.2.1. Independent Panel Report

287. The Independent Panel considered that the hybrid approach chosen offers a sensible approach minimising interest rate risk and refinancing risk. In addition, the hybrid trailing average approach satisfies the NPV=0 principle.[131]

288. The Independent Panel noted that:[132]

- The approach was implementable and replicable.
- The hybrid trailing average approach has been in use since 2015.
- All submissions received for the 2022 draft gas instrument were in favour of maintaining this approach which establishes regulatory certainty.

9.1.2.2. Stakeholder submissions

289. Five of the submissions to the 2022 draft gas instrument commented on the return on debt.[133,134,135,136, 137]

[128] ERA, *Final Gas Rate of Return Guidelines (2018)*, December 2018, p. 17.

[129] ERA, *Final Gas Rate of Return Guidelines (2018)*, December 2018, p. 17.

[130] ERA, *2022 draft gas rate of return instrument*, June 2022, pp. 8-10.

[131] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 33.

[132] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 33.

[133] AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 17.

[134] ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

[135] CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

[136] GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 8.

[137] Western Power, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 2.

290. Most submissions supported the ERA's hybrid trailing average approach for debt for the 2022 gas instrument.[138,139,140,141]

- AGIG noted the widespread acceptance amongst stakeholders of the hybrid trailing average approach.[142]
- ATCO supported the hybrid trailing average approach as it is a practical debt strategy able to be replicated by service providers. A deviation from this approach may create practical difficulties for service providers in realigning their debt portfolio with a new approach.[143]
- The CRG considered that the hybrid trailing average approach is the best method for estimating the risk free rate and debt risk premium components of the return on debt with respect to promoting the long-term interests of consumers.[144]
- GGT submitted that the hybrid trailing average approach should continue as the approach provides reasonable estimates of a benchmark rate of return on debt.[145]

291. Consistent with Western Power's AA5 proposal, Western Power considered that the allowed return on debt should be set using the 10-year trailing average approach. Western Power submitted that:[146]

- The hybrid trailing average approach does not reflect a financing strategy that a business operating in the market would adopt, other than replicating the allowance provided to it by the ERA.
- The ERA also recognises that the trailing average approach is consistent with the NPV=0 principle.
- Other Australian regulators now use the standard 10-year trailing average approach applied to the entire return on debt, matching the regulatory approach with the approach generally observed in the market.

9.1.3. 2022 final approach

292. The estimate of the return on debt will comprise a risk premium above the risk free rate, plus an additional margin for administrative and hedging costs:

$$Return\ on\ debt = Risk\ free\ rate\ +\ Debt\ risk\ premium\ + Debt\ raising\ costs + Hedging\ costs$$

Equation 3

293. The risk free rate is the rate of return of a hypothetical investment with no risk of financial loss, over a given period of time.

138 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 17.
139 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.
140 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.
141 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 8.
142 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 17.
143 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.
144 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.
145 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 8.
146 Western Power, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 2.

294. The debt risk premium is the margin above the risk free rate of return required to compensate holders of debt securities for the risk in providing debt finance. The debt risk premium is compensation for investors who tolerate the extra risk, compared to that of a risk free asset.

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

296. The return on debt estimate is based on the hybrid trailing average approach. Under the hybrid trailing average approach for debt:

- The benchmark entity enters into the assumed benchmark efficient debt strategy, assumed to be a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year.
- The benchmark entity uses derivative arrangements to adjust rates from the efficient debt portfolio to lock in five-year interest rate swaps rates, set on the day at the start of the regulatory period.
- The 10-year trailing average debt risk premium is updated annually.

297. The on-the-day estimate of the risk free rate will be based on the observed yield of a five-year interest rate swap rate, averaged over a 20-day period just prior to the regulatory period.

298. The on-the-day debt risk premium will be derived from the yield of an observed sample of bonds issued by comparator firms with similar credit ratings as the benchmark efficient entity (see section 9.59.5.4.4 – Estimating the 10-year trailing average debt risk premium). The ERA calculates the debt risk premium based on a 10-year trailing average, which will be updated annually.

299. The nomination of averaging periods for the interest rate swap rate and debt risk premium is discussed in Chapter 7.

300. An annual allowance will be provided for debt raising and hedging costs (see Chapter 11 – Debt and equity raising costs).

9.1.3.1. Initial revenue path

301. The return on debt estimated for the first year of an access arrangement contributes to the setting of the initial revenue path for the remaining years of the regulatory period (that is, for years two to five).

9.1.3.2. Annual update of the return on debt

302. To allow for market changes the ERA will revise the return on debt each year to incorporate an annual update of the estimate of the debt risk premium.

303. Each year, the ERA will estimate the latest on-the-day value of the debt risk premium over the specified averaging period. It will then be incorporated in the 10-year trailing average, replacing the estimate made 10 years prior.

9.1.3.3. Implementing the annual update

304. The ERA will implement the annual update by setting tariffs for regulatory years two to five by including an automatic adjustment to the initial revenue path in each year.

305. The automatic adjustment will account for the change in revenue in each year that arises from the difference between the return on debt under the initial revenue path and that under the annually updated return on debt.

306. The difference in the return on debt will reflect the change in the debt risk premium. The other components of the return on debt – the risk free rate and the allowances for debt raising costs and hedging costs – will apply unchanged for each regulatory year in the regulatory period.

307. First, the cash flow allowance for the return on debt in any regulatory year t may be defined as:

$$RoD_t = \left(DRP_t + R_f + Drc + Hc\right) \times \frac{D}{(D+E)} \times RAB_{Op,t}$$

Equation 4

where

RoD_t is the return on debt in year t

DRP_t is the initial debt risk premium

R_f is nominal risk free rate

Drc is the debt raising cost

Hc is the hedging cost

$\frac{D}{(D+E)}$ is the gearing

$RAB_{Op,t}$ is the opening regulated asset base at the beginning of year t

t ranges from year 1 to 5.

308. The 'initial revenue path' will be calculated in line with the above formula, using the estimated DRP_t for year 1 (that is, DRP_1).

309. Second, the formula for calculating the subsequent annual adjustment to the initial revenue path for a change in the estimate of the debt risk premium will be as follows:

$$\Delta RoD_t = \frac{D}{(D+E)} \times \Delta DRP_t \times RAB_{Op,t}$$

Equation 5

where

ΔRoD_t is the change in the allowance for the return on debt in year t

$\frac{D}{(D+E)}$ is the gearing

ΔDRP_t is the change in debt risk premium (the trailing average DRP) in year t defined as: $(DRP_t - DRP_{t-1})$

$RAB_{Op,t}$ is the opening regulated asset base in year t

t is the regulatory year, ranging from year 2 to 5.

310. Revenue and prices to apply in the relevant regulatory year will be adjusted along with the updated return on debt, as part of the annual tariff update, through the automatic update mechanism.

311. As only the estimate of the debt risk premium is updated annually, the approach constitutes a partial update of the return on debt and the rate of return.

9.1.4. Reasoning

312. The reasoning for the ERA's final approach for estimating return on debt is consistent with its draft reasoning, informed by the Independent Panel and public submissions, and detailed below.

313. The ERA has evaluated three approaches on the return on debt:

- The on-the-day approach for estimating the risk free rate and the debt risk premium.
- A full trailing average for the total cost of debt, with annual updating.
- The hybrid trailing average approach for estimating the debt risk premium, with annual updating.

314. Consistent with the national gas objective and the revenue and pricing principles, the ERA considers that the service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs. The NPV=0 principle also helps ensure that investors are compensated at a level to encourage efficient investment, so that the present value of the future stream of expected cash flows of a firm is equal to the regulated asset base.

315. To consider the different approaches it is also necessary to consider how they address financial risks of debt financing, including:

- Interest rate risk – the risk of differences arising between the allowed return on debt costs and the actual cost of debt. Interest rate risk can be managed using interest rate swap contracts.
- Refinancing risk – the risk of rolling over debt and the cost of debt at the time of issuing new debt. Refinancing risk can be managed by having multiple sources of debt, issuing longer term debt and staggering debt over different periods.

316. In its consideration of the overall return on debt approach, the ERA has also considered the NPV=0 principle and evaluated how well each approach would achieve the national gas objective, revenue and pricing principles, under the National Gas Law and the National Gas Rules.

317. The ERA's consideration of the three different methods of estimating the return on debt are detailed below.

9.1.4.1. On-the-day approach

318. The on-the-day approach sets the regulatory cost of debt over a short period immediately preceding the start of the regulatory period. The allowed cost of debt is subsequently reset before the start of the next regulatory period.

319. The strengths of the on-the-day approach include:

- It is very simple to implement.
- The current cost of debt at the time of a regulatory determination provides a forward-looking return, which provides the most appropriate signal for new investment.
- It minimises price volatility within an access arrangement period.

320. The weaknesses of the on-the-day approach include:

- It does not reflect that most capital has already been invested and is sunk so that the investment signals provided are of limited relevance. For sunk capital, focus needs to be on ensuring that it is efficiently financed consistent with the time of the investment.
- It assumes that all the debt of a regulated entity can be financed at the prevailing rates in the short period just prior to the regulatory decision. This exposes a regulated business to large refinancing risks.
- It does not reflect that refinancing risk is a concern to a business, which drives a business to stagger its debt portfolios.
- It departs from the NPV=0 principle.
- It leads to the greatest price volatility at the time of an access arrangement reset.

321. The on-the-day approach was the main approach adopted by regulators for regulated energy network businesses, from the first decisions in the 1990s until the AER adopted a trailing average cost of debt approach in its 2013 rate of return guidelines.

9.1.4.2. Full trailing average approach

322. A full trailing average approach measures the return on debt as a trailing average of the total cost of debt. Generally, this approach applies a 10-year term of debt and a simple weight of 10 per cent for each year of the trailing average. This assumes that all debt is contracted for 10 years and 10 per cent of the total debt portfolio is refinanced each year. Under this approach, all debt is issued at a fixed rate.

323. The strengths of a full trailing average approach include:

- It recognises that most capital is sunk.
- It reflects a general infrastructure asset approach, where long-term fixed debt is issued and is regularly refinanced.
- It is effective in addressing refinancing risk. This assumes that the weights for the trailing average are reasonable estimates for what the benchmark entity employs and the assumed 10-year term of debt actually applies.
- It achieves the NPV=0 principle, as it can be implementable so that debt costs are able to match the debt allowance included in regulated revenues.

- It reduces volatility of the cost of debt and the resulting volatility for regulated services. This is possible due to the smoothing effect of the 10-year trailing average.
- It can take account of extreme events that affect both the risk free rate and the debt risk premium. The smoothing effect spreads any volatility over time.
- It minimises price volatility at the start of an access arrangement.
- It is simpler than the hybrid trailing average approach and has no requirement for incorporating hedging costs into the total debt portfolio.
- It is used by other regulators across Australia.

324. The weaknesses of a full trailing average approach include:

- It does not incorporate a forward-looking efficient component, as a trailing average of the total cost of debt only reflects past debt costs.
- It may deliver higher costs of debt to regulated entities as firms may exploit the typical upward sloping yield curve to issue debt at lower cost. This is achieved by issuing debt at shorter maturities than the assumed 10-year tenor.
- Compared to other debt approaches, it leads to the greatest volatility of the cost of debt within an access arrangement period, including the greatest difference between forecast cost of debt and actual cost of debt in the last year of an access arrangement.
- It introduces complexity through annual updating.

325. Given the strengths of the full trailing average approach over the on-the-day approach regulators started adopting trailing average approaches in 2013.

9.1.4.3. Hybrid trailing average approach

326. The hybrid trailing average approach combines elements from the on-the-day and the full trailing average approaches. Under the hybrid trailing average approach for estimating the return on debt:

- The benchmark entity enters into the assumed benchmark efficient debt strategy, assumed to be a portfolio of 10 year fixed-rate debt with 10 per cent refinanced each year (the same debt portfolio as the full trailing average approach).
- The benchmark entity uses derivative arrangements to adjust rates from the efficient debt portfolio to lock in five-year interest rate swaps rates, set on the day at the start of the regulatory period.
- The 10-year trailing average debt risk premium is updated annually.

327. The strengths of the hybrid trailing average approach include:

- It recognises that most capital is sunk, while accounting for the regulatory period.
- It incorporates a forward-looking efficient component into estimating the return on debt.
- It minimises price volatility within an access arrangement period.
- It achieves the NPV=0 principle, as it can be implemented so that debt costs are able to match the debt allowance included in regulated revenues.
- It reduces the ability of firms to exploit the slope of the yield curve.

- It reduces refinancing risk. Refinancing risk provides justification for adopting some form of trailing average method.
- Compared to a full trailing average approach, it better minimises interest rate risk by linking revenues to a five year risk free rate, which is reset at the end of the access arrangement period.
- Compared to the on-the-day approach, it better reflects how regulated firms refinance their debt in practice.
- It avoids the effect of recovering current low (or high) interest rates in the next regulatory period.

328. The weaknesses of the hybrid trailing average approach include:

- Compared to a full trailing average approach, it creates greater variability at the start of an access arrangement. It can produce high volatility in environments when there are large swings in debt markets.
- It introduces complexity through annual updating.
- It imposes additional hedging costs on top of a benchmark efficient debt strategy.

329. Since 2015, the ERA has applied the hybrid trailing average approach for estimating the return on debt for all Western Australia's regulated gas pipelines and Western Power through access arrangement determinations. The ERA's method used all available information in developing an initial 10-year hybrid trailing average and therefore no transitional arrangements were required for implementation.[147] Since then, the ERA has used the hybrid trailing average approach to determine the return on debt for regulated energy networks in Western Australia.[148]

9.1.4.4. Changes to market conditions

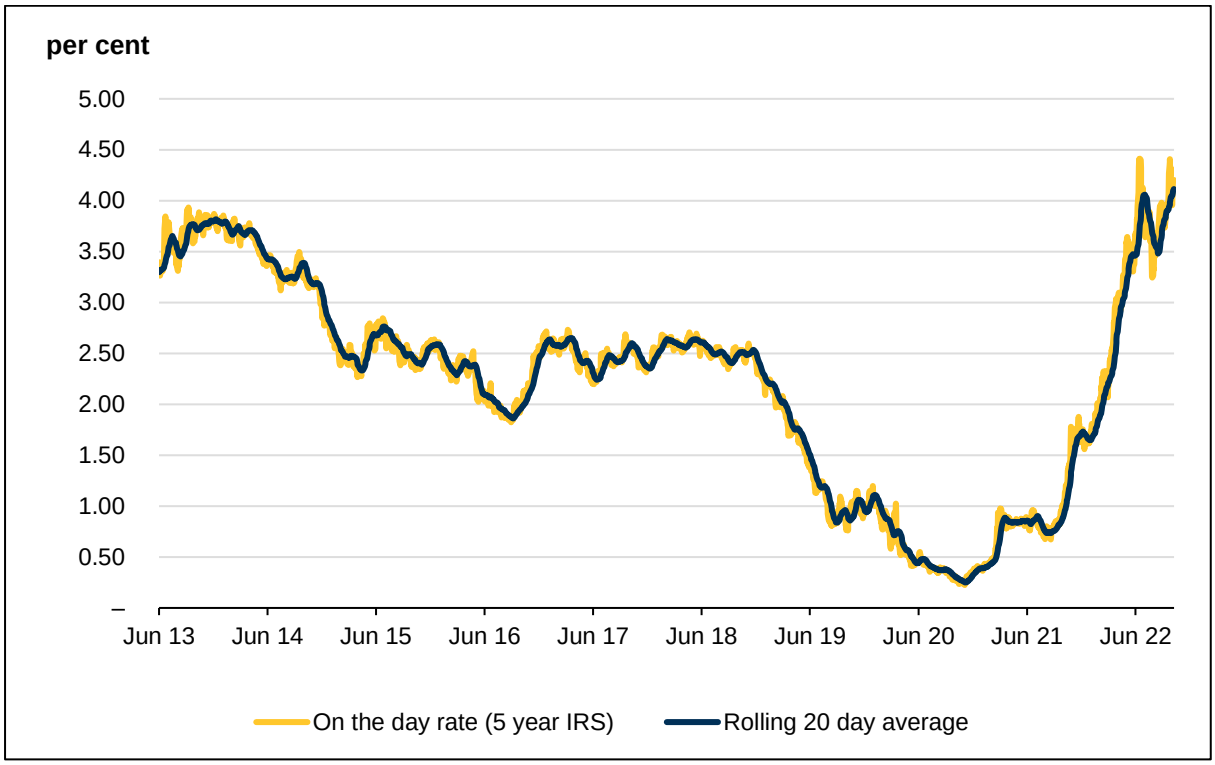
330. Market conditions have changed significantly since the ERA published the 2018 gas instrument in December 2018.

331. The five-year interest rate swap yields had been below historic averages until recent months, as detailed in Figure 1. Figure 1 shows that the swap yields have changed significantly, increasing from an average of 1.66 per cent in December 2021 to above four per cent in September 2022.

[147] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 16.

[148] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network – Appendix 5 Return on Regulated Capital Base*, September 2018, p. 66.

Figure 1: Five-year interest rate swap yields



Source: ERA analysis; based on Bloomberg data.

332. The near-term rates have been volatile and uncertain as the economy recovers from the COVID-19 pandemic. In response to the domestic and international economic and geopolitical changes, the Reserve Bank of Australia has subsequently increased the cash rate. In addition, inflation expectations in the market have increased significantly, but there is also uncertainty as to whether this will be transitory or more permanent. This raises the possibility of volatile rates during the period in which the 2022 gas instrument is in effect.

333. Given the changes in market conditions and its variable and forward-looking risk free rate, the cost of debt estimates under the hybrid trailing average approach have increased compared to the full trailing average approach.

334. However, the full trailing average approach produces costs of debt that increase over time as the present higher debt costs are reflected in the 10-year trailing average.

335. The ERA notes that as the full trailing average approach gets updated annually to reflect all changes for actual debt costs, the debt amounts that are incorporated in revenues could change significantly over time. This will result in increased price variability over time.

336. Under a full trailing average approach, current high debt costs will have an ongoing effect over multiple regulatory periods.

9.1.4.5. Maintaining the hybrid trailing average approach

337. Dr Martin Lally provided new advice on return on debt approaches.[149] Dr Lally's advice included the following:

- With respect to the cost of debt, the appropriate debt term is dependent on the form of the return on debt. The different forms for established firms include the trailing average and hybrid approaches, and for a new firm it could be something different that is more reflective of on-the-day rates. The NPV=0 principle requires that the allowed cost of debt matches that incurred by the benchmark efficient firm.[150]
- Both the trailing average approach and hybrid trailing average approach satisfied the NPV=0 principle, as both approaches allowed firms to align their borrowing arrangements with the regulatory allowance.[151]
- With respect to the hybrid trailing average approach, the appropriate term for the allowed debt risk premium would be historical and equal to the term for which the benchmark efficient entity borrows, while the appropriate term for the allowed risk free rate within the cost of debt would be the future term of the regulatory period.[152]

338. The ERA notes that while most of the stakeholder submissions to the ERA's 2022 draft gas instrument supported maintaining the hybrid trailing average approach[153,154,155,156], Western Power supported a 10-year full trailing average approach.[157]

339. The ERA disagrees with Western Power's view that all other Australian regulators use the standard 10-year trailing average approach applied to the entire return on debt. For example, the Office of the Tasmanian Economic Regulator used an approach that was an average of on-the-day and an historical average, weighted towards the present debt data, for the entire cost of debt.[158]

340. Significant changes to debt markets have occurred since 2021 and this will mean that the size of the increases in debt costs, and how they are recovered over time, are affected by the method used to estimate the return on debt.

341. The ERA recognises that both the current hybrid trailing average and trailing average approaches to the cost of debt have pros and cons as discussed in this section.

- The full trailing average approach reduces volatility of the cost of debt and the resulting volatility for regulated services as it provides smoothing benefits for networks and customers. For example, the recent increase in interest rates will not be matched by an immediate increase in debt allowance.

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149 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021.

150 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 53.

151 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 53.

152 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 40.

153 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 17.

154 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

155 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

156 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 8.

157 Western Power, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 2.

158 Office of the Tasmanian Economic Regulator, *Investigation into TasWater's Prices and Services for the Period 1 July 2022 to 30 June 2026 Final Report*, May 2022, p. 84.

- However, compared to other debt approaches, the full trailing approach leads to the greatest volatility of the cost of debt within an access arrangement period, including the greatest difference between forecast cost of debt and actual cost of debt in the last year of an access arrangement.
- In the current market conditions, the hybrid trailing average approach results in a higher return on debt allowance compared to the full trailing average approach. It creates greater variability at the start of an access arrangement period.
- However, the hybrid trailing average approach minimises price volatility within an access arrangement period and incorporates forward-looking rates into debt costs.

342. After considering the above information and stakeholder support, on balance, the ERA considers that as a regulatory approach, the hybrid trailing average approach best meets the national gas objective.

343. The ERA considers that this is an efficient and implementable debt strategy for a gas pipeline. The ERA maintains that the use of derivative arrangements to adjust rates to lock in a five-year bill swap at the start of the regulatory period appropriately aligns cost of debt in the regulatory context.

344. Dr Lally's recent advice has reconfirmed that the hybrid trailing average approach satisfies the NPV=0 principle and allows firms to align their borrowing arrangements with the regulatory allowance.[159]

345. The ERA considers that this return on debt regulatory approach best approximates the NPV=0 principle while also recognising interest rate risk, refinancing risk and the staggered nature of debt portfolios.

346. The ERA recognises that all the regulated gas pipelines and the CRG supported maintaining the hybrid trailing average approach for the 2022 gas instrument.[160,161,162,163]

347. Departing from the current hybrid trailing average approach may be difficult as the benchmark service provider has:

- Established a portfolio of 10-year fixed-rate debt.
- Entered into derivative arrangements to convert part of these annual debt issuances to floating interest rate swap rates.

348. The ERA cautions against an approach that would actively swap between debt methods depending on market conditions, which could be to the long-term detriment of both consumers and network providers. Actively swapping methods would reduce regulatory certainty and the ability of network service providers to manage debt portfolio costs so as to match allowed revenue. Over time debt returns are not averaged and service providers would likely be under or over-compensated.

159 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 53.

160 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 17.

161 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

162 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 8.

163 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

349. The ERA recognises that maintaining the current hybrid trailing average approach would help to promote regulatory certainty.

350. For the purposes of the 2022 final gas instrument, the ERA applies the hybrid trailing average approach to estimate the cost of debt.

351. In determining the best approach to estimate the cost of debt the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's approach has been determined considering relevant economic and finance principles and current conditions; transparency and whether it can be implemented. The ERA considers that the hybrid trailing average approach to estimate the cost of debt is fit for the purpose of the 2022 final gas instrument.

352. Based on the preceding reasoning, the ERA considers that the hybrid trailing average approach to estimate the cost of debt as set out in the 2022 final gas instrument will provide the best estimate of the return on debt over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation methods that provide the best estimate of the return on debt in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the hybrid trailing average approach as set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

353. The individual debt components are further discussed below.

9.2. Debt risk free rate

354. The risk free rate is the return an investor would expect when investing in an asset with no risk.

355. The risk free rate is the rate of return an investor receives from holding an asset with a guaranteed payment stream (that is, where there is no risk of default). Since there is no likelihood of default, the return on risk free assets compensates investors for the time value of money.

356. This section outlines the ERA's reasoning for its final position on estimating the risk free rate for the return on debt outlined in the 2022 final gas instrument.

9.2.1. Draft position

357. The 2018 gas instrument applied the prevailing five-year interest rate swap for the return on debt.[164]

358. Consistent with the 2018 gas instrument, the ERA used the prevailing five-year interest rate swap rate for the return on debt in the 2022 draft gas instrument.[165]

[164] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 20.

[165] ERA, *2022 draft gas rate of return instrument*, June 2022, p. 11.

359. The interest rate swap rate is referred to as the base rate in the return on debt calculation. It incorporates a spread to the rate of Commonwealth Government Security bonds and is available at specified terms from data providers such as Bloomberg.

360. The 2022 draft gas instrument specified that, consistent with the hybrid trailing average debt approach, for the risk free rate for the return on debt:

- The ERA used a five-year term to estimate the swap rate.[166]
- The ERA set the swap rate at the start of a regulatory access arrangement period and the estimate is fixed for the length of the regulatory access arrangement period.[167]

9.2.2. Consultation

9.2.2.1. Independent Panel Report

361. The Independent Panel considered that the ERA's reasoning for the debt risk free rate was credible.[168]

362. The Independent Panel noted that the ERA's reasoning could be improved by:[169]

- Providing more explanation as to how firms would go about exploiting the slope of the yield curve.
- Further clarifying why it is reasonable for the five-year term to differ from that used elsewhere.

9.2.2.2. Stakeholder submissions

363. Three of the submissions to the 2022 draft gas instrument commented on the risk free rate for the return on debt. All these submissions supported the use of a five-year interest rate swap rate for the return on debt.[170,171,172]

364. ATCO supported the use of five-year interest rate swap rate as an estimate of the debt risk free rate for the following reasons:[173]

- Use of the five-year interest rate swap rate is consistent with the efficient and implementable hybrid trailing average debt strategy.
- Under the hybrid approach the business will enter into swap contracts to hedge the risk free rate every time it is reset during the regulatory review process. This strategy facilitates the service provider's ability to repeat the process for the next regulatory period. The continued adoption of the five-year interest rate swap rate is necessary for regulatory certainty to support this financing strategy.

166 ERA, *2022 draft gas rate of return instrument*, June 2022, p. 11.

167 ERA, *2022 draft gas rate of return instrument*, June 2022, p. 11.

168 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 34.

169 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 34.

170 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

171 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

172 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 9.

173 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

- The terms of the risk free rates for debt and equity are independent and need not be the same. For debt, a five year term is consistent with the efficient debt strategy. For equity, a 10 year term is consistent with setting a rate of return consistent with market practice as expected by equity investors.

365. The CRG supported the hybrid trailing average approach as 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.[174]

9.2.3. 2022 final approach

366. Consistent with the hybrid trailing average approach, the ERA uses the prevailing five-year interest rate swaps for the risk free rate in the return on debt.

367. The ERA will set the interest rate swap rate at the start of a regulatory access arrangement period. The estimate will be fixed for the length of the regulatory access arrangement period.

368. For estimating the risk free rate in the return on debt, the ERA will use the five-year swap mid-rate, as published on Bloomberg (Last Price), over the relevant averaging period.

369. The nomination of the averaging period for the interest rate swap rate is outlined in Chapter 7.

9.2.4. Reasoning

370. The reasoning for the ERA's final approach for estimating the risk free rate for debt is consistent with its draft instrument reasoning, informed by the Independent Panel and public submissions, and detailed below.

371. The interest swap spread captures the credit risk of financial institutions. The interest rate swap rate is the index rate at which financial institutions borrow from and lend to each other.

372. The interest rate swap is available at specified terms from data providers such as Bloomberg. Interest rate swaps provide a strong means to hedge and manage risk.

373. The interest rate swap rate is referred to as the base rate in the return on debt calculation.

374. The rationale for using a swap rate is that it is difficult to hedge government bonds. This means that regulated firms can be exposed if the risk free rate does not correlate with the swap rate.

375. For the purpose of determining the cost of debt the use of interbank swap rate is also more convenient for businesses and regulators. Use of the swap rate further simplifies the calculation of the debt risk premium.

[174] CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument,* September 2022, p. 39.

376. The difference between a Commonwealth Government Security risk free rate and a swap rate of similar term is called the spread of swap. Although interbank lending has a cost above that of the Commonwealth Government, the use of the interbank rate is equivalent to using a Government Security and separately adjusting the debt risk premium for the Government Security.

377. If debt risk premiums are estimated consistently with the chosen base rate – whether that base be the Commonwealth Government Security risk free rate or the swap rate – there should be no difference in the resulting build-up of the overall return on debt. The two approaches just represent two different ways of splitting the total interest rate.

378. The ERA has used a five-year interest rate swap rate for its energy network regulatory determinations.[175,176]

379. The ERA considers that the use of the swap rate:

- Provides a strong means to hedge and manage risk.
- Simplifies the calculation of the debt risk premium.
- Produces a closer match between the allowed cost of debt and the cost actually incurred by the firm.

380. The ERA notes the Independent Panel's comment on the use of different terms for different inputs into the rate of return determination and the consistent application of the NPV=0 principle.

381. ATCO and Energy Networks Australia also raised the terms of the components of the rate of return and that they do not need to be the same.

- ATCO considered that the terms of the risk free rates for debt and equity are independent and need not be the same. For debt, a five year term is consistent with the efficient debt strategy. For equity, a 10 year term is consistent with setting a rate of return consistent with market practice as expected by equity investors.[177]
- The Energy Networks Australia's submission to the ERA's 2022 draft gas instrument considered that the allowed return is set to match the return that real-world investors require. For debt, the regulator should determine what it considers to be the prudent and efficient debt management strategy, and then set the regulatory allowance accordingly. Energy Networks Australia recognised the ERA's debt management approach, which is to issue 10-year debt, fix the base risk-free rate at the beginning of each regulatory period using swap contracts, and set the regulatory allowance to reflect the cost of implementing this debt strategy.[178]

[175] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 20.

[176] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network – Appendix 5 Return on Regulated Capital Base*, September 2018, p. 66.

[177] ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

[178] ENA, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 11.

382. The ERA does not consider that terms applied to equity and debt need to be equal. The ERA maintains that the terms for debt and equity are separate issues which are discussed in the respective chapters of this final determination. The determination of terms for the separate components of the rate of return are unified by the consistent consideration of the NPV=0 principle.

- For debt, meeting the NPV=0 principle is about determining an efficient implementable debt management strategy for energy networks. The ERA considers its hybrid trailing average approach best approximates the NPV=0 principle while also recognising interest rate risk, refinancing risk and the staggered nature of debt portfolios. This recognises that energy networks enter into long-term debt arrangements to fund long-term assets, while also allowing for the use of derivatives to partially align with the regulatory cycle. This is an implementable strategy (allowing energy network debt costs to equal the revenue allowance for debt) and thus ensures NPV=0.
- For equity, the ERA considers that regulated assets have long lives, equity holders receive cash returns over more than one regulatory period and investors are concerned with cashflows over the long term. Using the longest term generally available (10 years) reflects investors' efficient costs and efficient financing in a competitive market. A 10-year equity term ensures that regulated revenues match the requirements of efficient investors and best approximates the NPV=0 principle.
- Both approaches aim to meet the NPV=0 through matching regulated revenues to the efficient financing costs of energy networks.

383. The ERA notes that stakeholder submissions to the ERA's 2022 draft gas instrument supported maintaining the hybrid trailing average approach.[179,180,181,182]

384. The hybrid trailing average approach reduces the ability of firms to exploit the slope of the yield curves, which can be achieved by issuing debt at shorter maturities than the assumed 10-year tenor. The use of a debt risk free rate longer than the regulatory period would mean that the allowed return was larger than needed to finance investment given the regulatory resets that occur. The use of a five-year interest rate swap rate ensures that firm would not benefit from a higher margin allowed in a 10-year rate.

385. On the basis of these considerations, for the purposes of the 2022 final gas instrument, the ERA uses the prevailing five-year interest rate swaps for the risk free rate in the return on debt.

386. The ERA will set the interest rate swap rate at the start of a regulatory access arrangement period. The estimate will be fixed for the length of the regulatory access arrangement period.

387. For estimating the risk free rate in the return on debt, the ERA will use the five-year swap mid-rate, as published on Bloomberg (Last Price), over the relevant averaging period.

179 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 17.

180 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

181 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

182 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 8.

388. In determining the best approach to estimate debt risk free rate, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's approach has been determined considering relevant economic and finance principles and current market information or conditions; transparency and whether it can be implemented. The ERA considers that the use of the interest rate swap rate for the risk free rate for the return on debt is fit for the purpose of the 2022 final gas instrument.

389. Based on the preceding reasoning, the ERA considers that the use of the interest rate swap rate for the risk free rate for the return on debt as set out in the 2022 final gas instrument will best deliver an efficient rate of return in the long-term interests of consumers. By adopting the estimation methods that provide the best estimate of the cost of debt in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the method for the debt risk free rate as set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

390. For illustrative purposes, the five-year interest rate swap was 4.07 per cent for the 20 trading days to 30 September 2022.

9.3. Term of debt

391. To estimate a return on debt, a regulator needs to set a benchmark debt term.

392. This section outlines the ERA's reasoning for its final position on the term of debt outlined in the 2022 final gas instrument.

9.3.1. Draft position

393. The 2018 gas instrument implemented a hybrid trailing average approach where the benchmark entity enters into the assumed benchmark efficient debt strategy. In this case, the strategy was assumed to be a portfolio of 10-year fixed-rate with 10 per cent refinanced each year.[183]

394. Consistent with the 2018 gas instrument, the 2022 draft gas instrument applied a benchmark efficient debt strategy as a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year.[184]

9.3.2. Consultation

9.3.2.1. Independent Panel Report

395. The Independent Panel considered that the ERA's 10-year term of debt was appropriate and based on sound reasoning.[185]

[183] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 25.

[184] ERA, *2022 draft gas rate of return instrument*, June 2022, p. 11.

[185] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 34.

396. The Independent Panel noted that:[186]

- All submissions received for the 2022 draft gas instrument supported the 10-year term of debt.
- The approach is consistent with standard Australian regulatory practice and there is evidence that it aligns with the debt term targeted by gas pipelines.

9.3.2.2. Stakeholder submissions

397. Three of the submissions to the 2022 draft gas instrument commented on the term of debt. All of these submissions supported the ERA's hybrid trailing average approach and its 10-year term of debt for the 2022 gas instrument.[187,188,189]

9.3.3. 2022 final approach

398. The 2022 final gas instrument applies a benchmark efficient debt strategy as a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year.

9.3.4. Reasoning

399. Recent Australian regulatory practices for the term of debt are summarised in Table 6.

Table 6: Term of debt in Australian regulatory decisions

Regulator	Year	Term of debt (year)
ESCOSA[190]	2016	10
IPART[191]	2018	10
ERA[192]	2018	10
ESC[193]	2020	10
AER[194]	2022	10
QCA[195]	2021	10
OTTER[196]	2022	10

Source: ERA analysis

186 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 34.

187 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 6.

188 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 39.

189 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 9-10.

190 ESCOSA, *SA Water Regulatory Determination 2016, Final Determination*, June 2016, p. 122.

191 IPART, *Review of our WACC Method, Final Report*, February 2018, p. 25.

192 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 17.

193 ESC, *Western Water Determination 1July 2020 – 30 June 2023*, 10 June 2020, p. 29.

194 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 194.

195 QCA, *Final Report: Rate of Return Review*, November 2021, p. 39.

196 OTTER, *Investigation into TasWater's Prices and Services for the Period 1 July 2022 to 30 June 2026 Draft Report*, February 2022, p. 70.

400. It is standard Australian regulatory practice to use a 10-year term for debt.

401. The ERA has reviewed the analysis undertaken by the AER on its Energy Infrastructure Credit Spread Index (EICSI). The EICSI is an index constructed by the AER, with the assistance of Chairmont, from actual debt information collected from privately owned network service providers regulated by the AER and provides an indication of the cost of actual network-issued debt. The focus of the index is to indicate the cost of network issued debt and compare that with the AER's estimate of the cost of debt. In this context, the AER intended to use the index to monitor the performance of its benchmark return on debt.

402. The ERA notes that actual debt information underlying the EICSI is confidential and so is not available to the ERA.

403. The AER's analysis found that:

- The average term at issuance declined from an average term at issuance of 10 years in April 2018 down to around 7.5 years in mid-2021.[197]
- That the average term of instruments in the EICSI was influenced by a few service providers that raised shorter term debt. If three of the service providers with the shortest-term debt instrument were removed from the analysis, the overall average term of debt instrument in the EICSI increases from 7.5 year to 8.5 years.[198]

404. The AER's position in its 2022 draft rate of return instrument was that the weighted average term to maturity of issuance (WATMI) could be useful in checking the benchmark term. The AER's updated analysis suggested that the conservative upper bound of the WATMI remains above 10 years, while the lower band is around eight years.[199] The AER considered that analysis of industry debt data does not show clear evidence that the current benchmark of 10 years is no longer an appropriate benchmark term.[200]

405. Energy Networks Australia has also sought the same actual debt information from the same energy networks and analysed the data with the assistance of CEG.[201,202] The Energy Networks Australia's analysis found that:

- Without value weighting, the EICSI was not a meaningful measure of industry average costs and that all debt that forms part of the industry average costs should be included in the EICSI.[203]
- That, depending on assumptions made about callable debt and the inclusion of NSW businesses (affected by privatisations), this results in a range from nine years to 10 years for the WATMI.[204]

197 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 209.

198 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 196.

199 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 194.

200 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 39.

201 ENA, *Estimating the Cost of Debt: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021.

202 ENA, *Rate of Return Instrument Review – Response to AER's Final Omnibus and Information papers*, March 2022, p. 114.

203 ENA, *Estimating the Cost of Debt: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021, p. 5.

204 ENA, *Estimating the Cost of Debt: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021, p. 8.

- The benchmark debt strategy was consistent with a broad range of network service provider debt strategies.[205]
- Networks following the benchmark debt strategy will have a cost of that debt in line with that AER's compensation for the cost of debt.[206]
- That residual outperformance of debt was neither material nor persistent.[207]

406. In the 2022 AER's concurrent evidence sessions, the experts agreed that:

- The EICSI's construction required further work to ensure its reliability, including on ensuring the inclusion of all types of debt and the appropriate weighting approach.
- The average WATMI based on the current EICSI was approximately 10 years.
- On a weighted basis, outperformance of debt by the networks was small and, with large standard errors potentially not existent. There was both over-performance and under-performance, which varied through time.
- It was not possible for networks to implement debt strategies to match the EICSI. The EICSI could more reliably be used to guide the AER's assumptions regarding the efficient benchmark strategy than to mechanistically set or guide the cost of debt or adjustments to the cost of debt.
- Any change to the 10-year term would cause practical difficulties in transitioning over time.

407. Energy Networks Australia supported the AER's proposed approach of using the EICSI as a 'sense check' only as the current EICSI data provides no evidence of material and persistent outperformance.[208]

408. The ERA requested information about the debt portfolios of regulated pipelines to inform this review. The information revealed that the gas pipelines have sought to align their debt costs to regulated revenues through targeting debt maturities of 10 years.

409. The ERA notes that while the term of debt issued is an area being actively managed by gas pipelines, it is a difficult part of the benchmark to change in the gas instrument. If the term were to be adjusted, this would mean that the trailing average calculation would have to be adjusted. This may require a transition to a new trailing average over time. Maintaining a 10-year benchmark debt strategy supports the stability of regulatory arrangements.

410. The ERA does not consider that the EICSI can be used to cross check its return on debt estimates as the index is not a replicable benchmark for regulated energy networks. The actual debt information underlying the index is also confidential. However, the EICSI is useful to cross check on the term of debt.

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[205] ENA, *Estimating the Cost of Debt: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021, p. 3.

[206] ENA, *Estimating the Cost of Debt: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021, p. 3.

[207] ENA, *Estimating the Cost of Debt: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021, p. 3.

[208] ENA, *Rate of Return Instrument Review: Response to AER's Draft Instrument and Explanatory Statement*, September 2022, p. 112.

411. For the purposes of the 2022 final gas instrument, the ERA applies a benchmark efficient debt strategy as a portfolio of 10 year fixed-rate debt with 10 per cent refinanced each year.

412. In determining the best approach to set a benchmark debt strategy, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's approach has been determined considering relevant economic and finance principles and current market information or conditions; transparency and whether it can be implemented. The ERA considers that the use of a debt strategy as a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year is fit for the purpose of the 2022 final gas instrument.

413. Based on the preceding reasoning, the ERA considers that the use of a debt strategy as a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year will best deliver an efficient rate of return in the long-term interests of consumers. By adopting the estimation methods that provide the best estimate of the return on debt in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the method for the term of debt as set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

9.4. Benchmark credit rating

414. The benchmark credit rating is an input required to estimate the debt risk premium.

415. The credit rating is defined as the forward-looking opinion provided by a ratings agency of an entity's credit risk. Credit ratings provide a broad classification of a firm's probability of defaulting on its debt obligations. Therefore, credit ratings represent the risk present in holding a debt instrument.

416. Credit ratings provide a broadly uniform measure of default risk. Firms with the same credit rating at a particular point in time should have similar levels of default risk.

417. Generally, the debt risk premium is higher when the credit rating is lower, and vice versa. A lower credit rating can be associated with a higher risk of default and lenders generally require higher compensation (a higher debt risk premium) for higher levels of risk.

418. For this reason, both listed and unlisted firms can be used where a credit rating is available.

419. This section outlines the ERA's reasoning for its final position on the benchmark credit rating outlined in the 2022 final gas instrument.

9.4.1. Draft position

420. The 2018 gas instrument used a benchmark credit rating of BBB+ for application in the cost of debt estimations, which was fixed over the period of the instrument.[209]

[209] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 22.

421. Consistent with the 2018 gas instrument, the 2022 draft gas instrument maintained a benchmark credit rating of BBB+.[210]

422. The ERA took the median credit rating of a sample of comparator businesses to determine the credit ratings of the benchmark efficient entity. Other regulators' decisions were used as a cross check.[211]

423. The ERA determined a credit rating of BBB+ to be appropriate for application in the cost of debt estimations.

9.4.2. Consultation

9.4.2.1. Independent Panel Report

424. The Independent Panel considered that it was reasonable to anticipate stability in the BBB+ credit rating for this regulatory period.[212]

425. The Independent Panel noted that:[213]

- Submissions received for the 2022 draft gas instrument were largely supportive of this.
- For the next review, the ERA will need to consider how to determine the credit rating with the decreasing number of benchmark sample firms.

9.4.2.2. Stakeholder submissions

426. Four of the submissions to the 2022 draft gas instrument commented on the benchmark credit rating. These submissions expressed mixed views.[214,215,216,217]

427. ATCO and CRG's submissions supported the use of a BBB+ benchmark credit rating.[218,219]

428. The CRG considered that there is strong support for at least a BBB+ credit rating.[220]

- The CRG noted that where foreign parental ownership provided a higher credit rating, the cost of debt would likely be lower, 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.

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210 ERA, *2022 draft gas rate of return instrument*, June 2022, p. 12.

211 ERA, Explanatory Statement for the *2022 draft gas rate of return instrument*, June 2022, pp. 68-70.

212 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 35.

213 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 35.

214 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

215 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 40-41.

216 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 40-41.

217 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 10.

218 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

219 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 40-41.

220 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 40-41.

- However, the CRG recognised that it may be very difficult to make appropriate adjustments for the impact of foreign ownership. For practical reasons, the CRG accepted a BBB+ credit rating.

429. ATCO noted that increasing uncertainty on the use of gas (for example, climate change related legislation, and consumer action to reduce carbon emissions) may change the role and operations of natural gas distribution networks. In the future maintaining an investment grade credit rating consistent with the benchmark credit rating may require different actions by regulators and service providers than in the past.[221]

430. While not directly commenting on the benchmark credit rating, AGIG supported the ERA's assessment on the impact of foreign parental ownership on credit ratings and considered that a foreign-owned benchmark is not suitable for the Australian regulatory context.[222]

431. Consistent with its submission to the discussion paper, GGT did not support a benchmark credit rating of BBB+.[223]

- GGT submitted that if a credit rating was required it should be BBB for a stand-alone benchmark.
- GGT considered that the BBB+ benchmark was not derived from data for stand-alone businesses, but from businesses with financially strong parent entities.

9.4.3. 2022 final approach

432. The 2022 final gas instrument applies a credit rating of BBB+.

433. The credit rating will remain fixed for the term of the gas instrument.

9.4.4. Reasoning

9.4.4.1. Benchmark credit rating estimation

434. To estimate the benchmark efficient entity's credit rating, the ERA uses a median credit rating approach. Under this approach, a benchmark sample of comparator companies must be constructed. This does not have to be constrained to listed or privately owned companies.

435. The ERA considers that it is appropriate to select Australian companies with similar risk for the benchmark sample which is used to determine a benchmark credit rating. A company that is included in the sample is required to satisfy two characteristics:

- First, the company must be a network service provider in the gas and/or electricity industry in Australia.
- Second, the company's credit rating must be published by an international ratings agency such as S&P or Moody's. Moody's credit ratings are converted into the equivalent S&P credit ratings as the ERA's debt risk premium approach uses S&P ratings.

[221] ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

[222] AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 17.

[223] GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 10.

436. The ERA's 2018 gas instrument benchmark sample included the DUET Group, Spark Infrastructure, AusNet Services and the APA Group.

437. The ERA notes that the list of Australian energy networks is reducing, with DUET not being rated since 2012.

438. The ERA's review of the credit ratings of the Australian energy network sample found that credit ratings varied between BBB and A-. The median credit rating is BBB+ (see Table 7).

Table 7: Australian energy network sample credit rating

Firm	2018	2019	2020	2021	2022
APA Group	BBB	BBB	BBB	BBB	BBB
AusNet	A-	A-	A-	A-	BBB+
Spark Infrastructure	BBB+	BBB+	BBB+	BBB	BBB

Source: ERA analysis, Bloomberg, S&P Global Ratings and Moody's Investor Service

439. The ERA notes some recent changes with credit ratings:

- In April 2021, Moody's Investor Services downgraded Spark Infrastructure Trust to BBB equivalent with a stable rating. This downgrade reflected its expectation that Spark Instructure's look-through credit metrics will overtime be more consistent with a BBB rating.[224]
- In February 2022 both S&P Global Ratings and Moody's Investor Service downgraded AusNet to BBB+ equivalent with a stable rating. Moody's detailed that the downgrade reflected: 1) the change in ownership following the acquisition of AusNet by a consortium led by Brookfield Asset Management Inc (BBB+ stable); and 2) Moody's expectation that AusNet's credit metrics will weaken.[225,226]

440. The ERA considers the benchmark credit rating to be relatively stable over time, and that the existing benchmark sample provides information to inform a decision on a benchmark credit rating for the 2022 gas instrument.

441. With the reducing Australian energy network sample the ERA will have to consider the credit rating sample further for the next gas instrument review.

442. Other regulators' decisions are referred to as a cross check. For example, the AER's 2022 draft rate of return instrument analysed the credit ratings of energy networks. It shows that the median credit rating in recent years remains almost unchanged at BBB+. The only exception is 2021 when the median credit rating improved to A- but dropped back to BBB+ in 2022.[227]

[224] Moody's Investors Service, *Rating Action: Moody's downgrades Spark Infrastructure Trust to Baa2; stable outlook*, April 2021.

[225] S&P Global Ratings, *Research Update: AusNet services Ltd. Downgraded to 'BBB+' on Ownership Change; Outlook Stable*, February 2022.

[226] Moody's Investors Service, *Rating Action: Moody's downgrades AusNet's rating to Baa1; stable outlook*, February 2022.

[227] AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 217.

443. The ERA considers a benchmark credit rating of BBB+ to be appropriate for the 2022 gas instrument.

444. In determining the benchmark credit rating, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information. The benchmark credit rating estimate is transparent. The use of a fixed credit rating is readily implementable over the term of the instrument. The ERA considers that the use of a benchmark credit rating of BBB+ is fit for the purpose of the 2022 final gas instrument.

445. Based on the preceding reasoning, the ERA considers that the use of a benchmark BBB+ credit rating will best deliver an efficient rate of return in the long-term interests of consumers. By adopting the estimation methods that provide the best estimate of the cost of debt in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that a benchmark BBB+ credit rating in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

9.4.4.2. Parental ownership

446. The ERA notes the mixed stakeholder views on the role and treatment of parental ownership of a regulated energy network operating in Australia.

- GGT considered that the credit rating should be BBB for a "stand-alone" benchmark. GGT submitted the BBB+ benchmark was not derived from data for stand-alone businesses but from businesses with financially strong parent entities.[228]
- The CRG supported the use of a benchmark credit rating of BBB+ for practical reasons. However, the CRG noted that where foreign parental ownership provided a higher credit rating, the cost of debt would likely be lower. The CRG considered that a BBB+ credit rating was reasonable but likely to be at the low end if foreign ownership was recognised. In addition, the CRG submitted that precluding the impact of foreign ownership would in effect be contrary to recognition of efficient financing arrangements.[229]

447. It is common regulatory practice to use a benchmark efficient entity to inform the WACC parameters set for a regulated entity.

448. 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.

[228] Goldfields Gas Transmission Pty Ltd, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 10.

[229] CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 10.

449. "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.

450. 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.

451. Allowing for parental ownership may discourage energy network ownership by smaller Australian companies which would be disadvantaged. This may also result in inefficient investment as the returns for these companies will not reflect the risk, and costs, of these network assets.

452. On the basis of these considerations, the ERA continues to define the benchmark efficient entity without parental ownership. In determining the benchmark credit rating the ERA will continue to utilise the best available information to develop an Australian benchmark sample.

9.5. Debt risk premium

453. 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 compensates holders of debt securities for the possibility of default by the issuer.

454. This section outlines the ERA's reasoning for its final position on determining the debt risk premium outlined in the 2022 final gas instrument.

9.5.1. Draft position

455. The 2018 gas instrument applied the revised bond yield approach to determine the debt risk premium.[230]

456. The 2022 draft gas instrument maintained the revised bond yield approach to determine the debt risk premium and detailed its method.[231]

457. Consistent with the hybrid trailing average debt approach and a benchmark efficient debt strategy, the ERA used a 10-year term to estimate the debt risk premium.[232]

[230] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 23.

[231] ERA, *2022 draft gas rate of return instrument*, June 2022, pp. 12-14.

[232] ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, p. 73.

458. To determine the debt risk premium used to calculate the gas rate of return, the 2022 draft gas instrument specified that the ERA would construct a 10-year trailing average debt risk premium. This consisted of a debt risk premium for the current year and a debt risk premium for each of the nine prior years. The 10-year trailing average debt risk premium would be updated each year.[233]

9.5.2. Consultation

9.5.2.1. Independent Panel Report

459. The Independent Panel considered that the ERA's revised bond yield approach to calculate the debt risk premium to be transparent and replicable.[234]

460. The Independent Panel detailed some minor technical matters on the debt risk premium calculation process for the ERA to consider, including the maturity of bonds in the benchmark sample selection and the curve techniques used.[235]

9.5.2.2. Stakeholder submissions

461. Four submissions to the 2022 draft gas instrument commented on the debt risk premium. All these submissions provided general support for the approach.[236,237,238,239]

462. Two of these submissions supported the ERA's revised bond yield approach to estimate the debt risk premium for the 2022 gas instrument.[240,241]

463. AGIG provided some feedback on contingencies for the debt risk premium estimation process, including the use of the Thompson Reuter curve (contingency A) and divergence of estimates (contingency B).[242]

464. ATCO supported the revised bond yield approach and: [243]

- Noted that it is important that the ERA incorporates the DRP method tools into the 2022 final gas instrument and publish these tools.
- Suggested an additional contingency for the unavailability of Bloomberg bond data but did not elaborate on that contingency.

233 ERA, *2022 draft gas rate of return instrument*, June 2022, p. 13.

234 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 36.

235 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 36.

236 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 17-18.

237 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 7-8.

238 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 40-41.

239 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 10.

240 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 7.

241 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 11.

242 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 17-18.

243 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 7-8.

465. The CRG recognised the advantages of the ERA's approach relative to the AER's current approach. While noting that the revised bond yield approach requires considerable statistical expertise to implement, the ERA has provided helpful templates and guidelines for implementation.[244]

466. GGT submitted that the use of the revised bond yield approach to estimate the debt risk premium should be retained in the 2022 final gas instrument.[245]

9.5.3. 2022 final approach

467. The revised bond yield approach will be used to determine the debt risk premium for the 2022 final gas instrument.

468. Consistent with the hybrid trailing average debt approach and a benchmark efficient debt strategy, the ERA uses a 10-year term to estimate the debt risk premium.

469. Estimating the debt risk premium involves the following steps:

- Step 1: Determining the benchmark sample - Identifying a sample of relevant domestic and international corporate bonds that reflect the credit rating of the benchmark efficient entity.
- Step 2: Collecting data and converting yields to Australian dollar equivalents - Converting the bond yields from the sample into hedged Australian dollar equivalent yields inclusive of Australian swap rates.
- Step 3: Averaging yields over the averaging period – Calculating an average AUD equivalent bond yield for each bond across the averaging period.
- Step 4: Estimating curves - Estimating yield curves on this data by applying the Gaussian Kernel, Nelson-Siegel and Nelson-Siegel-Svensson techniques.
- Step 5: Estimating the cost of debt - Calculating the simple average of the three yield curves' 10-year costs of debt to arrive at a market estimate of the 10-year cost of debt.
- Step 6: Calculating the debt risk premium - Calculating the debt risk premium by subtracting the 10-year interest rate swap rate from the 10-year cost of debt.

470. These steps determine the debt risk premium at a point in time, being the date of calculation.

471. To determine the debt risk premium used to calculate the gas rate of return, the ERA will construct a 10-year trailing average debt risk premium. This consists of a debt risk premium for the current year and a debt risk premium for each of the nine prior years. The ERA will update the 10-year trailing average debt risk premium each year.

9.5.3.1. Determining the benchmark sample

472. The ERA's revised bond yield approach uses international and domestic bonds – identified by Bloomberg as having Australia as their country of risk – to estimate the return on debt each year.

[244] CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 41.

[245] GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 11.

473. The ERA will apply the following characteristics to identify international domestic corporate bonds to be included in the benchmark sample:

- The credit rating of each bond must match that of the benchmark efficient entity, as rated by S&P.
- Time to maturity must be two years or longer.
- Issued bonds must have the country of risk specified as Australia, and must be denominated in either AUD, USD, Euros or GBP (all compliant bonds are included, except those issued by the financial sector).
- The benchmark sample will include both fixed bonds and floating bonds.
- The benchmark sample will include both bullet and callable/puttable redemptions.
- Bonds will have at least 50 per cent of observations for the averaging period. That is, 10 yield observations over the required averaging period of 20 trading days are required.
- The bonds are not called perpetual, a duplicate, or inflation-linked.

9.5.3.2. Collecting data and converting bond yields to Australian dollar equivalent yields

474. The ERA will estimate the "spread to swap" for each bond. The relevant basis swap rate is the interest rate swap of equivalent tenor to the yield to maturity of each bond in the extended benchmark sample in the denominated currency of each bond. Subtracting this swap rate from the bond yield to isolate the credit spread, giving the spread to swap in the denominated currency.

475. The ERA will convert this denominated currency credit to Australian dollar terms by accounting for hedging costs.

9.5.3.3. Estimating yield curves

476. The ERA will apply three curve-fitting techniques to the bond yield data to estimate the yield curves. These are the Gaussian Kernel method, the Nelson-Siegel method and the Nelson-Siegel-Svensson method.

9.5.3.4. Estimating the cost of debt

477. The ERA will average the results of these three methods to arrive at a market estimate of the 10-year return on debt.

9.5.3.5. Calculating the debt risk premium

478. The estimate of the debt risk premium for each year will be a simple 10-year trailing average.

479. The ERA began calculating annual debt risk premia in April 2015 and used these premia as inputs when constructing a 10-year trailing average.

480. For calendar years prior to 2015, the ERA used a third-party source for debt risk premiums, based on the RBA's historical credit spreads for 10-year non financial corporate bonds.

481. The trailing average debt risk premium over the most recent 10 years will be a simple average of each year's debt premium (that is, the calculation will weight each year's debt risk premium at 10 per cent).

482. The 10-year trailing average debt risk premium will be updated each year by adding in the most recent estimate of the debt risk premium and dropping the estimate from 10 years ago.

483. The automatic formula for the simple, equally-weighted 10-year trailing average is:

$$TA\ DRP_0 = \frac{\sum_{t=0}^{-9} DRP_t}{10}$$

Equation 6

where

$TA\ DRP_0$ is the equally weighted trailing average of the debt risk premium to apply in the following year as the annual update of the estimate used in the current year; and

DRP_t is the debt risk premium estimated for each of the 10 regulatory years t =0, -1, -2…, -9.

9.5.4. Reasoning

9.5.4.1. Theoretical considerations

484. The debt risk premium relies on two inputs: the benchmark credit rating and the term of debt.

Benchmark credit rating

485. The debt risk premium compensates lenders for the additional risk associated with providing debt capital, over and above the risk free rate. The extent of the compensation, or "credit spread", is closely related to the business. When issuing debt in the form of bonds, a credit rating can be assigned which reflects the probability of default of the issuer and hence the risk present in the bond.

486. The debt risk premium for the benchmark efficient firm is estimated by first observing the credit spread on bonds with equivalent credit ratings to that of the benchmark firm. The yield of corporate bonds reflects the discount rate of the cash flows arising from the purchase of a bond. Therefore, it reflects the promised return of the bond. As cash flows are constrained by the promised coupons and face value, the promised yield can be directly observed via the traded price of the bond and is quoted by financial services such as Bloomberg.[246]

487. The ERA considers that the observed yields on existing bonds in the market are the best proxy for the cost of debt of the benchmark efficient entity.

[246] By setting the price of the bond equal to the promised cash flows of the bond and solving for the discount rate.

488. A benchmark sample of corporate bonds is intended to capture the characteristics of the benchmark firm because the firms in the sample have the same credit rating assigned by an international ratings agency such as S&P. Therefore, the corporate bonds in the sample have a similar level of risk to that faced by the benchmark efficient entity and have the same level of expected return. The benchmark sample of bonds will reflect the prevailing market conditions for funds of the benchmark efficient entity, consistent with market expectations.

489. Therefore, any method used to estimate the debt risk premium must first rely on a sample of corporate bonds with a similar degree of risk.

490. Assigning a credit rating to a debt security of a business involves an independent assessment made by an independent rating agency. This process considers both qualitative and quantitative statements that reflect the likely risk of holding a debt security. Therefore, bonds with the same credit rating have a similar probability of default and therefore similar level of risk. As a result, the credit rating is the most appropriate measure for determining the efficient financing costs incurred by a benchmark efficient entity with a similar degree of risk.

Benchmark debt term

491. The ERA needs to determine a benchmark debt term to calculate the debt risk premium for a service provider. The benchmark debt term also establishes the period over which the trailing average is calculated.

492. A bond is a loan made by an investor to a borrower for a set period in return for regular interest payments. The time from when the bond is issued to when the borrower has agreed to pay the loan back is called its “term to maturity”.

493. A bond's yield is the return an investor expects to receive each year over its term to maturity.

494. The yield curve – also called the term structure of interest rates – shows the yield on bonds over different terms to maturity.

495. A normal shape for the yield curve is where short-term yields are lower than long-term yields, so the yield curve slopes upward. This is considered a normal shape for the yield curve because bonds that have a longer term are more exposed to the uncertainty that interest rates or inflation could rise at some point in the future (if this occurs, the price of a long-term bond will fall). This means investors usually demand a higher yield to own longer-term bonds.

496. Therefore, any method used to estimate the debt risk premium must define the term of debt to be issued.

497. Consistent with the benchmark debt strategy, the term at issuance for a benchmark efficient entity is approximately 10 years.

9.5.4.2. Methods adopted by other regulators for estimating the debt risk premium

498. Australian and overseas economic regulators have adopted various approaches for determining the cost of debt.

499. The AER, Essential Services Commission, Essential Services Commission of South Australia, and Office of the Tasmanian Economic Regulator estimate the return on debt by reference to independent third-party data series including the RBA and Bloomberg. Third-party data series generally provide yields for credit rating bands, rather than specific credit ratings. These regulators do not directly estimate a debt risk premium.

500. The New Zealand Commerce Commission (NZCC) estimates the return on debt by adding the estimate of the risk free rate, an average debt premium of the benchmark service provider and debt issuance costs.[247] The NZCC determines the debt risk premium by identifying publicly traded New Zealand dollar denominated bonds issued by a qualifying issuer that are investment grade credit rated.[248]

501. Ofgem estimates the cost of debt directly from a sample of corporate bonds without separately identifying the risk free rate or debt risk premium.[249]

9.5.4.3. The revised bond yield approach

502. The ERA has used the revised bond yield approach across its regulatory determinations and all its annual tariff variations.[250,251,252]

503. The revised bond yield approach allows for the estimation of a debt risk premium for a specific credit rating and term based on current bond market data.

504. The ERA provides debt risk premium process documents and accompanying tools consistent with the revised bond yield approach. These documents and tools provide technical steps and details necessary for stakeholders to estimate the debt risk premium.[253]

505. The ERA considers that the revised bond yield approach:

- Is transparent, because the sample of bonds underlying the bond yield approach estimates is published.
- Is drawn from market data.
- Provides flexibility in sampling bonds within particular credit ratings.
- Reflects market conditions for a nominated averaging period.

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247 New Zealand Commerce Commission, *Gas Distribution Services Input Methodologies Amendments Determination 2022*, February 2022, p.68.

248 New Zealand Commerce Commission, *Gas Distribution Services Input Methodologies Amendments Determination 2022*, February 2022, p. 70.

249 Ofgem, *Cost of Debt Indexation Model AIP 2020*, 27 November 2020.

250 ERA, *Final Rate of Return Guidelines*, December 2018, p. 23.

251 ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network – Appendix 5 Return on Regulated Capital Base*, September 2018, p. 75.

252 ERA, *Final Determination 2018 and 2019 Weighted Average Cost of Capital for the Freight and Urban Networks and Pilbara Railways*, August 2019, p. 25.

253 Technical detail and tools to run the ERA's revised bond yield approach can be found on the ERA's website.

- Recognises the reality that Australian firms also source debt funding overseas.
- Directly targets a debt tenor of 10 years.
- Is more robust to volatile market yields by virtue of using yield observations averaged over the averaging period instead of using methods based on one day of observations.

506. The ERA considers the debt risk premium process is robust and replicable.

507. The ERA considers that this debt risk premium estimation approach best delivers an efficient rate of return in the long-term interests of consumers.

508. The ERA will use the revised bond yield approach to estimate the debt risk premium for the 2022 gas instrument.

509. Further technical detail is provided below. The ERA provides debt risk premium process documents and accompanying tools consistent with the revised bond yield approach in the gas instrument.[254] The ERA has published these tools with the 2022 gas instrument and when calculating the debt risk premium the ERA uses these tools.

The benchmark sample

510. A bond price, or its observed yield, is determined by the markets, not by the companies or the regulators. Relying on market data will provide the best means of estimating the proxy for the cost of debt. This means that observed bond yields play a fundamental role in the method of estimation.

511. The observed yields of bonds currently traded in the market will reflect the nature of the prevailing market conditions prior to the issuance of the bonds.

512. Many Australian corporate bonds are denominated in foreign currencies. Furthermore, overseas markets have assumed greater importance for the longer end of the yield curve.

513. As long as the majority of bond issuances of the various markets and currencies can be captured, then the associated outcomes are ”market relevant” and ideally should be included in the benchmark sample.

514. The decision to issue bonds in the Australian or overseas financial markets lies with businesses. There may be a cost advantage in issuing bonds overseas considering all possible risks associated with the process such as exchange rate risk. Alternatively, it may be more convenient to issue longer-term bonds and/or bonds with larger amounts at issuance in overseas markets given the Australian financial market is generally considered a smaller market in comparison with the United States, United Kingdom and European markets.

515. Consequently, Australian corporate bonds denominated in selected foreign currencies should be included in the benchmark sample. Doing so will increase the sample size of the benchmark sample, which leads to a more robust estimate of the debt risk premium. The ERA included Australian bonds denominated in USD, Euros and GBP in the benchmark sample under its revised bond yield approach.

[254] Technical detail and tools to run the ERA’s revised bond yield approach can be found on the ERA’s website.

516. Further, it is standard practice to exclude firms operating in the financial sector, because these firms have a different capital structure.[255]

517. The ERA uses the following revised bond yield approach criteria to determine the benchmark sample of bonds (see Table 8).

Table 8: Bonds in sample with country of risk of Australia

Criteria	ERA's approach
Country of risk	Australia
Currency	Australian Dollar, United States Dollar, Euro Currency and British Pound
Maturity date	More than or equal to 2 years from now
Maturity type	Bullet or Callable or Puttable but not Perpetual
Security type	Exclude inflation linked note and called instruments
Sector/industry group	Exclude 'Financials'

Source: Bloomberg and ERA analysis

518. The country of risk criterion ensures that yields and credit spreads estimated on the bonds issued are reflective of risks primarily linked to economic and financial market conditions in Australia.

519. Perpetual, inflation-linked and called instruments are excluded. This is because these instruments appear infrequently in sampling and require additional complexity in calculating yields that are comparable to those of the other instruments. The additional benefit of including such instruments does not justify the additional complexity of including them.

520. Duplicate issues such as those that are reported by Bloomberg as both privately placed and publicly issued are excluded to avoid double counting their yields in the sample.

Converting bond yields to Australian dollar equivalents

521. The ERA's approach for conversion into Australian dollar equivalents does not require estimates of a conversion factor. This approach is transparent and replicable — anyone with access to a Bloomberg terminal can get the same hedged Australian dollar equivalent yield for any given bond, provided they use the same date, currency, payment frequency and deal type.

[255] The ERA notes that the RBA estimates exclude financial sector bonds.

Data availability

522. Given the lack of pricing data on some Australian corporate bond markets, the ERA employs a criterion that removes bonds that contain less than 50 per cent of observations over the averaging period. Requiring bonds to have 100 per cent observed yields during the sample period significantly reduces the number of bonds in the benchmark sample. Given the ERA's adoption of a 20-day averaging period, the ERA requires each bond to have at least 10 days of pricing data in this 20-trading day averaging period in order to be included in the benchmark sample. This maximises the number of bonds available in the benchmark sample.

Curve-fitting techniques

523. There are different curve fitting techniques that can be used to estimate the cost of debt tenors beyond five years. However, the following three techniques are widely used:

- Gaussian Kernel Method
- Nelson-Siegel Method
- Nelson-Siegel-Svensson Method.

524. A simple average of these three techniques provides a robust approach, improving the validity of the yield estimates. Each of the techniques is described below.

525. The Independent Panel sought more detail on:

- Why the ERA does not use one preferred curve estimation technique? While the Independent Panel does not have a preferred method to estimate the cost of debt, it noted that the calculation would be simplified if a single preferrable method was identified.
  - The ERA uses the three curve estimation techniques to estimate a return on debt at the desired tenor.
  - The use of multiple estimation techniques with different strengths means the approach is robust to different market conditions that may occur.
  - The ERA considers that the debt risk premium estimation process is publicly available, transparent and replicable to stakeholders, while balancing the need to produce robust and valid yield estimates based on the three curve fitting techniques.
- Why the ERA includes bonds with maturities over two years?
  - To support the most robust curve estimations across the techniques the ERA's bond selection method includes all bonds with maturities over two years to maximise the bond sample.
  - The bond sample includes bonds that have maturities that are less than the desired tenor, around the desired tenor and longer than the desired tenor. This approach maximises the bond sample.
  - The curve fitting techniques are sophisticated enough to then place more weight on the bonds with maturities closer to the targeted tenor. The method recognises that the observed spreads on bonds with residual maturities close to the target tenor contain more information about the underlying spread at that tenor than spreads on bonds with residual maturities further away.

Gaussian Kernel Method

526. The Gaussian Kernel method is consistent with the approach used by the RBA.[256]

527. This method recognises that the observed spreads on bonds with residual maturities close to the target tenor contain more relevant information for estimation, which has advantages over other simpler weighting methods. This method is robust and is capable of producing estimates even when the number of available observations is relatively small.

528. The Gaussian Kernel method assigns a weight to every observation in the bond sample – informed by the distance of the observation's residual maturity from the target tenor – according to a Gaussian (normal) distribution centred at the target tenor.[257] This method recognises that the observed spreads on bonds with residual maturities close to the target tenor contain more information about the underlying spread at that tenor than spreads on bonds with residual maturities further away.

529. For the ERA's Gaussian Kernel estimates, bond issue amounts expressed in foreign currencies are converted to Australian dollar amounts before being applied as weights in the Gaussian Kernel estimates. Consequently, where a bond is issued in a foreign currency the weighting in the Gaussian Kernel estimates uses the principal amount converted into an Australian dollar amount. The currency conversion uses the closing exchange rate on the date of the bond's issue.

530. Formally, the Gaussian Kernel average credit spread estimator S[T] at target tenor [T] (say, five years) for a given broad rating and date is given by Equation 7.

$$S(T) = \sum_{t=1}^{n} w_i(T;\sigma) \times S_i$$

Equation 7

where

$w_i(T;\sigma)$ is the weight for the target tenor T of the i^{th} bond in the sub-sample of bonds with the given broad rating

S_i is the observed spread of the i^{th} bond in the sub-sample of N bonds with the given broad rating

$\sigma(sigma)$ which is measured in years, controls the weight assigned to the spread of each observation based on the distance between that bond's residual maturity and the target tenor. Sigma is the standard deviation of the normal distribution used to assign the weights. It determines the effective width of the window of residual maturities used in the estimator, with a larger effective window producing smoother estimates.

[256] RBA, *New Measures of Australian Corporate Credit Spreads*, Bulletin, December quarter 2013.

[257] RBA, *New Measures of Australian Corporate Credit Spreads*, Bulletin, December quarter 2013, p. 20.

531. The weighting function is as follows in Equation 8.

$$w_i(T;\sigma) = \frac{K(T_i - T;\sigma) \times F_i}{\sum_{j=1}^{N} K(T_j - T;\sigma) \times F_j}$$

Equation 8

where

$K(T;\sigma)$ is the Gaussian Kernel function giving weight to the i^{th} bond based on the distance of its residual maturity from the target tenor ($T_i - T$)

F_i is the face value of the i^{th} bond.

532. The Gaussian Kernel may then be defined as below in Equation 9.

$$K(T_i - T;\sigma) = \frac{1}{\sqrt{2\pi\sigma}} exp\left[-\frac{(T_i - T)^2}{2\sigma^2}\right]$$

Equation 9

533. The Gaussian Kernel method provides for a degree of flexibility in weighting the observations around the target tenor through the choice of the value of the smoothing parameter, σ.

Nelson-Siegel Method

534. The ERA also uses the Nelson-Siegel method and Nelson-Siegel-Svensson method to derive its debt risk premium estimate. Nelson-Siegel and Nelson-Siegel-Svensson are the most used parametric models for yield curve estimation and have been adopted by many central banks.[258]

535. The Nelson-Siegel model is a popular term structure estimation method. It can capture many of the typical observed shapes that the yield curve assumes over time.[259]

536. The Nelson-Siegel method assumes that the term structure of the yield curve has the parametric form shown in Equation 10

$$y_t(\tau) = \beta_{0t} + \beta_{1t} \frac{1 - e^{-\lambda\tau}}{\lambda\tau} + \beta_{2t} \left(\frac{1 - e^{-\lambda\tau}}{\lambda\tau} - e^{-\lambda\tau}\right)$$

Equation 10

where

$y_t(\tau)$ is the credit spread (debt risk premium) at time t with maturity τ

$\beta_{0t}, \beta_{1t}, \beta_{2t}, \lambda$ are the parameters of the model to be estimated from the data.

537. The Nelson-Siegel method uses observed data from the bond market to estimate the parameters $\beta_{0t}, \beta_{1t}, \beta_{2t}, \lambda$ by using the observed yields and maturities for bonds.

[258] A parametric model or parametric family or finite-dimensional model is a family of distributions that can be described using a finite number of parameters.

[259] de Pooter, M., *Examining the Nelson-Siegel Class of Term Structure Models*, 2007.

538. With the estimated parameters $\beta_{0t}, \beta_{1t}, \beta_{2t}, \lambda$, a yield curve is produced by substituting these estimates into Equation 10 and plotting the resulting estimated yield $\hat{y}(\tau)$ by varying the maturity τ. $\hat{y}(\tau)$ has the interpretation of being the estimated yield for a benchmark bond with a maturity of τ for a given credit rating.

Nelson-Siegel-Svensson Method

539. The Nelson-Siegel-Svensson model is an extension of the Nelson-Siegel model. By adding two additional parameters, it incorporates additional flexibility to capture the curve movement of a more volatile market more precisely.

540. The parametric form of the Nelson-Siegel-Svensson curve used by the ERA is that specified in Svensson's 1994 paper.[260] The notation for this parametric form is shown in equation 11.

$$\hat{y}(\tau) = \beta_{0t} + \beta_{1t} \frac{1 - e^{-\tau/\lambda_1}}{\tau/\lambda_1} + \beta_{2t} \left[\frac{1 - e^{-\tau/\lambda_1}}{\tau/\lambda_1} - e^{-\tau/\lambda_1}\right] + \beta_{3t} \left[\frac{1 - e^{-\tau/\lambda_2}}{\tau/\lambda_2} - e^{-\tau/\lambda_2}\right]$$

Equation 11

where

$\hat{y}(\tau)$	is the credit spread (debt risk premium) at time t for maturity τ.
$\beta_{0t}, \beta_{1t}, \beta_{2t}, \beta_{3t}, \lambda_1, \lambda_2$	are the parameters of the model to be estimated from the data.

541. The Nelson-Siegel-Svensson method is estimated in the same way as the Nelson Siegel method, except it uses a different parametric form.

Contingencies

542. The debt risk premium includes three contingency approaches detailed below (see Table 9).

[260] Svensson, L., *Estimating and Interpreting Forward Interest Rates: Sweden 1992-1994*, Institute for International Economic Studies, University of Stockholm, Seminar Paper no. 579, p. 6.

Table 9: ERA's contingency approaches to data issues

Event	Contingency approach
Contingency A – Bond size	**Expansion of credit rating sample**
The contingency is triggered when the total number of bonds in the sample is less than 15 across the term structure; and/or the sample is less than 10 bonds between the maturities of five and 15 years.	In the event that minimum bond sample requirements are not met, the ERA will use the AER's method to calculate the cost of debt using RBA and Bloomberg data sources. Under this contingency, the 10-year BBB+ cost of debt estimate will be calculated by the sum of: • 1/3 of the broad A-rated estimate • 2/3 of the broad BBB-rated estimate. The debt risk premium will then be calculated by removing the risk free rate.
Contingency B – Estimation divergence	**Use of RBA and Bloomberg data sources**
The three curve estimation techniques diverge to a large extent. Contingency triggered when the standard deviation of the three yield estimates (Gaussian Kernel, Nelson-Siegel and Nelson-Siegel Svensson) is equal to or greater than 100 basis points.	In the event that estimation techniques diverge to a significant degree, the ERA will use the AER's method to calculate the cost of debt using RBA and Bloomberg data sources. Under this contingency, the 10-year BBB+ cost of debt estimate will be calculated by the sum of: • 1/3 of the broad A-rated estimate • 2/3 of the broad BBB-rated estimate. The debt risk premium will then be calculated by removing the risk free rate.
Contingency C - Bloomberg data unavailable	**Use of RBA bond curves**
Bloomberg stops producing bond data and bond data becomes unavailable.	This contingency will use the RBA Table F3 "Aggregate Measures of Australian Corporate Bond Spreads and Yields" data.[261] The RBA only publishes 10-year broad A-rated and broad BBB-rated estimates. Therefore, under this contingency, the 10-year BBB+ cost of debt estimate will be calculated by the sum of: 1/3 of the broad A-rated estimate 2/3 of the broad BBB-rated estimate. The debt risk premium will then be calculated by removing the risk free rate.

[261] RBA Table F3: Aggregate Measures of Australian Corporate Bond Spreads and Yields – Non-financial Corporate Bonds.

543. The ERA has reflected the following considerations of each contingency in the detailed debt risk premium technical process documents.[262]

Contingency A – Bond Size

544. The ERA considered other market yield curve providers' practice to arrive at this minimum bond requirement. Bloomberg requires at least 15 bonds,[263] while Thomson Reuters requires at least 5 bonds for the yield curve to be constructed.[264]

545. The ERA notes that Bloomberg's bond count requirements are:[265]

- at least 15 bonds across the term structure
- at least five bonds with maturities between five and 10 years
- at least five bonds with maturities beyond 10 years.

546. The ERA supports a minimum number of bonds in the sample of at least 15 across the term structures.

547. Recognising the importance of observations around the 10-year tenor, the ERA includes an additional criterion that the sample must have at least 10 bonds between the maturities of five and 15 years.

548. In the event that minimum bond sample requirements are not met, the ERA will use the AER's method to calculate the cost of debt based on market data sourced from Bloomberg and RBA.

549. Under this contingency, the 10-year BBB+ cost of debt estimate will be calculated as the sum of:

- one-third of the broad A-rated estimate
- two-thirds of the broad BBB-rated estimate.

550. The debt risk premium will then be calculated by removing the risk free rate.

551. AGIG queried why the ERA's contingency did not also use the AER's third set of data from Thompson Reuters. AGIG also noted that not using the Thompson Reuters data is likely to be of limited consequence as it is only a contingency.[266] Given the contingency has to be replicable and the Thompson Reuters requires a further subscription for stakeholders, the ERA considers that the use of the RBA and Bloomberg data was sufficient for this contingency.

[262] The detailed process for estimating the debt risk premium can be found on the ERA's website.

[263] ACCC, Regulatory Economics Unit, *Return on debt estimation: a review of the alternative third party data series*, August 2014, p. 18.

[264] ACCC, *Regulatory Economics Unit, Thomson Reuters Credit Curve Methodology Note for the AER*, April 2017, p. 5.

[265] ACCC, Regulatory Economics Unit, *Return on debt estimation: a review of the alternative third party data series*, August 2014, p. 18.

[266] AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 17-18.

Contingency B – Estimation Divergence

552. In the event that estimators diverge significantly, the ERA recognises the anomaly may rest in either of the three estimation techniques (Gaussian Kernel, Nelson-Siegel and Nelson-Siegel Svensson).

553. In the event that the standard deviation of the three yield estimates is equal to or greater than 100 basis points, the ERA will use the AER's method to calculate the cost of debt based on market data sourced from Bloomberg and RBA.

554. Under this contingency, the 10-year BBB+ cost of debt estimate will be calculated as the sum of:

- one-third of the broad A-rated estimate
- two-thirds of the broad BBB-rated estimate.

555. The debt risk premium will then be calculated by removing the risk free rate.

556. The AGIG provided some feedback on contingency B and suggested that it is more prudent for the ERA to maintain its own approach if two of the three yield curves remain very close to each other (say within 25 basis points), even if one of them diverges significantly.[267] In the event of significant divergence the proposed approach of retaining the two yields curves that remain very close implies that the anomaly lies with the other yield curve. However, the ERA notes that it may be the case that the anomaly may in fact lie in the two yield curves that produce similar results as they may be similarly affected by event/s. Therefore, the ERA maintains its contingency B that in the event that estimates diverge significantly, the ERA contingency approach will use the AER's method based on market data sourced from Bloomberg and RBA.

Contingency C – Bloomberg data unavailable

557. In the event that Bloomberg data is unavailable, the ERA will use the RBA data to calculate the debt risk premium.

558. The ERA will use the AER's method to calculate the cost of debt based on market data sourced from RBA.

559. Under this contingency, the 10-year BBB+ cost of debt estimate will be calculated as the sum of:

- one-third of the broad A-rated estimate
- two-thirds of the broad BBB-rated estimate.

560. The debt risk premium will then be calculated by removing the risk free rate.

561. The ERA notes ATCO's suggestion of a fourth contingency with a broader definition than the unavailability of Bloomberg bond data.[268] ATCO has not provided further explanation on this contingency. The ERA maintains that the current contingency approach is sufficient in response to the unavailability of Bloomberg data.

[267] AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 18.

[268] ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 8.

9.5.4.4. Estimating the 10-year trailing average debt risk premium

562. The trailing average approach requires annual estimates of the debt risk premium for nine past years to combine with the current ERA forward-looking annual debt risk premium estimate.

563. As annually updated trailing averages of the debt risk premium are now in place for the Mid-West and South-West Gas Distribution System, the Goldfields Gas Pipeline and the Dampier to Bunbury Natural Gas Pipeline, the past year estimates have already been determined.

564. The past year estimates (prior to 2015) were based on the RBA estimates. The third party source for these debt risk premia estimates had been incorporated into the initial trailing average used to determine the rate of return. Given the 10-year trailing average formula, debt risk premia estimate for years 2013, 2014 and 2015 will become obsolete for the four-year period when the 2022 gas rate of return instrument is in effect.

565. The trailing average estimate of the debt risk premium weights the past 10 years of estimates of the annual debt risk premium, consistent with the average term of debt issued by the benchmark efficient entity and its staggered debt portfolio.

566. The resulting 10-year trailing average should be updated annually, adding in the most recent estimate of the debt risk premium, according to its weight, and dropping the estimate from 10 years ago. This replicates the cost of debt for the benchmark efficient entity under a strategy whereby it rolls over 10 per cent of its debt each year.

567. The weights for a simple hybrid trailing average debt risk premium estimate should be 10 per cent for each year's estimate of the debt risk premium over the most recent relevant 10 years.

568. The benchmark efficient entity can then replicate a simple 10-year trailing average by issuing one tenth of its debt each year. While a simplification of likely practice, this would closely replicate the return on debt under the observed financing strategies of benchmark efficient entities.

569. In determining the best approach to estimate the debt risk premium, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information or conditions; transparency and whether it can be implemented. The ERA considers that the use of a revised bond yield approach to estimate the debt risk premium is fit for the purpose of the 2022 final gas instrument.

570. Based on the preceding reasoning, the ERA considers that the use of the debt risk premium estimation process will best deliver an efficient rate of return in the long-term interests of consumers. By adopting the estimation methods that provide the best estimate of the return on debt in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the debt risk premium method in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

10. Return on equity

571. The return on equity is the return that investors require from a firm to compensate them for the risk they take by investing their capital.

572. There are no readily observable proxies for the expected return on equity. While estimates of the cost of debt can be obtained by observing debt instruments, financial markets do not provide a directly observable proxy for the cost of equity, for either individual firms or for the market.

573. Estimating a forward-looking return on equity – sufficient to enable firms to recoup their prevailing equity financing costs – requires the use of models.

574. The model most used by Australian regulators for quantifying the return on equity has been the Sharpe-Lintner Capital Asset Pricing Model (CAPM).

575. This chapter outlines the ERA's reasoning for its current position on determining the return on equity in the 2022 final gas instrument.

10.1. Return on equity model

576. This section outlines the ERA's reasoning for its final position on the return on equity model outlined in the 2022 final gas instrument.

10.1.1. Draft position

577. The 2018 gas instrument adopted the Sharpe-Lintner CAPM to estimate the return on equity.[269]

578. For the 2022 draft instrument the ERA maintained the use of the Sharpe-Lintner CAPM to estimate the return on equity.[270]

579. The ERA determines a single point estimate for the return on equity using the Sharpe-Lintner CAPM, applying the following formula:

$$R_i = R_f + \beta_i(R_m - R_f)$$

Equation 12

where:

R_i is the required rate of return on equity for the asset, firm or industry in question

R_f is the risk free rate

β_i is the equity beta that describes how a particular portfolio *i* will follow the market which is defined as $\beta_i = cov(R_i, R_m)/var\ (R_m)$

$(R_m - R_f)$ is the market risk premium.

[269] ERA, *Final Rate of Return Guidelines (2018),* December 2018, pp. 27-28.

[270] ERA, *2022 Gas Rate of Return Draft Instrument*, June 2022, p. 15.

580. To estimate the return on equity the ERA would separately estimate:

- the risk free rate
- the market risk premium
- the equity beta.

581. The ERA's 2018 gas instrument adopted a return on equity calculated for a five-year term. At the time of publishing the 2018 gas instrument the ERA considered a five-year term would best approximate the NPV=0 principle and thus provide the best estimate of the return on equity.[271]

582. The ERA's 2022 draft instrument applied a 10-year term when estimating the return on equity.[272] The term for equity was in the 2022 draft instrument changed from five years to 10 years. This change was made to align the assumed term for equity with common investor practice, where investors in long-lived assets consider cash flows over a long time horizon exceeding the regulatory period. A 10-year term for equity still allows efficient rates of return and is consistent with private market practice.[273]

10.1.2. Consultation

10.1.2.1. Independent Panel Report

CAPM

583. The Independent Panel considered the ERA's proposed use of the Sharpe-Lintner CAPM was appropriate and based on sound reasoning.[274]

- For the Sharpe-Lintner CAPM, the Independent Panel noted that whilst other asset pricing models were being used in academia and industry, the CAPM has characteristics which made it appropriate for economic regulation.
- The Independent Panel noted support from stakeholder submissions for the use of the CAPM.

Term for equity

584. The Independent Panel considered the ERA's proposal to use a 10-year term of equity was appropriate and based on sound reasoning.[275]

- The Independent Panel considered that reasonable arguments could be made for either a five- or 10-year rate and noted that submissions expressed differing views on the term of equity.
- The Independent Panel noted that 10-year estimation periods are arguably more consistent with standard finance practice of applying a discount rate with a term equal to the period of the cashflows being discounted.

[271] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 34-35.

[272] ERA, *2022 Gas Rate of Return Draft Instrument*, June 2022, p.15.

[273] ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, pp. 92-99.

[274] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 37.

[275] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 37-38.

- The Independent Panel noted that whether a five-year term better achieves the NPV=0 principle was still open for debate and that in the presence of uncertainty reasonable people can draw different conclusions from the same arguments.

10.1.2.2. Stakeholder submissions

585. Six of the submissions to the 2022 draft gas instrument provided stakeholder comments on the equity rate of return framework.[276, 277, 278, 279, 280, 281]

CAPM

586. No comments were expressed on the return on equity model.

587. However, the CRG viewed that the Sharpe-Lintner CAPM was widely accepted.[282] GGT acknowledged that when properly applied CAPM can be used to estimate equity returns.[283]

Term for equity

588. All stakeholder submissions to the 2022 draft gas instrument commented on the term for equity.

589. There were mixed views submitted on the term for equity, with the CRG supporting a five-year term for equity, while energy networks supported a 10-year term.

590. The CRG supported the five-year term for equity:

- Submitted that the term matching approach was supported by both Dr Lally's proof based on standard financial mathematics and Professor Schmalensee (1989).[284]
- Considered that certainty of the RAB was not required for Dr Lally's proof to hold.[285]
- Agreed that the NPV=0 principle will hold for any allowed return that equals the discount rate, but submitted that this must match the payoff period.[286]
- Submitted that the residual value and cashflows at risk from technological and customer preferences were better delt with via equity beta, but if such risks were diversifiable then it should not be priced according to the theory of the Sharpe-Lintner CAPM.[287]

[276] Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, pp. 2-4.
[277] ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 9-13.
[278] CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 3-19.
[279] ENA, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp.4-12.
[280] Goldfields Gas Transmission Pty Ltd, *Submission to Draft Gas Instrument*, September 2022, p. 13.
[281] Western Power, *Submission to Draft Gas Instrument,* September 2022, p 1.
[282] CRG, *Submission to Draft Gas Instrument*, September 2022, p. 20.
[283] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. iv.
[284] CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 8-11.
[285] CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 11-12.
[286] CRG, *Submission to Draft Gas Instrument*, September 2022, p. 15.
[287] CRG, *Submission to Draft Gas Instrument*, September 2022, p. 12.

- The CRG stated that a 10-year term is inconsistent with the term of inflation and the five year base rate for debt. [288]
- Submitted that commercial practice does not actually support a ten-year term.[289]

591. Energy networks strongly supported a move to a 10-year term for equity.[290, 291,292,293,294] All referred to and supported a report by Professor Richard Schmalensee commissioned by the Energy Networks Australia.[295] The Energy Networks Australia commissioned Professor Schmalensee to respond to the use of his work by Dr Lally, as this has been stated as providing the basis of Dr Lally's proof. Professor Schmalensee raised concerns with the assumptions that underlie Dr Lally's proof for term matching and supported the use of a longer term for equity.

592. Submissions also acknowledged that the term for equity, debt and inflation can be set independently.[296,297]

593. AGIG supported the competitive rate approach, stating that choosing a rate of return below what investors require would be NPV negative and investors would invest elsewhere:[298]

- Contended that deliberately setting NPV negative rates would be inconsistent with the long term interests of consumers and the revenue and pricing principles.[299]
- Considered that Professor Schmalensee's report was the rebuttal to Dr Lally's framework that the Independent Panel referred to.[300]

594. ATCO supported the competitive rate approach and the proposed 10-year term as it considered that it better reflected an investor's long term time horizon:[301]

- Submitted that the competitive approach would better provide for the opportunity to at least recover the efficient investment costs consistent with the Revenue and Pricing Principles. [302]
- Referred to an Australian Competition Tribunal case and the practices of other Australian regulators as providing support for a 10-year term.[303]

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288 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 12.
289 CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 9-11.
290 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 1.
291 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 1.
292 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 3.
293 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. i-ii, 13.
294 Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1.
295 Schmalensee, R, *Statement to the Australian Energy Regulator*, July 2022.
296 AGIG, *Submission to Draft Gas Instrument*, September 2022, pp. 4-5.
297 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 11.
298 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 3.
299 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 4.
300 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 4.
301 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 9.
302 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 10.
303 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 10-11.

- Referred to the AER's draft rate of return decision, but submitted that it was incorrect and that the ERA should not consider it.[304]
- Supported the ERA's proposition that the horizon of relevant cashflows is not limited by regulatory periods or the useful lives of assets. ATCO considered that equity investments are utilised to finance network services over an indefinite long term horizon (via reinvestment in expansion or augmentation) and rational equity investors will discount the cashflows based on the market opportunity cost for alternative securities of equivalent risk.[305]

595. Energy Networks Australia strongly endorsed the ERA's proposed 10-year term, stating that the appropriate regulatory task is to set the allowed return equal to the market cost of capital required by real-world investors:[306]

- Submitted that the key question for every regulator is to set a return on what real-world investors actually require, not what a regulator thinks they should require based on an interpretation of a theoretical mathematical analysis.[307]
- Noted that other Australian regulators except the AER's draft decision have adopted a 10-year term.[308]
- Stated that market practice is to use 10-year rates, so the regulatory allowance should match this practice.[309]

596. Energy Networks Australia submitted that the AER's draft rate of return approach for a five-year term was incorrect for the following reasons:

- The AER is undertaking the wrong task in setting a regulatory rate.[310]
- Professor Schmalensee (2022) refutes Dr Lally proof and the AER's mathematics. Professor Schmalensee concluded that Dr Lally has got the maths "almost exactly backwards" and that it is not so much a proof as "an amazing bit of sleight of hand." He further concludes that "Dr Lally is simply wrong." [311]
- The algebra underpinning term matching established nothing more than that the regulator's allowed return must match the return that investors require.[312]

597. The Energy Networks Australia contrasts the AER's debt and equity approaches, where the AER's return on debt approach sets the costs of a prudent and efficient debt management practice that infrastructure investors adopt.

- States that the AER is proposing to treat equity differently to debt without a clear reason, or explain why its previous position of a 10-year term was incorrect.[313]

304 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 11.
305 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 12.
306 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 4.
307 ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 5-7.
308 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 6.
309 ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 7-8.
310 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 9.
311 ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 9-10.
312 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 9.
313 ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 10-11.

- Considered that the floating rate bond analogy does not support term matching, referring to a submission by the Queensland Treasury Corporation to the AER's draft rate of return instrument. The Queensland Treasury Corporation demonstrates that a long term resetting bond is subject to an additional premium over the rate of one reset period.[314]
- Referred to the Independent Panel's conclusion that a 10-year term is appropriate and based on sound reasoning, suggesting that Professor Schmalensee (2022) is the "stronger rebuttal of Dr Lally's proof" mentioned by the Panel.[315]

598. GGT supported the ERA's proposed 10-year term of equity: [316]

- Continued to doubt Dr Lally's proof, particularly on the assumption that the market value of the regulated assets is equal to the regulated asset base. As investors were unlikely to make this assumption, the requirement for NPV=0 did not specifically require that the equity term match the regulatory period.[317]
- Referred to its February 2022 submission, noting that there is no theoretical guidance on term except that the discount rate should match the term of the cashflows discounted. [318]
- Commissioned a report from Professor Wright who has previously advised UK regulators on rate of return matters.[319] Professor Wright concluded that:
  - The term of equity should be set to the assumed investment horizon of equity investors. [320]
  - The investment horizon of equity investors is debateable, but is distinctly longer than five years. [321]
  - A longer term is consistent with UK practice, which uses terms ranging from 10 to 20 years. [322]

599. Western Power fully supported the ERA's 10-year term for equity, viewing that there was very strong evidence that the market approach is to use 10 years.[323] Additionally, Western Power referred to the practices of other regulators, the ENA's submission and Professor Schmalensee 2022 report in support of its submission.[324]

314 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 11.

315 ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 11-12.

316 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 14.

317 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 16.

318 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 16.

319 Wright, S, *The Appropriate Term for the Risk-Free Rate: A report prepared for APA*, Submission to Draft Gas Instrument, August 2022.

320 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 16-17.

321 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 16-17.

322 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 16-17.

323 Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1.

324 Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1.

10.1.3. 2022 final approach

600. The ERA will use the Sharpe-Lintner CAPM for estimating the return on equity and will determine a single point estimate.

601. To estimate the return on equity the ERA will separately estimate:

- the risk free rate
- the market risk premium
- the equity beta.

602. The ERA will use a term for equity of 10 years.

10.1.4. Reasoning

603. The reasoning for the ERA's final approach for estimating return on equity model is consistent with its draft reasoning, informed by the Independent Panel and public submissions, and detailed below.

10.1.4.1. CAPM

604. The Sharpe-Lintner CAPM remains the principal model for estimating the return on equity used by economic regulators in Australia.

605. Recent reviews of the return on equity by the Queensland Competition Authority (QCA) and the AER have endorsed the Sharpe-Lintner CAPM as the foundational model.[325,326]

606. The ERA considers that the Sharpe-Lintner CAPM is:

- reflective of economic and finance principles and market information
- commonly used by regulators and market participants
- fit-for-purpose as it was developed for estimating the return on equity.

607. The Independent Panel noted that whilst there are alternative models to the Sharpe-Lintner CAPM, the CAPM has desirable properties for the purposes of economic regulation. These properties are that it is theoretically sound, transparent, replicable and relatively intuitive.[327]

608. The ERA considers that applying the Sharpe-Lintner CAPM to estimate the return on equity will provide the best estimate of the return on equity and is in the long term interests of consumers, because it will likely promote efficient investment in, and use of, gas network services through setting efficient rates.

609. To estimate the return on equity the ERA will separately estimate:

- the risk free rate
- the market risk premium

325 QCA, *Final Report: Rate of return review*, November 2021, pp. 53-54.

326 AER, *CAPM and alternative return on equity models, Final working paper*, December 2020, p. 24.

327 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 37.

- the equity beta.

610. The ERA separately considers how best to estimate these individual return on equity parameters to ensure they support the best estimate of an efficient forward looking return on equity in the long term interests of consumers.

10.1.4.2. Term for equity

611. When determining a cost of equity it is necessary to consider the term of the estimate of the cost of equity.

612. The 2018 gas instrument applied a term of the estimates for the rate of return that was, as far as possible, consistent with the term of the regulatory period. Accordingly, as the regulatory period for the ERA's gas pipeline decisions is five years, under the 2018 gas instrument the term of its estimates for the rate of return was generally five years. [328,329]

613. At the time of publishing the 2018 gas instrument, the ERA viewed that setting the term for equity equal to the length of the regulatory period best satisfied the NPV=0 principle, which was considered important for providing economically efficient investment signals. This position was supported by studies by Dr Lally and Kevin Davis. [330]

614. The ERA considered that a return on equity calculated using a five-year term best approximated the NPV=0 principle. The ERA considered that the valuation problem for a regulator was to set the return on equity for the regulatory period, and that this rate is reset every five years.

615. The term that regulators use for the cost of equity has been an ongoing matter of contention. Different views exist, amongst stakeholders and between regulators, on the appropriate time horizon for estimating the cost of equity.

616. In the 2022 gas instrument review the ERA has given further consideration to the term for equity in light of:

- The new regulatory work on the term for the return for equity.
- The AER's concurrent evidence sessions.
- New advice from Dr Lally commissioned by the ERA, and stakeholder and expert feedback on this report.
- Submissions received in response to the 2022 draft gas instrument.

328 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 12.

329 While the ERA set a five-year term across the WACC and its parameters, the cost of debt did recognise that businesses do enter into longer term debt on a staggered basis.

330 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 30-34.

Regulatory work

574. In 2020, the AER conducted a review of inflation and decided to match its estimate of expected inflation to the length of the regulatory period.[331] The AER had previously been using a 10-year term for expected inflation.

617. Given the change to the term of expected inflation, the AER considered that it should review the term of the rate of return to check whether its current approach remained appropriate.[332]

618. The AER engaged Dr Martin Lally as part of its review of the appropriate term for the rate of return.[333] Dr Lally's advice included the following:

- The valuation problem facing a regulator with a five-year regulatory cycle is different from that of valuing an unregulated business.[334]
- The terms for the return of equity, return on debt and expected inflation do not need to align and these terms can be determined separately by applying the NPV=0 principle.[335]
- In respect of the cost of equity, the NPV=0 principle implies that the term must match the regulatory cycle. The valuation problem for a regulator is like that for a business terminating in five years' time, or a floating rate bond whose coupon rate is reset every five years.[336]

619. In November 2021 the Queensland Competition Authority finalised its rate of return review. In this review the Queensland Competition Authority considered that it was reasonable to use a long-term of 10 years for the return on equity. The Queensland Competition Authority considered that this approach reflects the requirements of investors who, in relation to long-lived infrastructure assets, will deploy equity over the entire life of the asset, rather than over any given regulatory period.[337]

620. The Queensland Competition Authority noted that it had changed from its previous term-matching approach:[338]

> In the last decade, we have estimated the risk-free rate using an interpolated term-matched bond term. However, in our most recent reviews, we have reverted to using a 10-year bond term, as we considered that it would better provide for an overall return that was commensurate with the commercial and regulatory risks associated with investment for the life of the asset.

331 AER, *Final Position: Regulatory Treatment of Inflation,* December 2020, p. 35.

332 AER, *Final Position: Regulatory Treatment of Inflation,* December 2020, p. 23.

333 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021.

334 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 21.

335 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, pp. 3-4.

336 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 52.

337 Queensland Competition Authority, *Final report – Rate of return review,* November 2021, pp. 83-84.

338 Queensland Competition Authority, *Final report – Rate of return review,* November 2021, p. 83.

Concurrent evidence sessions

621. One of the AER's concurrent evidence sessions specifically considered the term for equity.[339]

622. There was a consensus view among the experts that NPV=0 was the correct principle for determining the term for equity.

623. However, experts' views on how best to achieve the NPV=0 condition for the return on equity diverged between two methods:

- The regulatory approach - The term for the return on equity should be set to the term of the regulatory period. Notably, this view was the view advocated by Dr Lally. Dr Lally provided mathematical proofs accompanying his presentation as support for this view.[340]
- The competitive approach – The term for the rate of return should be set to provide NPV=0 over the life of the regulatory asset, which would entail using the discount rate based on the longest feasible discount rate (the 10-year rate). The reasoning for this approach is that equity investors receive their cashflows over multiple regulatory periods and therefore a longer term rate is needed. The experts who advocated this view consider it is more closely aligned with capital budgeting and investment practice and therefore provides more efficient investment incentives relative to other investment opportunities with similar risk.

624. Experts discussed that any change to the term for the risk free rate would have some offsetting effect on the market risk premium. That is, a move from a five-year to a 10-year risk free rate would be partially offset by a reduction in the market risk premium.

Advice commissioned from Dr Lally

625. In stakeholder submissions to the ERA's discussion paper, energy networks were critical of Dr Lally's approach and advice on the term for equity. Energy networks submitted that:[341,342,343,344, 345]

- Dr Lally's approach did not reflect the required returns of investors.
- There were critical flaws in Dr Lally's proof, in particular, that investors assume that the market value of the network is equal to the regulated asset base at the end of regulatory periods and therefore investors do not need to consider longer term cashflows.
- Dr Lally's comparison between the valuation of regulatory cash flows and the valuation of a floating rate bond whose coupon rate is reset every five years was inaccurate.
- A rate set below what an investor reasonably expected would result in a negative NPV outcome.

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339 AER, *Rate of Return Instrument Concurrent Evidence Session 2 of 4*, February 2022.

340 Dr Lally, M., *Notes for the Expert Sessions 10 February 2022: Term of the Rate of Return*, February 2022.

341 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 11-15.

342 ATCO, *Submission to Discussion Paper*, February 2022, pp. 5-11.

343 Energy Networks Australia, *Submission to Discussion Paper*, February 2022, pp. 2-3.

344 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, pp. 4-10.

345 Frontier Economics, *Considerations for the regulatory rate of return allowance,* December 2021, pp. 7-26.

626. The ERA commissioned Dr Lally to review the appropriate term for the allowed cost of equity and review submissions received by the ERA.[346]

627. Dr Lally's continued to support the use of a five-year term for equity and considered that it ensures that the NPV=0 principle is satisfied. Dr Lally considered that this was supported by his proof. Dr Lally viewed that the NPV=0 principle was the primary consideration for choosing the term for the cost of equity.[347]

AER term for equity

628. In June 2022 the AER also released a draft rate of return instrument. In this draft the AER changed its historic approach of estimating the return on equity based on a 10-year term to one that matches the regulatory period (typically five). The AER's resulting methodology varies the return on equity based on the length of the energy networks regulatory period, so that an entity with a shorter regulatory period would receive a lower return on equity compared to an entity with a longer regulatory period.[348]

629. In making this decision the AER now considered that:[349]

- Its task was to set a revenue allowance for the regulatory period and at the start of each regulatory period revenues are reset.
- The resetting profile of returns impacts the expected return investors require. While market practitioners value assets into perpetuity and therefore tend to use long-term estimates, the AER viewed it had the task of setting a rate to apply for the regulatory period.
- Utilising a similar mathematic approach to Dr Lally the AER considered that a term matching approach now better met the NPV=0 principle.

630. The AER acknowledged the arguments for the 10-year approach for the term of equity, including that:[350]

- It has been its regulatory practice to use a term of 10 years for considerable time.
- Most other regulators employ a 10-year term.
- Investors typically use a 10-year discount rate when making their investment decision on infrastructure investments. If the AER change to a shorter term the revenue allowance would not meet investor expectations.

631. The ERA notes that this position was detailed in the AER's draft rate of return instrument, and the AER was yet to finalise its final instrument.

Further reports from submissions to the draft instrument

632. The ERA's previous position on setting a regulatory rate by term matching was informed by the research from Dr Lally that concluded that NPV=0 is met when the term of the risk free rate for equity was set to the regulatory period.

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346 Dr Lally, M., *The Appropriate Term for the Cost of Equity*, April 2022.

347 Dr Lally, M., *The Appropriate Term for the Cost of Equity*, pp. 4-16.

348 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022.

349 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, pp. 13-14, 94-118.

350 AER, *Draft Rate of Return Instrument Explanatory Statement*, June 2022, p. 14.

633. Dr Lally's proof has been subject to further debate and discussion by stakeholders and has recently culminated in the Professor Schmalensee (2022) report for Energy Networks Australia.

634. Professor Schmalensee is the author of Schmalensee (1989),[351] an academic paper that Dr Lally cites as support for term matching.

635. Energy Networks Australia requested that Professor Schmalensee provide an opinion on two issues which is summarised in Table 10:

Table 10: Schmalensee (2022) report for ENA

Question	Response
Do you agree with the characterisation of Schmalensee (1989) that appears in Lally (2021)?	"In fact, Dr. Lally's characterization of Schmalensee (1989) is almost exactly backwards. Schmalensee (1989) shows that the NPV=0 principle will be satisfied for any choices of allowed rates of return as long as accounting rates of return in each period are constrained by price regulation to equal the corresponding allowed rates of return." "Schmalensee (1989) certainly does not "show" that the term of the allowed return must match the term of the regulatory cycle. Efficient regulation generally requires that the allowed rate of return must be consistent with the return required by investors – however they determine it." "Dr. Lally (2021) cites Schmalensee (1989) for the proposition that the NPV=0 condition is satisfied only if the regulator sets allowed rates of return in one particular way. Dr. Lally is simply wrong. Schmalensee (1989) shows that, properly computed, NPV=0 holds however the allowed rates of return are determined. Economic efficiency of course, requires that the allowed rate of return is always commensurate with the return that investors require."
If an economic regulator seeks to reach "an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services" to be applied over a defined regulatory period, does Schmalensee (1989) have any implications for the way that return should be estimated?	"Even after a rather careful review of Schmalensee (1989), I cannot understand how Dr. Lally arrived at his view of what that paper implies for real-world determination of regulated firms' allowed rates of return. Fundamentally, Schmalensee (1989) takes the regulator-determined allowed rates of return as exogenous; the proof of The Invariance Proposition does not depend in any way on how the allowed rates of return are determined." "Of course, it is universally understood that to avoid granting rents to regulated firms while still maintaining adequate investment incentives, the regulator should set allowed rates of return to match the rates that investors require. There is no serious discussion in Schmalensee (1989) about how that should be done: I was not then nor am I now an expert in applied corporate finance, and, in particular, I have no opinion on how the AER should determine the actual, market-based costs of capital of the firms it regulates."

Source: Schmalensee, R, Statement of Richard Schmalensee, Ph. D. To the Australian Energy Regulator, July 2022.

636. In addition, the Energy Networks Australia referred to a paper by the Queensland Treasury Corporation that demonstrated that Dr Lally's resetting bond interpretation of regulatory cash flows is incorrect:[352]

- A large part of the argument for the term matching approach is that investors do not consider cash flows after the regulatory allowance re-sets, similar to a resetting bond. Therefore, investors only need to apply a discount rate consistent with the length of the regulatory period.

[351] Schmalensee, R, An expository note on depreciation and profitability under rate-of-return regulation. *Journal of Regulatory Economics*, 1989, 1(3), 293–298.

[352] Queensland Treasury Corporation, *Submission to Draft Rate of Return Instrument Explanatory Statement,* September 2022.

637. The Queensland Treasury Corporation considered that the floating rate bond analysis was essential to the AER's term matching proposal because it avoids the assumption that investors receive an amount equal to the residual regulated asset base in cash at the end of the regulatory period. This assumption was one of the main reasons why the AER did not adopt term-matching in the 2018 rate of return instrument.

- The Queensland Treasury Corporation demonstrated that if regulated equity is viewed as a long term floating rate bond with five yearly coupon resets, the risk free rate in the allowed return on equity should be materially higher than the five year risk free yield.
- The Queensland Treasury Corporation considered that this is supported by:
- A first principles analysis based on the incremental cost of locking in funds for longer periods of time while maintaining the same exposure to interest rate risk. That is, investors also consider the opportunity cost of locking in capital over the long term.
- Its empirical analysis that built up a long term coupon resetting Commonwealth Government Security and estimated its resulting market yield.
- Queensland Treasury Corporation considered that term-matching is not consistent with contemporary regulatory practice in Australia.

10-year term for equity

638. The ERA has considered the term for equity throughout its 2022 gas instrument review.

639. The ERA has considered the opposing stakeholder views and new information on the term for equity.

640. 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.

641. The ERA recognises that it has historically set a regulatory rate when setting the return on equity and this has supported its past practice of term matching to the five-year regulatory period.

642. The ERA's historic position has been supported by Dr Lally's theoretical proof that term matching for the cost of equity best meets the NPV=0 principle.

643. Dr Lally in his most recent advice to the ERA has continued to rely on his theoretical proof to argue for a five-year term for equity and respond to issues raised by stakeholders. Dr Lally's theoretical proof:

- Applies standard finance practice of setting the term of the discount rate equal to the period of cashflows being considered.

- Assumes that at the end of the regulatory access period (in the ERA's case five years) the asset market value is equal to the value of the regulated asset base.
- Assumes, therefore, that there is no need to consider future cashflows beyond the regulatory period because of the resetting nature of the regulatory periods.
- Sets regulatory revenues based on a five-year term and then discounting over that five-year term produces NPV=0.
- Then details that setting regulatory revenues based on a 10-year term and then at the same time constraining the discount rate to five years achieves a positive NPV outcome.

644. The ERA considers that Schmalensee (2022) disagrees that the earlier Schmalensee (1989) can be characterised as providing support for the term matching approach and generally disagrees with both Lally (2021) and the AER's mathematical exploration in support of their draft rate of return decision on the term for equity.

645. After reviewing Schmalensee (1989), the ERA agrees with Professor Schmalensee that the *Invariance Principle* does not provide explicit support for term matching.[353] The Schmalensee (1989) paper is primarily concerned with setting regulatory deprecation under a rate of return framework.

646. Additionally, the ERA considers that Professor Schmalensee supports a competitive rate approach in determining the term for equity, where rates are set to match what investors require.

647. The CRG reviewed Schmalensee (2022) and provided a response given the CRG's support of Dr Lally's framework and the AER's mathematical exploration.[354] The CRG made the following conclusions:

- Both Lally and Schmalensee provide methods of achieving NPV=0 provided that the allowed rates of return are used in both setting capital charges each period and in determining the discount rate.[355]
- As a mathematical matter, the NPV=0 calculation can be met for any arbitrary discount rate if the same discount rate is used to set allowed returns in the numerator each period and then represented in the denominator to calculate a present value.[356] This means that separate information needs to be used to interpret and apply the present value model.[357]

[353] The Invariance Principle is the result from Schmalensee (1989) and Myers (1972) where NPV=0 is achieved for a regulated investment under any method of depreciation. These results are derived under certain assumptions such as perfect price regulation, where regulated rates are exogenously determined as the regulator will set regulated rates equal to the required rates.

[354] CRG, *Response to Schmalensee statement in ENA (Attachment A) submission to draft gas rate of return instrument*, October 2022.

[355] CRG, *Response to Schmalensee statement in ENA (Attachment A) submission to draft gas rate of return instrument*, October 2022, p. 1.

[356] CRG, *Response to Schmalensee statement in ENA (Attachment A) submission to draft gas rate of return instrument*, October 2022, pp. 5.

[357] CRG, *Response to Schmalensee statement in ENA (Attachment A) submission to draft gas rate of return instrument*, October 2022, pp. 3,5.

- The CRG considered that the additional information to be used are the regulatory arrangements in place. The presence of revenue resets, recovery of investments and a regulatory commitment to an efficient return on capital supports that conclusion that the pay-off period for the appropriate return is the regulatory period.[358]

648. The ERA has considered the CRG's submission on Schmalensee (2022) and agrees that separate information is required to interpret and achieve NPV=0. While the CRG considers that the regulatory arrangements are what should be considered in setting the term for equity, the ERA considers that the appropriate separate information is that investors take a longer term view of investments that is greater than a regulatory period as evidenced by:

- The holding period and asset life of infrastructure investments, especially when equity is deployed for the entire life of equity and not just for a regulatory period.
- The duration of equity as a perpetual instrument, especially when compared with debt.
- How cash returns are provided under the post-tax revenue model and the regulatory framework targeting a real return.
- The valuation of the residual value of network assets that are uncertain, but may only be equal to the RAB by coincidence.
- Shareholder and investor stakeholder submissions by Global Infrastructure Investor Association (GIIA) and Network Shareholders Group (NSG) that provide evidence on investor practices:
  - GIIA stated that its investors in long-term regulated infrastructure assets use longer term rates due to the "long-lived nature of energy infrastructure assets and standard commercial practice".[359]
  - NSG stated that equity investors value regulated businesses as the present value of cashflows over the long-term horizon. Equity investors do this because the regulatory framework sets out those cashflows over the life of the investment.[360]
  - NSG rejected the notion that equity investors value their assets as five years of regulatory cashflows and the ending RAB. NSG submitted that there is no evidence that investors assume that the RAB is recovered at the end of the regulatory period. Further, NSG stated that all investors that they represent use a ten-year term when valuing their equity investments in regulated energy networks, with none using Dr Lally's valuation approach.[361]

[358] CRG, *Response to Schmalensee statement in ENA (Attachment A) submission to draft gas rate of return instrument*, October 2022, pp. 5-7.

[359] Global Infrastructure Investor Association, *Response to AER Final Omnibus Paper*, March 2022, pp. 2-3.

[360] Network Shareholders Group, *Response to the AER Rate of Return Information Paper and Omnibus Final Working Paper*, March 2022, p. 3.

[361] Network Shareholders Group, *Response to the AER Rate of Return Information Paper and Omnibus Final Working Paper*, March 2022, p. 7.

649. The ERA acknowledges that some new documents have been published late in the review period by the AER on the term for equity:

- Professor Schmalensee's response to AER questions: In his response Professor Schmalensee has maintained his position that a regulator should be setting the allowed return on equity consistent with the market rate expected by investors. Professor Schmalensee supports this as a competitive long term rate and considered that returns being determined by how often a regulator will compute such estimates due to the regulatory period was unlikely to result in NPV=0.[362]
- Dr Lally's response to Prof Schmalensee: In his response Dr Lally has maintained his position of setting a regulatory rate of return based on the length of the regulatory period. Dr Lally has continued to rely on his theoretical proof.[363]
- Dr Boyle's comment on the positions of Professor Schmalensee and Dr Lally: Dr Boyle has not also reviewed the above responses from Professor Schmalensee and Dr Lally. The comment restates both approaches of Professor Schmalensee and Dr Lally. However, Dr Boyle's conclusion in general is consistent with one of general finance theory that the cashflow period under consideration should determine the period used to determine the discount rate. Therefore, the period under consideration would be dependent on a regulator's view on how investors actually consider cashflows.[364]

650. The ERA has not had input into the development of the above documents, nor has it consulted on these new documents.

651. However, the ERA has reviewed these documents and considers that they do not change its position. The documents reaffirm the validity of a regulator taking different views on the term for equity based on its view of the chosen cashflow period actually used by investors for the determination of a market-based rate of return. Having considered these documents the ERA maintains that there is a level of regulatory judgement or discretion to be exercised in determining the basis of the term for equity.

652. For the reasons discussed in this section, the ERA considers that investors consider cashflows over the long-term and therefore investors reasonably expect a long-term return on equity.

653. The ERA has also considered the report provided by the Queensland Treasury Corporation, which provided analysis to examine a long-term resetting bond from a first principles and empirical basis. The ERA considers that investors might responsibly expect a premium, over and above a short term rate, to lock in their capital over the long-term.

362 Schmalensee, R, *Response of Richard Schmalensee in response to questions posed on 6 September 2022 by the Australian Energy Regulator*, October 2022.

363 Dr Lally, M., *Review of the Schmalensee Report*, September 2022.

364 Boyle, G, *A comment on Schmalensee (2022) vs Lally (2021) and AER (2022)*, September 2022.

654. The ERA has some concern with the limitations of Dr Lally's theoretical proof for the term for equity. The ERA has also noted concerns raised by stakeholders. In considering the term for equity the ERA recognises that investors' expectations may not align with Dr Lally's theoretical proof and the practical application of the proof breaks down.

- 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.
- For example, NPV=0 can be achieved by applying a high 10 per cent return on equity to regulatory revenues and then discounting by that same rate. Applying a low two per cent rate in the same manner also achieves NPV=0.
- Energy network investors hold these assets over multiple regulatory periods. Other regulators such as the Queensland Competition Authority have noted that a longer-term perspective more likely reflects the requirements of investors who in relation to these infrastructure assets "deploy equity over the entire life of the asset, rather than over any given regulatory period".[365]
- Investors consider long term cashflows when making decisions. Infrastructure assets in particular are ones with relatively higher duration. Comparing the stream of cashflows and their relative value over time, it is reasonable to believe that infrastructure assets have the majority of their present values contained in the future, not the present. This longer duration implies that when considering valuations or budgeting, investors are likely to utilise longer term discount rates to better match the timing of distant cashflows.
- 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 (or over multiple periods).
- 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.
- The allowed return on equity is not provided as a series of cashflows during the regulatory period. This is a particularly important point, as equity investors are not paid an amount of equity to their required returns with the current regulatory period. Part of the return is provided to equity holders during the current regulatory period and the remainder is provided over the remaining life of the assets (future regulatory periods). Thus, the value of the firm always depends on the long-run expected future cash flows.

[365] Queensland Competition Authority, *Rate of return review: Final report*, November 2022, p. 83.

- Over an access arrangement period equity investors receive equity returns in the form of cash (residual cashflows) and non-cash returns (RAB escalation). The nature of regulatory revenues, and a post-tax revenue model that targets real rates of return, mean that equity investors receive both cash and non-cash returns over a regulatory period.
- Cash returns received by equity investors are the proceeds from the real WACC minus the nominal cost of debt. These cash returns provide 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.
- As equity investors do not sell the energy network at end of each regulatory period, equity investors are only able to realise their expected returns over the long-run.

655. On the basis of the above analysis, for the 2022 final gas instrument the ERA applies a term for equity of 10 years to set a competitive market rate of return that complies with the NPV=0 principle. The ERA considers that regulated assets have long lives and investors are concerned with cashflows over the life of the asset and not just with the regulatory period. Therefore, the ERA considers that investors consider long term cashflows across multiple regulatory periods and expect to receive returns consistent with this perspective.

656. As the ERA considers that investors expect a longer-term return on equity, a shorter-term will lead to negative NPV outcomes. Setting a short-term rate would not best meet the NPV=0 principle, nor would it support efficient signals for both network owners or consumers.

657. The ERA considers that a 10-year term for equity provides 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.
- It recognises the reality of regulatory cashflows and returns being realised by equity investors over the life of the asset.
- It 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.
- It 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 rate.

658. The ERA considers that the terms across equity, debt and inflation do not need to match and they should be separately set to best achieve an efficient weighted average return.

659. The ERA maintains that the terms for debt and inflation are separate issues which are discussed in the respective chapters of this final determination. The determination of terms for the separate components of the rate of return are unified by the consistent consideration of the NPV=0 principle.

- For equity, the ERA considers that regulated assets have long lives, equity holders receive cash returns over more than one regulatory period and investors are concerned with cashflows over the long term. Using the longest term generally available (10 years) reflects investors' efficient costs and efficient financing in a competitive market. A 10-year equity term ensures that regulated revenues match the requirements of efficient investors and best approximates the NPV=0 principle.
- For debt, the ERA also considers its hybrid trailing average approach best approximates the NPV=0 principle while also recognising interest rate risk, refinancing risk and the staggered nature of debt portfolios. This recognises that energy networks enter into long term debt arrangements to fund long term assets, while also allowing for the use of derivatives to partially align with the regulatory cycle. This is an implementable strategy and thus ensures NPV=0.
- For inflation, the ERA considers that the term of expected inflation should be five years, consistent with the length of the access arrangement. This allows the post-tax revenue model to take the best estimate of the five-year inflation forecast out (of the nominal WACC) and add back the actual inflation over the five-year access period (through the indexation of the RAB). Aligning the inflation term to the regulatory cycle best approximates the NPV=0 principle.

660. The consideration of each rate of return component with the objective of achieving the NPV=0 principle indicates that the respective terms do not match. Hence, the ERA considers that matching the terms of equity, debt and inflation would result in a present value error that would not be in the long term interests of consumers.

661. In determining the best approach to estimate the term for equity, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's approach has been determined considering relevant economic and finance principles and current market information; transparency and whether it can be implemented. The ERA considers that the use of a 10-year term for equity to estimate the return on equity is fit for the purpose of the 2022 final gas instrument.

662. Based on the preceding reasoning, the ERA considers that the selection of a 10-year term for equity as set out in the 2022 final gas instrument will provide the best estimate of the term for equity over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation methods that provide the best estimate of the term for equity in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the method for the term for equity as set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

10.2. Equity risk free rate

663. The risk free rate is the return an investor would expect when investing in an asset with no risk.

664. The risk free rate is the rate of return an investor receives from holding an asset with a guaranteed payment stream (that is, where there is no risk of default). Since there is no likelihood of default, the return on risk free assets compensates investors for the time value of money.

665. The risk free rate of return can be estimated as either a nominal or real risk free rate. The nominal risk free rate includes compensation to investors for the reduction in purchasing power caused by inflation. The real risk free rate of return would prevail if the expected inflation rate was zero during an investment period. The ERA uses a nominal vanilla rate of return under the national gas framework and therefore a nominal risk free rate.

666. This section outlines the ERA's reasoning for its final position on estimating the risk free rate for the return on equity outlined in the 2022 final gas instrument.

10.2.1. Draft position

667. The 2018 gas instrument applied a five year Commonwealth Government bond for the risk free rate for the return on equity.[366] The term of the estimates for the rate of return was, as far as possible, consistent with the term of the regulatory period.[367] The risk free rate for equity was estimated using the averaging period process that was set at the start of the regulatory access arrangement period and fixed for the period of the access arrangement.[368]

668. For the 2022 draft gas instrument the ERA applied a 10-year Commonwealth Government bond for the risk free rate for the return on equity. The ERA would use this yield to set the risk free rate for equity at the start of the regulatory access arrangement period. This rate was to be fixed for the duration of the regulatory period.[369]

669. The ERA estimated the risk free rate for equity by:[370]

- Using observed yields from 10-year Commonwealth Government bonds.
- Using linear interpolation of observed yields of Commonwealth Government Security bonds.

670. In the 2022 draft gas instrument the term used for the risk free rate for equity was consistent the ERA's 10-year term for equity.

366 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 20.

367 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 29.

368 ERA, *Final Rate of Return Guidelines (2018),* December 2018, pp. 20-21.

369 ERA, *2022 Gas Rate of Return Draft Instrument*, June 2022, p. 16.

370 ERA, *2022 Gas Rate of Return Draft Instrument*, June 2022, p. 16.

10.2.2. Consultation

10.2.2.1. Independent Panel Report

671. The Independent Panel considered that the ERA's approach to measuring the risk free rate was appropriate and based on sound reasoning.[371]

672. The Independent Panel noted that all submissions were generally supportive of the proposed approach.[372]

10.2.2.2. Stakeholder submissions

673. Two submissions to the 2022 draft gas instrument provided stakeholder comments on the equity risk free rate. Both ATCO and GGT supported the use of Commonwealth Government securities as the risk free asset. [373,374]

10.2.3. 2022 final approach

674. The ERA will use a 10-year Commonwealth Government bond for the risk free rate for the return on equity.

675. The ERA will use this yield to set the risk free rate for equity at the start of the regulatory access arrangement period. This rate will be fixed for the duration of the regulatory period.

676. The ERA will estimate the risk free rate for equity by:

- Using observed yields from 10-year Commonwealth Government bonds.
- Using linear interpolation of observed yields of Commonwealth Government Security bonds.

677. The averaging period for the risk free rate will be set according to Chapter 7.

10.2.4. Reasoning

678. The reasoning for the ERA's final approach for estimating the risk free rate is consistent with its draft reasoning, informed by the Independent Panel and public submissions, and detailed below.

679. To determine the best estimate of the risk free rate for equity, the ERA has considered:

- The most appropriate term for the risk free rate.
- The most appropriate choice of proxy instrument.

680. The ERA considers that the term for equity which would yield the best estimate of the efficient cost of equity is 10 years. The ERA's reasoning for selecting a 10-year term for equity is outlined in Chapter 10.1.4.2.

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371 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 38.

372 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 38.

373 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 14.

374 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. iii, 14.

681. The ERA considers that 10 years is the most appropriate term for the risk free rate as it is the longest feasible term that can be reliably estimated from observed data. While Commonwealth bonds with maturities of greater than 10 years do exist, these bonds are not as liquid as the 10-year bond.

682. Regarding the most appropriate proxy instrument for the risk free rate for equity, the ERA considers that observed yields from Commonwealth Government Security bonds are the best proxy for risk free assets in Australia as they are:

- essentially free from default risk
- relatively liquid
- transparently and regularly reported.

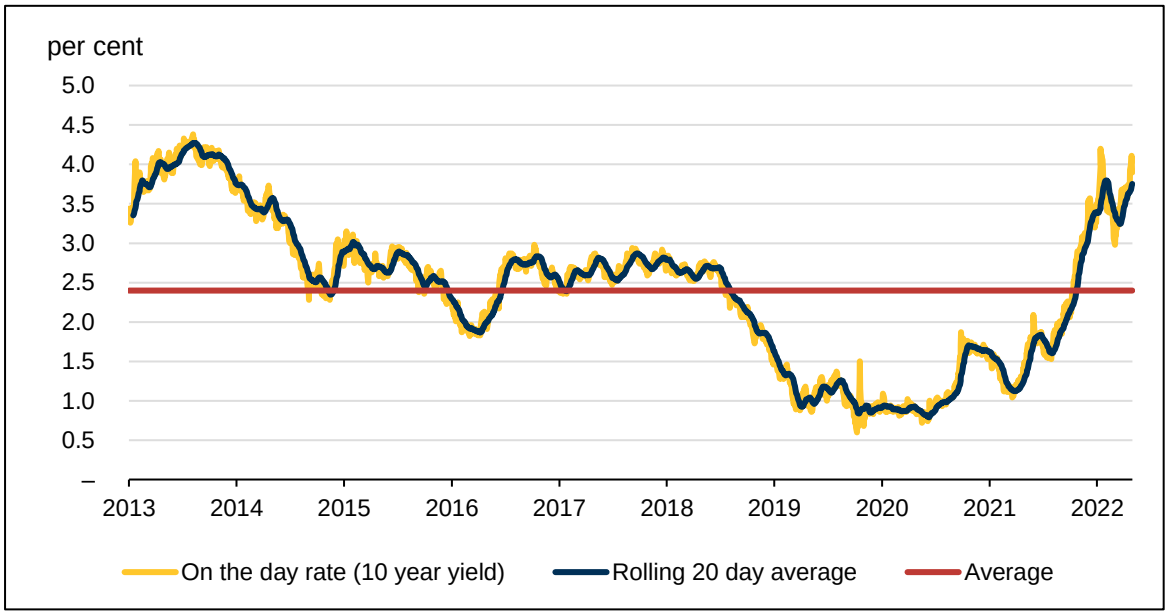
683. Commonwealth Government bonds are also commonly used by other Australian regulators and market practitioners to determine the risk free rate.

684. Submissions from stakeholders generally agreed with the use of a Commonwealth Government Security as the risk free asset.

685. The Independent Panel advised that the ERA's approach to measuring the risk-free rate was appropriate and based on sound reasoning.[375]

686. The ERA notes that Commonwealth Government Security yields are volatile and have recently risen, as shown in Figure 2 .

Figure 2 10-year Commonwealth Government Securities yields



Source: ERA analysis, based on Reserve Bank of Australia F2 statistical tables.

687. The near-term risk free rate has been volatile and uncertain as the economy recovers from the COVID-19 pandemic, and there is increasing global uncertainty around central bank monetary policy given the emergence of inflation.

[375] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 38.

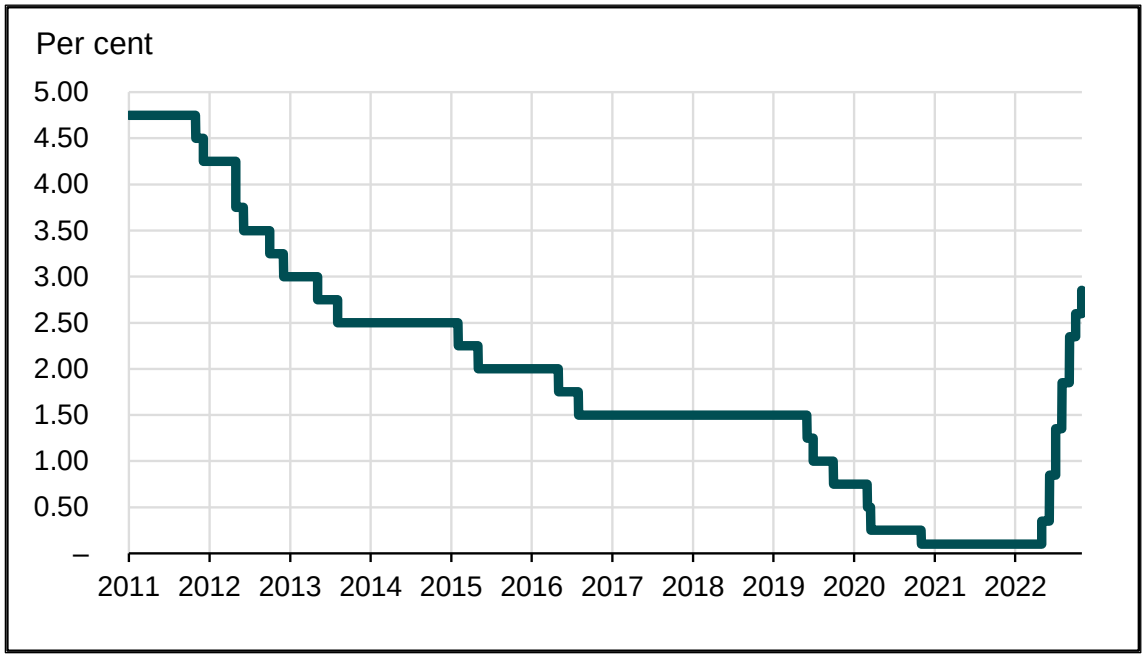
688. Inflation expectations in the market have recently increased, with central banks conducting monetary policy operations to meet inflation targeting mandates. Other shocks such as the conflict in Ukraine have added to the uncertainty of the inflationary environment, along with contributing to global supply shortages which affects prices.

689. Prior to the publication of the draft gas instrument, the RBA increased the cash rate target by 25 basis points to 0.35 per cent on 4 May 2022, the first such increase since 2010.[376] On 7 June 2022 the RBA decided to increase the cash rate target by 50 bps to 0.85 per cent.[377]

690. Since the publication of the 2022 draft gas instrument, the RBA has increased the cash rate target by a further 200 basis points to 2.85 per cent through increases on the 5 July 2022 (+50 basis points),[378] 2 August 2022 (+50 basis points),[379] 6 September 2022 (+50 basis points),[380] 4 October 2022 (+25 basis points),[381] and 1 November 2022 (+25 basis points).[382]

691. These monetary policy changes are illustrated in Figure 3.

Figure 3: RBA cash rate target



Source: ERA analysis, based on Reserve Bank of Australia F1 statistical tables.

376 RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 3 May 2022.
377 RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 7 June 2022.
378 RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 5 July 2022.
379 RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 2 August 2022.
380 RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 6 September 2022.
381 RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 4 October 2022.
382 RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 1 November 2022.

692. The November 2022 statement on monetary policy noted that inflation remained too high and could be attributed to global and domestic demand and supply factors. The Reserve Bank Board expected that further interest rate increases would be required to bring demand and supply back into balance, with the size and timing of increases to be determined on incoming data and the Board's assessment of the outlook for inflation and the labour market.[383]

693. This raises the possibility of continued volatility in the risk free rate during the period in which the 2022 gas instrument is in effect.

694. Therefore, an estimate of the risk free rate averaged over a period just prior to the regulatory period will be applied in order to incorporate prevailing conditions.

695. As the ERA sets the risk free rate based on a 10-year Commonwealth Government bond, this reflects the market's long term expectations and therefore is less affected by short volatility in inflation and interest rate changes. This will support a level of reduced volatility in the risk free rate.

696. On the basis of the above information, for the 2022 final gas instrument the ERA applies a 10-year Commonwealth Government bond for the risk free rate for the return on equity.

697. In determining the best approach to estimate the risk free rate for equity, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information; transparency and whether it can be implemented. The ERA considers that the use of a 10-year Commonwealth Government Bond to estimate the risk free rate for equity is fit for the purpose of the 2022 final gas instrument.

698. Based on the preceding reasoning, the ERA considers that the selection of 10-year Commonwealth Government bonds for the risk free rate set out in the 2022 final gas instrument will provide the best estimate of the value of the expected risk free rate. By adopting the estimation methods that provide the best estimate of the risk free rate in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the method for the risk free rate for equity as set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

699. For illustrative purposes, the 10-year Commonwealth Government bond was 3.78 per cent for the 20 trading days to 30 September 2022.

[383] RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 2 November 2022.

10.3. Market risk premium

700. The market risk premium is a parameter of the Sharpe-Lintner CAPM.

701. The market risk premium is the expected rate of return in excess of the risk free rate that investors require to invest in a fully-diversified portfolio. *Ex-ante*, investors always require a rate of return above the risk free rate to invest in a risky asset, therefore the expected market risk premium is always positive. *Ex-post*, the realised return to the market portfolio may be negative. To establish the cost of capital, the *ex-ante* market premium is relevant.

702. The market risk premium compensates an investor for the systematic risk of investing in a fully diversified portfolio. Systematic risk is risk that cannot be diversified away by investors because it affects all firms in the market.[384] This is a forward-looking concept.

703. The market risk premium is calculated as follows:

$$MRP = R_M - R_F$$

Equation 13

where:

R_M is the expected market return on equity observed in the Australian stock market

R_F is the risk free rate of return.

704. This section outlines the ERA's reasoning for its final position on determining the market risk premium outlined in the 2022 final gas instrument.

10.3.1. Draft position

705. The 2018 gas instrument applied a market risk premium of 6.0 per cent, which was fixed over the period of the instrument.[385]

706. The market risk premium was estimated from the historic market risk premium, the dividend growth model and conditioning variables.[386]

707. Following the receipt of stakeholder submissions on the discussion paper and the AER's concurrent expert sessions, the ERA considered that there was further value to be gained through further focused consultation on the market risk premium. The focused consultation addressed specific questions regarding the market risk premium:

- In April 2022, the ERA published a paper, *Focused consultation for the 2022 gas rate of return instrument review Discussion paper*, outlining questions on market risk premium and relevant background to these questions.
- In April 2022, the ERA conducted an online session with interested stakeholders on the questions addressed by the focused consultation.

[384] The foundation of the Sharpe-Lintner CAPM is the proposition that adding an asset to a portfolio reduces risk via the diversification effect but not beyond the risks that the assets in a portfolio share in common, that is, their systematic risk. At the limit, when one has invested in all available assets in the market portfolio, there is only systematic risk left. An important assumption of the CAPM is that assets are priced as though it is only their systematic risk that is relevant to investors.

[385] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 32.

[386] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 32.

- In May 2022, the ERA received written stakeholder submissions.

708. The ERA's draft approach for the 2022 gas instrument was to use a market risk premium of 6.2 per cent. The market risk premium was to remain fixed for the term of the gas instrument.[387]

709. The ERA simplified and refined the approach to calculating the market risk premium set out in the 2018 gas instrument and updated the market risk premium for current market information. The market risk premium was also estimated consistent with the change to a 10-year term for equity.

710. Consistent with the 2018 gas instrument, the determination of the 2022 draft gas instrument market risk premium:

- Placed more reliance on the historic market risk premium estimate (6.0 per cent), relative to the dividend growth model estimate (6.9 per cent).
- Determined a final point estimate of the market risk premium by using regulatory judgement, including considering conditioning variables.
- Rounded the final point estimate of the market risk premium to one decimal place.

711. The market risk premium was to remain fixed for the term of the gas instrument.

10.3.2. Consultation

10.3.2.1. Independent Panel Report

712. The Independent Panel considered that the ERA's approach to estimating the market risk premium was appropriate and based on sound reasoning.[388]

713. The Independent Panel considered that:[389]

- The removal of pre-1958 data was appropriate given data quality concerns, along with the inclusion of the post-2000 subperiod. Additionally, the sole use of the Brailsford, Handley and Maheswaran (BHM) dataset was appropriate given the considerations above.
- The averaging methodology and weighting proposed by the ERA in the draft gas instrument was reasonable. The Panel noted that the ERA's approach aligned with the purpose of the gas instrument and made use of all the sampling periods compared with the 2018 gas instrument approach. However, the Panel noted the sensitivity of the final rate of return to the estimate market risk premium.
- The proposed use of the dividend growth model by the ERA was reasonable, but noted that it carried a high risk of error and upward bias.

387 ERA, *2022 Draft Gas Rate of Return Instrument*, June 2022, p. 17.

388 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 39.

389 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 38-42.

- The use of conditioning variable was reasonable when the ERA applied its regulatory discretion. Further, the conclusion reached by the ERA that the level of conditioning variables at the time of the draft gas instrument was also reasonable. However, the Panel recommended that the ERA more fully describes how conditioning variables were applied.
- The relationship between the market risk premium and the risk free rate remains a contentious and unresolved issue. The Panel considered that the use of a constant market risk premium was appropriate and based on sound reasoning.

10.3.2.2. Stakeholder submissions

714. Five of the submissions to the 2022 draft gas instrument provided stakeholder comments on the market risk premium.[390, 391, 392, 393, 394]

715. Stakeholder submissions discussed multiple market risk premium matters including:

- historic market risk premium
- the dividend growth model
- conditioning variables
- a fixed or variable market risk premium.

716. Each market risk premium matter is discussed below.

Historic market risk premium

717. Stakeholders were generally supportive of the ERA's simplification of the historic market risk premium approach in the 2022 draft gas instrument.

718. Stakeholders expressed diverging views on the calculation of the geometric mean, along with the use of arithmetic and geometric mean in calculating the historic market risk premium.

719. The CRG agreed with the approach in the 2022 draft gas instrument except for the weights to be provided to the arithmetic and geometric means, supporting equal weights to both means.[395] The CRG:

- Considered that if returns were not fully or predominantly realised in each year due to a longer time horizon, then the arithmetic mean is no longer the appropriate method.[396]
- Questioned whether annual returns were independent and identically distributed, submitting that that this reduced support for the sole use of the arithmetic mean.[397]

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390 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, pp. 8-14.

391 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 15-23.

392 CRG, Submission to Draft Gas Instrument, September 2022, pp. 35-38.

393 ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 13-21.

394 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 17-27.

395 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 35.

396 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 36.

397 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 37.

- Submitted that there has been insufficient information to support a change from an equally weighted approach to the 60/40 weight in favour of the arithmetic mean.[398]

720. All gas network service providers strongly supported the sole use of the arithmetic mean. Each submitted that if the geometric mean was to be used, it should be calculated in a certain way and with weights to be applied according to the statistical methods in Indro and Lee (1997) and Jacquier et al (2003, 2005) (hereafter the statistical approach).[399,400,401,402]

721. AGIG submitted that the historic market risk premium should be 6.9 per cent on the basis that the geometric mean should not be used at all and that the calibrated DGM should.[403] AGIG:

- Stated that returns are not serially correlated, the use of geometric means was an inappropriate response to serial correlation, investors are not accumulating or compounding in a geometric sense, and noted that no other Australian economic regulator used the geometric mean.[404]
- Commissioned a report from the Competition Economists Group to support their submission.[405]

722. ATCO submitted that only the arithmetic mean should be used.[406] ATCO submitted that the ERA was mistaken if it believed the task is to estimate the expected compounded return from a buy and hold investment strategy that requires the geometric mean.[407]

723. Energy Networks Australia considered that only the arithmetic mean should be used.[408] The ENA submitted:

- That the consensus from the AER's expert sessions indicated that geometric means should be considered if there is serial correlation and a forecast over one future period is required.[409] If this is the case, then the weights on the geometric mean should be set according to the statistical approach.
- That if returns are serially correlated then it should be properly reflected throughout the determination of the market risk premium and not just for the geometric mean.[410]

398 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 38.

399 AGIG, *Submission to Draft Gas Instrument*, September 2022, pp. 8-9, 10-12.

400 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 18-19.

401 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 13.

402 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 18.

403 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 13.

404 AGIG, *Submission to Draft Gas Instrument*, September 2022, pp. 9-10.

405 CEG, *Estimating MRP for the ERA 2022 RoRI for AGIG's Submission to Draft Gas Instrument*, September 2022.

406 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 16.

407 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 16-18.

408 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 14.

409 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 14.

410 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 15.

724. GGT expressed concern that statistical methods were not used to set the weights for the arithmetic and geometric means.[411] GGT considered that autocorrelation was not material and the forecast horizon was short, which meant that the greatest weight should be placed on the arithmetic mean.[412]

Dividend Growth Models (DGM)

725. Stakeholder views on the use of the DGM were mixed.

726. The CRG agreed with the ERA's draft approach with regards to the DGM.[413]

727. All gas network service providers continued to support the use of a dividend growth model, particularly the Energy Networks Australia's calibrated DGM. [414,415]

728. AGIG supported the calibrated DGM, referring to the Energy Networks Australia's response to the ERA's review of the approach and provided additional responses.[416]

729. ATCO supported an explicit weight being placed on the DGM estimate as a forward looking estimate, stating that the ERA should not be solely relying on a backwards looking historical estimate.[417] ATCO:

- Referred to a Brattle Group report for the AER that illustrated how some international regulators put material weights on DGM estimates.[418]
- Submitted that past ERA decisions put material weights on the DGM and suggested that a 50 per cent weight could be used.[419]
- Stated that combining the DGM with the historic market risk premium estimate would provide additional information to the cost of equity and increases the likelihood that the estimate reflects current market conditions for equity funds.[420]

730. Energy Networks Australia disagreed with the ERA's criticism of the calibrated DGM, stating that they could equally be applied to the ERA's preferred DGM specification. Energy Networks Australia:

- Submitted that any DGM estimate must be unbiased, and that the calibrated DGM is an unbiased model when compared with other DGM models (referring to the AER's specification).[421]
- Considered that the ERA's criticism of the calibrated DGM was unwarranted and responded to each point. [422]

411 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 19.
412 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 20-25.
413 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 35.
414 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 12.
415 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 20-21.
416 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 12.
417 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 19.
418 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 19.
419 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 20.
420 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 21.
421 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 16.
422 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 16-21.

- Advised that Frontier Economics had further developed the calibrated DGM to address some of the criticisms.[423]

731. GGT stated that a DGM method better captures changes in asset risks and investor willingness to bear risk that seem to underly the time variation of the market risk premium.[424]

Conditioning variables

732. Some gas network service providers queried the use of conditioning variables, submitting that the ERA needed to explain how they were used.

- AGIG submitted that the ERA needed to explain how conditioning variables are used.[425]
- GGT submitted that no weight should be given to conditioning variables as no relationship has been established between the proposed conditioning variables and the market risk premium.[426]

A fixed or variable market risk premium

733. Some gas network service providers considered that the market risk premium should be updated at each access arrangement determination and not be fixed.

- AGIG submitted that such an update could be achieved as a weighted average of each updated historic and DGM estimate.[427]
- ATCO submitted that an updating approach would be more reflective of market conditions and would be consistent with the revenue and pricing principles by providing the contemporaneously observed opportunity cost of capital.[428] Additionally, ATCO stated that an updating approach would make estimation less vulnerable to financial market shocks, is more consistent with the practice of using an "on the day" risk free rate and could lead to potentially more stable returns on equity over time.[429]
- Energy Networks Australia supported an updating approach at each access arrangement determination, or at least annually. [430]

734. GGT noted that if the market risk premium was fixed for the term of the instrument, then there is less of a need for a mechanical approach for the estimation of the market risk premium.[431]

423 ENA, *Submission to AER Rate of Return Instrument*, September 2022.
424 GGT, *Submission to Draft Gas Instrument*, September 2022, p. iv.
425 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 19.
426 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 26-27.
427 AGIG, *Submission to Draft Gas Instrument*, September 2022, pp. 13-14.
428 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 22.
429 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 22.
430 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 14.
431 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 27.

10.3.3. 2022 final approach

735. The 2022 final gas instrument applies a market risk premium of 6.1 per cent.

736. The market risk premium will remain fixed for the term of the gas instrument.

10.3.4. Reasoning

737. The reasoning for the ERA's final approach for estimating the market risk premium is consistent with its draft reasoning, informed by the Independent Panel and public submissions, and detailed below.

10.3.4.1. Development since the 2018 gas instrument

Market developments

738. Since 2018, the risk free rate has reached historic low levels. However, relatively recently the risk free rate has quickly increased. This reversal is evidence of increasing volatility in an environment with uncertainty about future inflation.

739. With the use of a fixed market risk premium over the term of the 2018 gas instrument, the return on equity has tracked lower as interest rates have declined.

740. The increasing volatility of the risk free rate has meant that, with the fixed market risk premium, the return on equity under the 2018 gas instrument is also increasingly volatile.

Regulatory developments

741. With regard to the relationship between the market risk premium and the risk free rate, the Queensland Competition Authority made the following observations: [432]

- The market risk premium is unlikely to be perfectly stable over time, but it is also unlikely to be perfectly negatively correlated with the risk free rate over time.
- In Australia "there is little empirical evidence to support a direct and constant relationship between the risk free rate and the market risk premium."
- Analysis suggested that the "market risk premium for Australia is likely to be relatively more stable over time than the return on equity."

742. The AER commenced a review of the market risk premium as part of its 2022 rate of return instrument review.[433] The AER commissioned new consultant report and other papers regarding the market risk premium.

- A review of international rate of return approaches by the Brattle Group that examined eight regulators in six countries:
  - Brattle found that three of the eight regulators used historic excess returns, three used the Wright approach, the Federal Energy Regulatory

[432] QCA, *Draft Report: Rate of Return Review,* July 2021, pp. 51-52.

[433] AER, *Equity Omnibus Draft working paper,* July 2021.

Commission in the United States used DGMs and the New Zealand Commerce Commission used a combination of approaches.[434,435]

  - Some regulators use a mixture of approaches to set their market risk premium. Therefore, the assumed interrelationship between the market risk premium and the risk free rate depends on the weight applied to each method.
  - Brattle suggested that a sole reliance on the historic Ibbotson method was not as effective as the approaches of other regulators.[436]

- An AER working paper on CAPM and alternative return on equity models.[437]
- A Partington and Satchell expert report on return on equity models:[438]
  - Partington and Satchell's report discussed the Wright approach, which assumes a stable total market return and perfect negative correlation between the risk free rate and the market risk premium.[439]
  - Partington and Satchell stated that they found this implausible as this could result in negative market risk premiums.[440]
- A review of the relationship between the market risk premium and the risk free rate by CEPA:[441]
  - The CEPA report adds additional evidence to this consideration in the form of summaries of academic work, financial practice, regulatory use and some preliminary econometric analysis.
  - International regulators examined by CEPA do not rely on an estimate of the market risk premium that is wholly or even substantially based on the historic average of the realised market risk premium.[442]
  - CEPA suggested that there was preliminary evidence of a negative relationship between implied market risk premiums from dividend growth estimates and earnings yields with the risk free rate.[443]
  - CEPA stated:[444]

> Our assessment is that (i) there is acceptance that MRP is not stable and (ii) it is possible that there is an inverse relationship between the forward looking MRP and the RfR, and (iii) there is no good evidence that the MRP should be assumed to be independent of the RfR, the current implicit assumption of the AER's approach, and (iv) there is no conclusive theoretical basis for an assumption of independence or dependence.

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434 Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020, pp. 43-44.

435 The Wright approach is an alternative specification of the Sharpe-Lintner CAPM. In the Wright approach, the market risk premium is not an individual parameter, rather it is defined as the difference between the return on equity estimate and the prevailing risk free rate. The Wright approach assumes an inverse relationship between the market risk premium and the risk free rate.

436 Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020.

437 AER, *CAPM and alternative return on equity models,* December 2020.

438 Partington, G. and Satchell, S., *Report to the AER: Alternative Asset Pricing Models,* June 2020.

439 Partington, G. and Satchell, S., *Report to the AER: Alternative Asset Pricing Models,* June 2020, p. 23.

440 Partington, G. and Satchell, S., *Report to the AER: Alternative Asset Pricing Models,* June 2020, p. 23.

441 CEPA, *Relationship between RFR and MRP*, June 2021.

442 CEPA, *Relationship between RFR and MRP*, June 2021, p. 5.

443 CEPA, *Relationship between RFR and MRP*, June 2021, p. 6.

444 CEPA, *Relationship between RFR and MRP*, June 2021, pp. 6-7.

In judging evidence on MRP using historic data, the AER can choose whether to use:

- An assumption that the MRP is fixed (current approach)
- An assumption that the TRMR [total real market return] is stable ("Wright approach")
- An approach that has regard to both measures. This could be for example a weighted average of the two measures that assumes that the MRP is related to the RfR, but the relationship is not one to one.

- An AER working paper on rates of return in a low interest rate environment.[445] This paper sought comments on whether a low interest rate environment necessitated changes in the market risk premium.[446]

743. The Queensland Competition Authority reviewed its market risk premium approach following a review of its rate of return method in 2021. The Queensland Competition Authority's new approach can be summarised by the following: [447]

- Discontinuation of the Wright, Siegel and survey methods.
- Preference for the Ibbotson historic market risk premium method, with data post 1958.
- An adjustment to the overall cost of equity if economic conditions justify changes.

Concurrent evidence

744. In February 2022, the AER held its concurrent evidence sessions, which included the consideration of the market risk premium.[448] Experts had different views on the market risk premium.

745. Experts recognised that it was difficult to estimate the *ex-ante* market risk premium and regulatory judgement was needed. It is also not possible to analyse *ex-post* the accuracy of *ex-ante* estimates as the true value is unobservable.

746. The consensus view of the experts was that the market risk premium varies through time. However, even if the risk free rate also varies through time this does not necessarily mean that the market risk premium varies with the risk free rate.

747. Experts disagreed on the relationship between the market risk premium and the risk free rate. One expert submitted that it is difficult to estimate the direction of the relationship, let alone the magnitude of the relationship. In addition, this relationship may change over time. There were generally two views:

- *Negative relationship:* There is evidence of a negative relationship between the market risk premium and the risk free rate (through the use of the DGM to imply *ex-ante* returns, plus some *ex-post* evidence). In addition, there is no evidence of a constant market risk premium. Therefore, there may be just as much evidence (and potentially more) for a negative relationship than a constant relationship.

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445 AER, *Term of the rate of return & Rate of return and cashflows in a low interest rate environment: Final working paper*, September 2021.

446 AER, *Term of the rate of return & Rate of return and cashflows in a low interest rate environment: Final working paper*, September 2021, pp. 101-102.

447 QCA, *Final Report: Rate of return review*, November 2021, pp. 55-65.

448 AER, *Rate of Return Instrument Concurrent Evidence Session 3 of 4*, February 2022.

- *Unknown relationship:* There is no evidence of a relationship and there is no way to know direction and magnitude (particularly if it changes over time).

748. Generally, the experts considered that the best estimate of the market risk premium is likely to be yielded by using a wide range of estimators. Experts recognised that all methods are imperfect.

749. Estimators suggested by the experts were the historical excess returns model, DGMs, the Wright method and surveys. However, there were varying degrees of support for each method.

750. There was general agreement among experts that there was some benefit in considering a mix of additional evidence to the historic market risk premium and that this should be done in a non-mechanical way with the use of regulatory judgement.

751. Experts did not discuss methods for determining the weighting of the different models in depth.

752. There was no consensus view on whether the market risk premium should be fixed for the rate of return instrument or should vary at each access arrangement determination.

753. There were divergent expert views on how to estimate the historic market risk premium, including on the use of arithmetic and geometric means, and the period/s of consideration.

10.3.4.2. Historic market risk premium

754. The ERA estimates the historic market risk premium using current data and largely maintains the approach detailed in the 2018 gas rate of return instrument. The historic market risk premium can be directly measured. The Ibbotson approach is a well-accepted method for calculating the market risk premium using historic data.

755. As the ERA is using a 10-year term for equity, the risk free rate for the market risk premium will also be determined using a 10-year term.

756. The ERA estimates a historic market risk premium of 6.0 per cent.

757. The ERA's considerations on the estimation of the historic market risk premium are expanded in more detail below.

Sampling periods and method

758. The ERA will estimate the market risk premium using the Ibbotson method, which requires the selection of a time period to analyse historical data over.

759. The length of the estimation window involves a trade-off between relevance of the data and statistical robustness:

- Longer periods can include behaviour in the data that is no longer relevant due to changing economic and market conditions.
- However, shorter periods may produce estimates that are less statistically robust.

760. The 2018 gas instrument used five overlapping time periods:

- 1883 to current: the longest available time period.
- 1937 to current: includes data from the Sydney All Ordinary Shares price index that was retrospectively calculated.
- 1958 to current: includes data with the daily calculation of the Sydney All Ordinary Shares price index.
- 1980 to current: includes data from the Australian Securities Exchange (ASX) All Ordinaries index.
- 1988 to current: includes data after dividend imputation was introduced.

761. The ERA used five sampling periods to calculate the market risk premium to reflect different economic conditions. The dates of four of the selected sampling periods (1883, 1937, 1958 and 1980) reflected changes to the quality of the underlying data, while the other period reflected changes to the tax system (the introduction of the imputation tax system in 1988).[449]

762. The ERA has adjusted its sampling periods to better reflect forward expectations and simplify its process.

- The historical returns from over 100 years ago may not be relevant to future expected returns as significant market and economic changes have occurred during the period from 1883 to the present that introduce the likelihood of structural breaks that are only partially accounted for by the discrete time periods used.
- The AER and Pink Lake Analytics have raised concerns about data quality for returns pre-1932.[450,451]
- The dividend component of total returns estimated pre-1958 could have been overstated due to methodological issues from an equal weighting approach.[452]

763. The ERA's 2022 final gas instrument is to have regard to more recent time periods and use post-1958 data.

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449 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement,* December 2018, p. 177.

450 AER, *Rate of return instrument, Explanatory statement*, December 2018, pp. 240-244, 247-249.

451 Pink Lake Analytics, *Estimation of the Market Risk Premium*, December 2017, pp. 7-9.

452 AER, *Equity Omnibus, Draft working paper*, July 2021, p. 22.

764. For the estimation of the market risk premium for the 2022 final gas instrument the ERA will use the following four overlapping periods:

- 1958 to current
- 1980 to current
- 1988 to current
- 2000 to current.

765. The ERA will maintain the use of multiple sub-periods. The ERA considers that the periods chosen represent structural changes in the economy and financial markets that cannot be pooled together into a single period.

766. The ERA considers that the 2000 subperiod represents a discrete segment due to the introduction of the Goods and Services Tax. As an important macroeconomic reform, this would have likely led to changes in the real economy through productivity and redistribution of cashflows, along with potentially altering investor expectations.

767. The ERA notes that some stakeholders suggested replacing the 1988 sub-period with the new 2000 sub-period. The ERA will retain the 1988 sub-period and not replace it with the 2000 sub-period. The introduction of dividend imputation is a significant market change that likely introduces a structural break to be considered for the estimation of the market risk premium and should not be omitted.

768. The 2018 gas instrument used two datasets from BHM and NERA.

- BHM have produced the furthest backdated source of historical equity risk premium data for Australia. BHM's data series is, in part, based on a series constructed by Lamberton and the Sydney Stock Exchange (now the ASX).[453]
- In 2013, NERA raised concerns about the possibility of a downward bias in some of the older data observations in this dataset and produced an adjusted version of the BHM data.[454]

769. The NERA and BHM datasets prior to 1958 produce some different numbers. However, after 1936 the NERA and BHM datasets produce similar estimates.

770. The AER solely relies on the BHM dataset as it recognised that relatively few adjustments separated the two datasets and that the more recent periods converged.[455]

771. The ERA's approach for the 2022 final gas instrument is to simplify its method through the sole use of the BHM dataset to estimate the historic market risk premium:

- With the ERA's move to data post-1958, both the BHM and NERA data converges, which makes the NERA dataset redundant.
- Given that BHM is the original dataset, the ERA will solely use the BHM dataset for the purposes of estimating the market risk premium.

[453] Brailsford, T., Handley, J. and Maheswaran, K., *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance, Vol. 48, 2008, pp. 78-79.

[454] NERA, *The market size and value premiums*, June 2013.

[455] AER, *Rate of return instrument, Explanatory statement*, December 2018, pp. 248-249.

- In the interests of simplification and replication, the ERA will also align the dividend imputation methods of the historic market risk premium with that of the DGM.

772. The Independent Panel considered the use of sampling periods and method in their report. The Independent Panel noted that stakeholders supported removing pre-1958 data and considered that it was appropriate given the valid concerns regarding data quality prior to that date. Additionally, the Independent Panel also considered that the sole use of the BHM dataset was appropriate given the post-1958 focus and similarity of the data in recent years.[456]

773. Further, the Independent Panel also considered that the post-2000 subperiod was appropriate as it was plausible that the introduction of the GST and the end of the tech boom may represent a structural change in the Australian economy.[457]

Averaging method

774. When applying the historic market risk premium an averaging method must be selected to apply to historical returns. There are two averaging methods which can be used to derive an annualised return — the arithmetic and geometric average.[458]

775. The ERA has given further consideration to the use of the arithmetic and geometric means when calculating the historic market risk premium.

776. The 2018 gas instrument calculated the historic market premium through:

- Arithmetic and geometric averages of the historic market risk premium observations calculated using the BHM and NERA datasets.
- Five overlapping time periods (1883-2017, 1937-2017, 1958-2017, 1980-2017 and 1988-2017) used for averaging periods, to reflect different economic conditions.
- A simple average of the lowest arithmetic mean and highest geometric mean of the resultant historic market premium matrix was then used to estimate the historic market risk premium.

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456 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 39.

457 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 39.

458 The arithmetic mean is also called the simple average, which is the sum of all numbers in the series divided by the count of all numbers. The arithmetic mean formula is:

$$Arithmetic\ Mean = \frac{\sum_{i=1}^{n} x}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n}$$

The geometric mean is the average of a set of products. The geometric mean formula is:

$$Geometric\ Mean = \left(\prod_{i=1}^{n} x\right)^{\frac{1}{n}} = \sqrt[n]{x_1 \cdot x_2 \cdots x_n}$$

When geometric mean works with percentage returns, the formula is altered to reflect the compounding effect, as below:

$$Geometric\ Mean\ for\ \%\ return = \sqrt[n]{(1 + x_1\%) \cdot (1 + x_2\%) \cdots (1 + x_n\%)} - 1$$

777. The explanatory statement to the 2018 gas instrument detailed the ERA's consideration for the averaging method. An arithmetic average may overstate returns, whereas a geometric average may understate them. The ERA sought to minimise the error with over-reliance on one of the two types of averages by continuing the 50/50 weighting of the lowest arithmetic mean and highest geometric mean.[459]

778. There are mixed views as to the best averaging technique to apply to estimate the historic market risk premium.

779. The explanatory statement to the 2022 draft gas instrument detailed the available evidence on the methodology to estimate the historic market risk premium.[460]

780. An arithmetic average will tend to overstate returns, whereas a geometric average will tend to understate them. These biases are empirically significant. The biases result from the fact that cumulative performance is a non-linear function of average return, and that the sample average is necessarily a noisy estimate of the population mean. Bias is a function of both the imprecision of the estimate and of the forecast horizon:[461,462]

- When compounding the arithmetic average over time, it is the sampling error in the measurement of the arithmetic average return that causes the upward bias in the expected return.[463,464]
- The geometric average normally gives a downward biased measurement of expected returns.[465] The geometric mean can understate returns as it is based on an ideal consistent compounding, which does not account for sampling error and the actual variability of returns over time.

781. Indro and Lee extend Blume's analysis of the historic averages.[466] Indro and Lee:

- Confirmed Blume's finding that biases exist in the use of arithmetic and geometric averages.
- Compared the bias and efficiency (magnitude of the standard error) for the arithmetic average, geometric average, Blume's weighted average and the overlapped unbiased estimator.
- Found that biases tend to be exacerbated in the presence of autocorrelation in returns.

459 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 197-201.

460 ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, pp. 123-129.

461 An often-overlooked presumption of the textbook definition of mean is that the forecaster knows the true values of the parameters for the mean and variance. In practice, of course, these are estimated, and even using the best estimation techniques, the estimators are subject to sampling error. Symmetric errors in the estimate of the mean therefore have asymmetric effects on returns.

462 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003.

463 Blume, M., *Unbiased Estimators of Long-Run Expected Rates of Return*, Journal of the American Statistical Association, 69, 1974, pp. 634-638.

464 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003, p. 3.

465 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003, pp. 46-53.

466 Indro, D. and Lee, W., *Biases in arithmetic and geometric averages as estimates of long-run expected returns and risk premia*, Financial Management, vol 26, 1997, pp. 81–90.

- Found that bias arising from the use of the arithmetic average increases as the investment horizon lengthens and also as the volatility of returns increases.
- Found that bias arising from the geometric average increases as volatility of returns increases.

782. The academic literature concludes there is no unequivocal case for relying exclusively on either the arithmetic mean or the geometric mean to estimate a forward looking market risk premium.[467,468]

783. An unbiased estimate of the market risk premium is likely to be somewhere between the geometric average and the arithmetic average.[469,470]

784. Academics have proposed alternative methods to combine the geometric and arithmetic averages to give an approximately unbiased estimate of expected returns.[471]

785. Indro and Lee proposed an approach to adjust and minimise the bias of means. Indro and Lee use a formula, which includes factors for the length of the historic period and the length of the forecast period, to weight the arithmetic and geometric means.[472]

786. Partington and Satchell considered that it was clear that some weight should be attached to the geometric return.[473] Partington and Satchell's advice on the averaging method can be summarised as follows:

- The objective of the regulator is to determine the rate of return that investors expect in equilibrium, and investors do compound returns. Whether or not regulator compounds returns is not the relevant issue.[474]
- Since the unbiased estimate of the expected return for a long-term investment is bounded by the arithmetic and geometric averages, both are relevant to the determination of the market risk premium for a long horizon investment.[475]
- Some weight should be attached to the geometric return and that weight should be greater the more the concern for accuracy relative to unbiasedness.[476]

467 Damodoran, A., *Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2016 edition*, March 2016, p. 33.

468 Jacquier, E., Kane, A. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, vol 59, 2003, pp. 46-53.

469 McKenzie, M. and Partington, G., *Supplementary report on the equity MRP*, February 2012, p. 5.

470 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003, p. 4.

471 Blume, M., *Unbiased Estimators of Long-Run Expected Rates of Return*, Journal of the American Statistical Association, vol. 69, 1974, pp. 634-638.

472 Indro, D. and Lee, W, *Biases in Arithmetic and Geometric Averages as Estimates of Long-Run Expected Returns and Risk Premia*, Financial Management, vol. 26, 1997, pp. 81-90.

473 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, pp. 29-34.

474 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 30.

475 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 30.

476 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 34.

- When the investment horizon is substantially less than the number of observations of one period returns, the weighting scheme should give substantially more weight to the arithmetic mean. As the sample period shortens, or if there is more concern for accuracy over unbiasedness, then the weight on the geometric average increases.[477]
- Partington did not propose a weight and considered a regulator inevitably needs to exercise judgement in making this determination.[478]

787. The experts in the concurrent evidence session expressed divergent expert views on the use of arithmetic and geometric means.

788. The Independent Panel considered that the ERA's proposed changes to averaging approach were reasonable.[479] The Panel supported the ERA's position on providing more weight to the arithmetic average due to the mathematical principles underlying the two methods and the purposes of the gas instrument to estimate the probability weighted average future return. Further, the Panel considered that averaging across all subperiods made better use of the available information compared with the minimum-maximum approach adopted in the 2018 gas instrument.

789. Whilst the Independent Panel considered that the ERA's 2022 draft gas instrument approach was reasonable, it highlighted the risk of changes to the estimated market risk premium due to the assumptions on averaging and the weighting of averages.

790. Gas network service providers continued to disagree with the use of geometric means in the calculation of the historic market risk premium. Gas network service providers submitted that only arithmetic means should be used. However, they conceded that if geometric means were to be used then a statistical weighting method should be adopted.

791. AGIG commissioned advice from CEG regarding the historic market risk premium. CEG: [480]

- Provided additional reasoning for a geometric mean formula that takes the difference between the geometric mean of the market return from the geometric mean of the risk free rate.
- Provided additional reasoning on why the arithmetic mean should be accorded 100 per cent weight.
- Submitted that if geometric means are to be used then it should be statistically weighted using an investment horizon of no more than 10 years.

792. The ERA has further considered the basis for providing weights to the arithmetic and geometric means and has commissioned advice from Pink Lake Analytics for the following:

- Comment on the form of the geometric mean proposed by CEG for AGIG.

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477 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 31.

478 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 34.

479 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 40.

480 CEG, *Estimating MRP for the ERA 2022 RoRI*, August 2022.

- Comment on the statistical properties of the historic market risk premium, with reference to a report by Dr Lally for the AER.[481]
- How arithmetic and geometric means could be used by the ERA as an estimator for the historic market risk premium to achieve its task of setting revenues.
- Consideration of the relevant factors in a weighting/combination scheme for the two means, such as the statistical properties of the market risk premium time series, estimation error and any other relevant matter.
- Consideration of whether Indro and Lee (1997), Jacquier, Kane and Marcus (2003, 2005) and Kaserer (2022)[482] are relevant for the task of setting annual revenues through a rate of return.

793. Pink Lake Analytics reviewed the arguments provided by CEG in support of its geometric mean formulation which relied on the work by Dimson, Marsh and Staunton and Indro and Lee (1997). Pink Lake concluded that:[483]

- The difference between the ERA and CEG's proposed geometric mean formula is largely statistical.
- The ERA is seeking an unbiased estimator of the market risk premium to be applied to a long-term investment.
- CEG's geometric mean does not consider bias or variance as they appeal to practice for support and do not provide a proof via statistical methods.
- There is little statistical support for the Dimson, Marsh and Staunton geometric mean formulation being superior to the ERA's formulation.
- New academic work by Kaserer (2022) applied a method of estimating the geometric mean that is consistent with the one used by the ERA.

794. Pink Lake Analytics considered the statistical properties of the historic market risk premium and made the following conclusions:[484]

- Many tests of stationarity are possible, with Dr Lally examining three related concepts with their corresponding statistical tests.
- Statistical tests vary in terms of their power and the likelihood of making a type II error of falsely identifying no differences when actual differences exist.
- Alternative tests, in addition to the ones conducted by Dr Lally, were suggested before one could conclude that there are no differences between time periods.
- Considered that if additional statistical testing provided evidence of mean stationarity, then there is no need to include earlier historical data as the last 30 years of data would be sufficient as the last 140 years for a reliable estimate of the mean excess return. However, the efficiency of the estimator is a separate consideration.

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481 Lally, M, *Tests Of Mean Stationarity For Australian Share Market Returns Data*, June 2022.

482 Kaserer, C. *Estimating the market risk premium for valuations: arithmetic or geometric mean or something in between?* Journal of Business Economics 92, no. 8 (2022): 1373-1415.

483 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, pp. 6-8.

484 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, pp. 13-15.

795. Pink Lake Analytics considered the importance of serial correlation and made the following conclusions: [485]

- There is a strong academic basis for the proposition that negative serial autocorrelation leads to the arithmetic average overstating the unconditional expected long-term return.
- Serial correlation may be irrelevant for single period returns, but cannot be ignored if looking beyond a horizon of one period. By definition, a single period cannot be affected by serial correlation.

796. Upon examining both the arithmetic and geometric mean for the purposes of calculating an estimator for the market risk premium, Pink Lake Analytics made the following conclusions: [486]

- The statistical literature supports the use of an estimator that provides weight to arithmetic and geometric means that relates to the forecast horizon and estimation window.
- The example provided by CEG to support sole use of the arithmetic mean requires strong and unstated assumptions. Importantly, this does not account for the uncertainty in the estimation of the underlying returns and the horizon over which a forecast is made.
- By assuming a known probability structure for their example, this is equivalent to having an infinite training set which would cause a model with statistical weighting to converge to full weight upon the arithmetic mean.

797. Pink Lake Analytics conducted simulation studies. [487]

- Pink Lake Analytics found that conclusions regarding a weighting scheme depend on which definition of mean square error (MSE) is preferred, where a cumulative return MSE uses less of the geometric mean than the annualised return MSE.
- Simulation evidence resulted in the following findings:
  - A one period forecast would favour heavier usage of the arithmetic mean, regardless of the estimation span.
  - As the forecast horizon increases, more weight is given to the geometric mean to reduce MSE.
  - A geometric mean is provided weight even in the case of returns that are independent and identically distributed as sampling error is still present.

798. For the historic market risk premium estimate the ERA will utilise both arithmetic and geometric means as a combination and will not exclusively use one or the other. Given the nature of the regulatory task the ERA will adopt methods which provide greater weight to the arithmetic mean, but considers that geometric means are still necessary.

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485 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, pp. 8-13.

486 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, pp. 9-11.

487 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, pp. 16-26.

799. The ERA characterises the two averaging methods in the following manner:

- Arithmetic means: utilises a series of realised returns to form a probability distribution that can be used to estimate the mean of a future return.
- Geometric means: estimates a smoothed, compounded, periodic growth rate relevant for understanding historic performance across longer horizons.

800. The ERA's regulatory task is to estimate an expected return on equity to determine revenue requirements under an access arrangement determination. This task is best met by utilising methods that align with this requirement. The arithmetic mean is the method that appears best suited to achieving this task.

801. The arithmetic mean achieves this as it utilises the mean of the historic probability distribution as the estimate of the future return for the next period. The geometric mean does not have a similar correspondence as there is no probability weighting and only effectively considers two values in its calculation.[488]

- The Independent Panel noted that the ERA's preference for the arithmetic mean was reasonable given the mathematical underpinnings of the method and the nature of the regulatory task.

802. However, full reliance cannot be placed on the arithmetic mean in the presence of serial correlation and sampling error which would bias the arithmetic estimate. The ERA maintains that there is likely some bias present in the arithmetic average. Pink Lake Analytics has also concluded that even when returns are independent and identically distributed and serial correlation is not present, a forecast window greater than one period would place some weight on the geometric mean.

803. Serial correlation has been identified by expert and academic evidence through stakeholder consultation as a potential source of bias. The evidence presented on serial correlation (and related matters) has resulted in inconclusive findings.

- The CEG memorandum for AGIG analysed serial correlation, where the ERA noted that there is some evidence of autocorrelation for the market risk premium that appears driven by the risk free rate as presented by CEG.
- Dr Lally evaluated whether Australian market risk premiums were stationary for the AER, conducting several statistical tests and concluded that there was no evidence to reject the null hypothesis that returns are not mean stationary.[489]
- Pink Lake Analytics has reviewed Dr Lally's report on stationarity and concluded that it was difficult to devise an appropriately powered statistical test given the nature of the data. Simulation evidence found that serial and autocorrelation were relevant when trying to determine an unbiased and efficient market risk premium.

804. The ERA understands that statistical tests of autocorrelation, stationarity or ergodicity may lack power, especially when tested at the annual frequency. Hence weak findings are not unexpected given the available data, but the economic significance of serial correlation remains a concern.

- 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.

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[488] The geometric mean formula can be expressed as: $\sqrt[n]{(P_n/P_0)} - 1$

[489] Lally, M, *Tests Of Mean Stationarity For Australian Share Market Returns Data*, June 2022.

- This issue is also a matter of debate in financial economics, most recently in the literature regarding time series momentum.[490]
- Academic literature has found some evidence of negative serial correlation in financial markets.
- Brearley et al (2022) consider that when future returns are forecasted to distant horizons, the historical arithmetic means are upward biased.[491]

805. As the ERA considers that it is likely that the arithmetic mean is biased in some fashion, this bias can be addressed through the use of a combined approach that involves the geometric mean.

806. Additionally, the ERA has considered the evidence from Pink Lake Analytics that supports consideration of the geometric mean for both situations where serial correlation is and is not present. Accordingly, usage of the geometric mean is independent of considerations of serial correlation for forecast periods greater than one.

- Pink Lake detailed how serial correlation affects the expected return over multiple periods through a two-period example.[492]
- Pink Lake provided evidence that even when serial correlation is not present, sampling error due to the measurement of returns from historic data of a finite span would result in weight being provided to the geometric mean.[493]
- While CEG stated that serial correlation is irrelevant to the unconditional estimate of the market risk premium, the ERA considers the evidence provided by Pink Lake Analytics concludes otherwise.[494]

807. Various weighting schemes have been discussed and evaluated by the ERA. A consistent finding is that whilst both types of means have a role to play, the weight to be placed on the arithmetic mean is generally larger than the geometric mean.

808. Accordingly, the ERA maintains that the geometric mean will continue to play a role in the estimation of the historic market risk premium, but with a tilt towards the arithmetic mean.

809. The ERA recognises compounding to be an additional reason to place some weight on geometric means. This is especially the case in setting efficient returns with the 10-year term for equity. If the appropriate perspective for the purposes of the Sharpe-Lintner CAPM is of a long-term investor, then the compounding of returns is a reasonable investor expectation and will be incorporated into the market risk premium estimate through using geometric averages.

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490 Huang, D, Li, J, Wang, L and Zhou, G, 2020, *Time series momentum: Is it there?, Journal of Financial Economics*, 2020, 135(3),pp. 774-794.

491 Brearley, R, Myers, S, Allen, F and Edmans, A, *Principles of Corporate Finance,* 14th edition, McGraw Hill, May 2022, p. 188.

492 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, pp. 10-11.

493 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, p. 22.

494 Pink Lake Analytics, *Evaluating the Market Risk Premium – Statistical properties of the historic market risk premium*, November 2022, pp. 9-10.

810. The above reasoning is separate to whether compounding occurs as a result of the regulatory process. However, as noted by Partington and Satchell the relevant consideration is whether investors expect market returns to be compounded.[495] The ERA considers that the market risk premium is a market wide parameter that should not be tied into the regulatory process. The competitive market rate approach used by the ERA in determining the term for equity is based on investor expectations. The ERA considers that investors are aware of and have an expectation of compounding when making equity investments.

811. CEG's report for AGIG provided an alternative geometric mean formula that it submitted should be considered instead of the ERA's current formula.

812. The ERA has considered this matter and will maintain its current method of calculating the geometric mean based on the following:

- There are no material differences between the two geometric mean formulations.
- There are no canonical references which clearly explain the statistical basis for the difference in formulation, accordingly it is not clear that there is an unambiguously correct choice.
- For the purposes of setting revenues, the ERA considers that its current method has benefits by using the excess return directly compared with CEG's difference approach.

813. CEG also presented an example where an investment has a complete capital loss as a payoff and considered that this illustrated why the geometric mean should not be used even for an infinite investment holding period. The ERA considers that the example provided is an edge case and does not adequately characterise long term investment to be useful.

- As Pink Lake Analytics notes, this is a singular example that would potentially result in small sequential investments, but not one where reinvestment occurs.
- The ERA is doubtful that the payoffs and probabilities presented in CEG's example are a plausible equilibrium outcome that would satisfy a participation constraint for a risk averse, long-term investor who has constant exposure to the market portfolio.

814. The ERA has considered the available evidence on the use of the arithmetic and geometric means when estimating the market risk premium, including:

- expert views
- concurrent evidence
- stakeholder submissions
- academic papers.

815. For the 2022 final gas instrument the ERA continues to consider that an unbiased estimate of the historic market risk premium is likely to be somewhere between the arithmetic average and the geometric average. The ERA continues to support the use of both the arithmetic and geometric means.

[495] Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 30.

816. The ERA has considered the evaluation of statistical weighting approaches undertaken by Pink Lake Analytics. It considers that the optimal weights from the evaluated schemes are highly sensitive to assumptions regarding the data generation process of returns, the forecast window and which objective function is preferred for determining forecast error for the purposes of economic regulation. These sensitivities make it difficult to find a robust way to estimate which weights should be provided to the arithmetic and geometric means through statistical methods. As such, at this stage the ERA will not strictly use the statistical approach, but will set the historic market risk premium estimate informed by the theoretical and analytical conclusions from the Pink Lake Analytics report.

817. For the 2022 final gas instrument the ERA considers that the weight of evidence lies in favour of providing greater weight to the arithmetic mean. This approach recognises that:

- To the extent that arithmetic or geometric means are biased, a combined approach is more likely to result in a robust estimate.
- An unbiased estimate of the historic market risk premium is likely to be somewhere between the geometric average and the arithmetic average.
- Given the volatility of returns over time, an investor may consider different investment horizons.
- Investor practice may favour and place more weight on the arithmetic mean.

818. After considering the above information the ERA considers that an unbiased estimate of the historic market risk premium is likely to be closer to the arithmetic average than the geometric average. The ERA will calculate the historic market risk premium estimate as the weighted average of the arithmetic mean (60 per cent) and geometric mean (40 per cent).

819. For the 2022 final gas instrument the ERA's historic market risk premium estimation no longer relies on two points (lowest arithmetic mean and highest geometric mean). The ERA instead now incorporates all the data periods to calculate an arithmetic mean and a geometric mean. The ERA then applies a weighting to the resulting arithmetic and geometric means.

820. The ERA considers that the above approach has the following advantages:

- Greater use of all the sample periods, whereas the previous minimum/maximum method takes into account only two periods.
- Does not result in a potential mismatch between the time periods that are chosen with the minimum/maximum approach for the arithmetic and geometric means.
- Through the incorporation of overlapping periods, places more weight on more recent data.
- Places relatively more weight to arithmetic returns than geometric returns as a closer description of how revenues are set and accords with the evidence on investor practices.

Historic market risk premium estimate

821. Table 11 details the ERA's estimates of the historic market risk premium.

Table 11: Final historic market risk premium (with a 10 year risk free rate) (%)

Time period	Arithmetic mean	Geometric mean
1958-2021	6.77	4.56
1980-2021	6.84	4.77
1988-2021	6.55	5.11
2000-2021	6.84	5.30
Mean	**6.75**	**4.93**
Weights	**60**	**40**
Historic market risk premium estimate	**6.0**	

Source: ERA Analysis

822. Based on the ERA's final approach for the 2022 gas instrument, the ERA takes the weighted average of the arithmetic mean and the geometric mean to develop an estimate of the historic market risk premium of 6.0 per cent.

10.3.4.3. Dividend growth model

823. The ERA has given further consideration to the DGM.

824. The DGM uses an assumed forecast dividend growth rate and current share prices to estimate an implied market risk premium. This forward-looking discount rate is the implied market return on equity.

825. The DGM is based on the following formula to calculate a stock or market index price (P), as presented below.

$$Market\ price = \frac{Current\ value\ of\ the\ dividend \times (1 + dividend\ growth\ rate)}{Compound\ rate\ of\ return - Assumed\ dividend\ growth\ rate}$$

Equation 14

826. Through rearranging the above formula an implied market rate of return (r) can be calculated from current price (p), current dividend (D_0) and an assumed dividend growth rate (g). The market risk premium can then be calculated by using that market rate of return and taking away the risk free rate.

2018 approach

827. The 2018 gas instrument used the DGM to help estimate the market risk premium. While the ERA acknowledged the significant issues with the DGM, it is a forward-looking model that may provide information about investor expectations of the market risk premium.

828. The ERA used a two-stage DGM. The two-stage model assumes that dividends grow at the long-term growth rate following the dividend forecast period. The ERA's dividend growth model estimate used a growth rate from Dr Lally of 4.6 per cent.[496]

829. While the DGM has the benefit of taking the current economic outlook into account, it is unreliable on its own. The DGM suffers from some weaknesses including the form of the model, its input assumptions, its sensitivity to assumptions and its upward bias. The ERA held concern with the use of the DGM and did not place a large reliance on the model's market risk premium estimate.

Calibrated dividend growth model

830. In response to the ERA's discussion paper some stakeholders submitted that the ERA should adopt the ENA's calibrated DGM by Frontier Economics as the preferred DGM model. These stakeholders submitted that the calibrated DGM's approach addressed the ERA's past concerns with the DGM, and therefore provides more confidence and a greater weight can be given to the DGM when estimating the market risk premium.

831. The calibration referred to making monthly DGM estimates, which are then rescaled to fit a specified number over the entire sample period.[497] The method adjusts estimated long-term growth rates to fit a target mean market risk premium.

832. The ERA analysed the calibrated DGM and its adoption.

833. The calibrated DGM attempts to address concerns with the DGM usage by abstracting away the need to choose a long term growth rate and at the same time, on average, provides an estimate equal to the level of the historic market risk premium:

- The calibration process solves for the growth rate that sets implied market risk premiums equal to the historic market risk premium.
- This calibration is an attempt to adjust for biased analyst forecasts by ensuring that the calibrated estimates are on average equal to the historical average.
- In doing so it relies on the law of iterated expectations to provide a statistical basis for the calibration exercise and connects both conditional and unconditional estimates of the market risk premium together. The law of iterated expectations states that the unconditional estimate of the market risk premium is equal to the average of conditional market risk premium estimates.
- Frontier Economics considers that this ensures that any bias from analyst forecasts is removed as the average of the implied market risk premium is equal to the historic market risk premium by construction. The calibration process also removes the need to use an independent growth assumption as this is solved by the model to produce the calibrated estimates.

834. The ERA evaluated the calibrated DGM in the explanatory statement to the 2022 draft gas instrument.[498]

835. The ERA re-estimated the calibrated DGM model according to ERA parameters. The results are presented in Figure 4.

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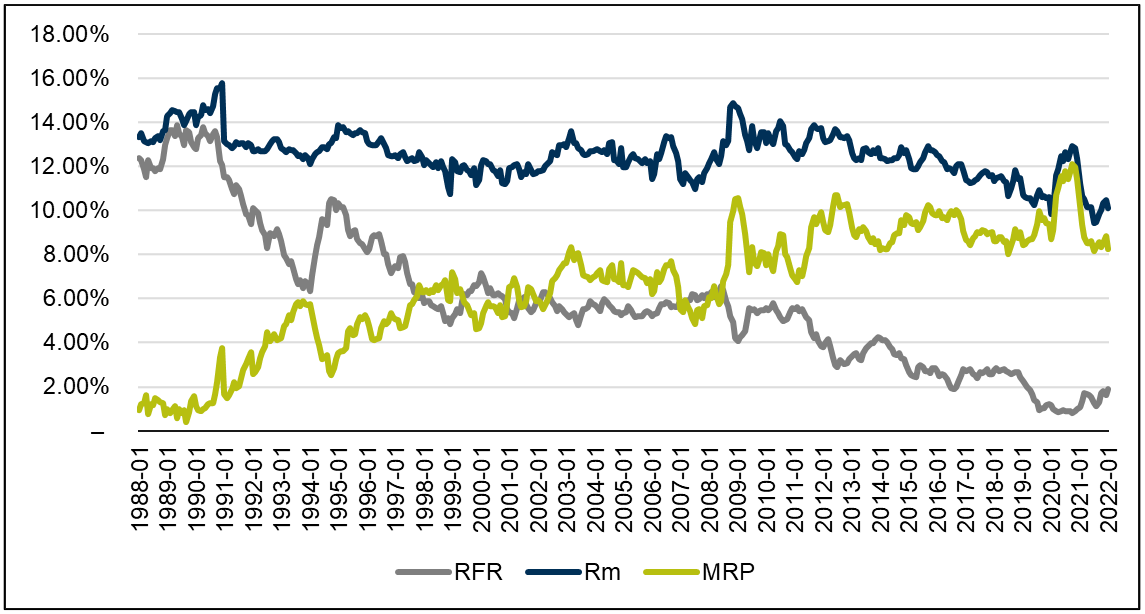
496 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 30.

497 Frontier Economics, *Implementation of a calibrated DGM*, available online.

498 ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, pp. 130-134.

Figure 4: Calibrated DGM under ERA parameters



Source: Frontier Economics model, ERA analysis.

836. Figure 4 shows that the calibrated DGM produces:

- A strong inverse relationship between the market risk premium and the risk free rate (though still partial).
- Relatively stable total implied market returns which only slowly reduce over time with large reductions in the risk free rate.
- Extreme variability of the implied market risk premium (starting very low below two per cent and going to above 12 per cent).

Interpretation and theory

837. The implied cost of capital method requires that discounted cashflows are used to infer the market return. The calibrated DGM, along with all DGMs, use dividends instead and do not directly account for cash items such as share buybacks and issuances. The ERA's existing DGM implementation recognises this issue and attempts to adjust for non-dividend cash effects through the long term growth rate supported by Dr Lally. The calibrated growth rate does not appear to consider these adjustments.

838. While a calibrated long term growth number that comes from the data removes the need for making a growth assumption, this is set to a constant value for all periods in the estimation sample. The theory of the DGM requires that the growth rate is a market forecast at all points in time, which is unlikely to be constant in all periods from 1988 to 2021. The fact that a calibrated figure can be derived from the data does not necessarily recover actual investor expectations as they were when setting prices.

839. While the law of iterated expectations has a plausible theoretical basis, it requires a long series of dividend forecasts which is simply not available for Australia. Frontier Economics attempts to address this information deficit by creating model estimates of dividend forecasts where they are not available for 1988 to 1995. This introduces another dimension of complexity that is examined below.

840. Additionally, in order for the calibration to work it must be adopted for the very long run in the regulatory process. This long-term adoption is necessary for the "overs and unders" of the calibrated market risk premium to balance out over the life of the regulated asset. For example, periods where the calibrated market risk premium is above the historical target will need to revert to below the target in the future in order for calibration to achieve its goal.

841. A significant issue is that the calibration is being adopted without a transition mechanism. If the calibrated DGM was adopted in 1988, then it would achieve the calibrated target if it was continually used from that point. However, the adoption now without having the associated "unders" would appear to unduly benefit network service providers who never received the below target calibrated market risk premiums necessary in the first half of the calibrated period in order to offset the above target market risk premiums in the current half of the calibrated period.

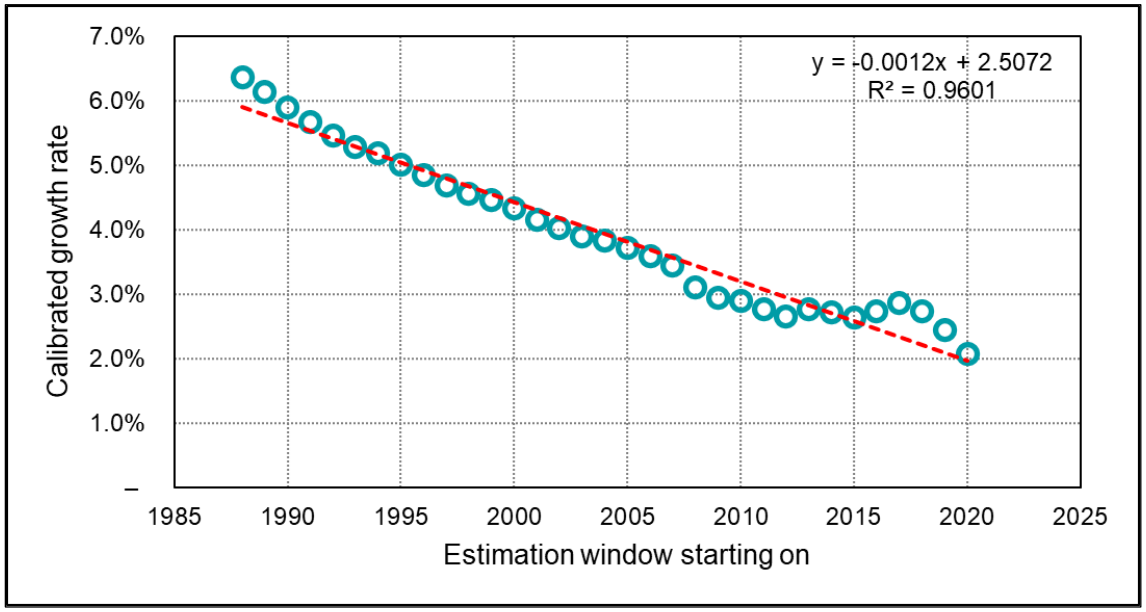
842. ERA analysis of the range of calibrated long term growth values reveals that the estimates can exceed plausible bounds. For example, the full sample calibrated long term growth rate is 6.4 per cent using ERA market parameters. This is significantly larger than most nominal GDP growth estimates, and as a perpetual growth rate would imply that the stock market will exceed the size of the entire economy dramatically. As this is a permanent, perpetual growth rate, it should be bounded between zero and some real GDP growth rate.

843. The implied market risk premium estimates provided by the calibrated DGM also do not seem plausible as it produces extreme ranges. For example, the lowest market risk premium estimate is 0.41 per cent (September 1989) and highest is 12.1 per cent (October 2020).

Robustness

844. The calibrated growth rates are very sensitive to the calibration window chosen, illustrated in Figure 5. The ERA calculated each calibrated growth rate by starting with the longest window and decreasing the calibration window by one year, with all periods ending in 2021. The resulting calibrated growth rates are very unstable, ranging from 6.4 per cent from the full 1988-2021 period to 2.1 per cent for the 2020-2021 period. There also appears to be a relationship between the calibrated growth rate and the size of the estimation window, where larger windows result in higher growth estimates.

Figure 5: Implied growth rates by estimation window ending 2021



Source: Frontier Economics model, ERA analysis.

Transparency and replicability

845. The data requirements for this method are higher than other DGMs. It requires archival financial data that is not available via Bloomberg or freely online.[499] Dividend forecasts are just not available pre-1995 from Bloomberg or Refinitiv, so to calibrate beyond this point another proxy for dividend forecasts is needed that raises additional complexity.

846. Given that Frontier Economics believes that the 1988 to 2021 period is the appropriate calibration window, they are required to create dividend forecasts for the market index when none were actually available.

847. The ERA is concerned that the calibrated growth rate estimates may be largely increased by the earlier sample period that relies on modelled dividends.

Calibrated DGM conclusions

848. The ERA's analysis of the calibrated DGM found:

- Sensitivity of the market risk premium estimates to the time period that the forecast is made.
- Large variability of the market risk premium estimate.
- Doubts that unbiasedness can be achieved without some transition process as it will be adopting the calibrated DGM late in the calibration cycle. The calibrated DGM is currently producing very high implied market risk premiums.
- Concern about the artificial static growth rate produced by the model and how actual changes in growth rates over the period may lead to distortions to the implied market risk premium.
- Concerns of whether calibration to a historical target reduces the usefulness of the calibrated DGM as a forward looking model.

[499] SPPR from UNSW is used, along with Refinitiv.

849. These concerns reduced the confidence that the ERA had in the use of the calibrated DGM for the draft gas instrument.

850. The Energy Networks Australia disagreed with the ERA's critique of the calibrated DGM in its submission to the 2022 draft gas instrument.[500] Gas network service providers largely endorsed the Energy Networks Australia's submission regarding the calibrated DGM.[501, 502,503]

851. The ENA made the following responses regarding the ERA's critique:

- ERA's concern with the variation in the long-term growth rate:[504]
  - Agreed that it was reasonable to assume a constant long-run perpetual growth rate, noting that the Commonwealth Treasury adopts similar practices for the Intergenerational Report.
  - Stated that the calibrated DGM adopts a constant long-run growth rate to achieve its desired calibration.
- ERA's concern with the relevance of historical allowed returns and the lack of a transition mechanism given late adoption of the calibrated DGM:[505]
  - Submitted that the ERA's reasoning implied that a DGM could only ever be implemented when the estimate was equal to the long-run average, which is when it would not make a material difference to the estimate.
  - Stated that regardless of the starting point the calibrated DGM will always produce the appropriate market risk premium by construction.
  - Proposed that since the ERA has given weight to DGM evidence that the calibrated DGM is not the introduction of a new approach, but the removal of bias from an existing approach.
- ERA's concern with the volatility of market risk premium estimates:[506]
  - Stated that the DGMs employed by other regulators such as the AER are also subject to volatility.
  - Stated that it is volatility in the allowed return to equity that matters, not the market risk premium. ENA submitted that DGM estimates are more stable than historical estimates as the implied market risk premium acts in a way to absorb the volatility in risk-free rates.
- ERA's concern with the sensitivity to the historical period:[507]
  - Stated that the DGM must be calibrated to the period that the regulator chooses, noting that the AER considers data post 1988.
  - Stated that the implied growth rates presented by the ERA in the explanatory statement to the 2022 draft gas instrument are not relevant as one would not calibrate to shorter periods.

[500] ENA, *Submission to Draft Gas Instrument*, September 2022, p. 16.
[501] AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 12.
[502] ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 20-21.
[503] GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 25-26.
[504] ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 17-18.
[505] ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 18-19.
[506] ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 19-20.
[507] ENA, *Submission to Draft Gas Instrument*, September 2022, p. 20.

- ERA's concern with the transparency and replicability:[508]
  - Stated that dividend expectations from 1988 to 2005 were made available to the ERA and AER.

852. The ERA has considered the ENA's responses and maintains the following:

- On the variation in the long-term growth rate: The ERA notes that varying the calibration window generates different growth assumption results from the model. When these estimates are examined, they do not seem plausible.
- On the transition mechanism: The ERA considers that the adoption of the calibrated DGM late in the regulatory cycle does at least require the consideration of a transition mechanism. This is especially the case when current calibrated DGM estimates are above the historic estimates. Given the general shape of the calibrated DGM estimates it is unclear if prospective estimates will ever be below their historic estimates. This raises the possibility that the early calibration period has acted to absorb the lower estimates which were never provided to gas network service providers, but will now only ever provide higher estimates moving forward.
- On the volatility of market risk premium estimates: As the ERA's DGM specification may be volatile, it is accorded a low weight in recognition of the issues involved in making implied estimates of the market return. The ERA also considers that its current DGM specification has the advantage of being reproducible and transparent.
- Sensitivity to the historical period: The ERA has chosen to consider historical market risk premium data from 1958 onwards. The ERA is not confident that it can calibrate estimates from 1958 given that analyst forecasts are not available that span this period.
- Transparency and replicability: Similar to the above point, the archival data for dividend expectations are both not freely available, but are also constructed via an econometric method that the ERA does not consider to be fully tested. As the ERA considers historic data from 1958 it is not clear that dividend forecasts for 1958-1988 could ever be constructed to the degree necessary for economic regulation.

853. These concerns reduce the confidence that the ERA has in the use of the calibrated DGM. The ERA appreciates Frontier Economics' proposal for an alternative DGM specification and its novel approach in a difficult area of finance. However, the ERA considers that significant implementation issues remain.

854. For the purposes of the 2022 final gas instrument the ERA will not use the calibrated DGM.

Dividend growth model estimate

855. The ERA's 2022 final gas instrument maintains the use of the DGM to contribute to the estimate of the market risk premium.

856. The ERA continues to support a simple two-stage approach to the estimation of the implied market risk premium from the DGM. The ERA's DGM estimate will retain a growth rate from Dr Lally of 4.6 per cent.

[508] ENA, *Submission to Draft Gas Instrument*, September 2022, p. 20.

857. Previous analysis by the ERA has revealed that DGM estimates can vary substantially month to month.

858. Accordingly, for the 2022 final gas instrument, to reduce sensitivity the ERA improves its estimation approach by estimating the DGM monthly in the six months prior to the setting of the instrument. The six DGM estimates are provided in Table 12. The average of these estimates will be the DGM point estimate.

Table 12: Dividend growth model estimates

	Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sep 2022	Mean
DGM implied return	9.26	9.44	10.35	10.54	9.95	10.45	10.00
Risk Free Rate	3.01	3.38	3.77	3.42	3.37	3.74	3.45
DGM market risk premium	6.25	6.06	6.58	7.12	6.58	6.71	6.55
DGM estimate							**6.6**

Source: ERA analysis.

859. The ERA estimates a market risk premium of 6.6 per cent from the dividend growth model.

860. While the DGM has the benefit of taking the current economic outlook into account, it is unreliable on its own. The DGM suffers from some weaknesses including the form of the model, its input assumptions, its sensitivity to assumptions and its upward bias. The ERA holds concerns with the use of the DGM and does not place a large reliance on the model's market risk premium estimate relative to historical estimates.

861. The Independent Panel noted that whilst the use of the DGM was reasonable, it carried a high risk of error and upward bias.[509] The Independent Panel recommended that the ERA consider this matter further for the next review of the gas instrument.

862. The ERA has previously noted the same concerns expressed by the Independent Panel regarding the use of the DGM. It has analysed submissions that seek to address the past identified problems through alternative models such as the calibrated DGM.

863. For the reasons discussed previously the ERA has not adopted the calibrated DGM.

864. For the purposes of the final decision, the ERA's implementation of the DGM is sufficient to provide a conditional estimate of the market risk premium. However, it still has concerns over the issues noted by the Independent Panel such that it cannot put equal weight on the DGM estimate as the historic market risk premium estimate. It is likely that ongoing investigation and refinement of the DGM methodology is required before a comparable weight could be provided to the DGM.

[509] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 41.

10.3.4.4. Conditioning variables

865. For the 2022 final gas instrument the ERA continues to consider conditioning variables when estimating the market risk premium.

866. Conditioning variables are readily available market data which allow the ERA to take into account current market conditions. The ERA considers conditioning variables as part of its determination of a point estimate for the market risk premium.

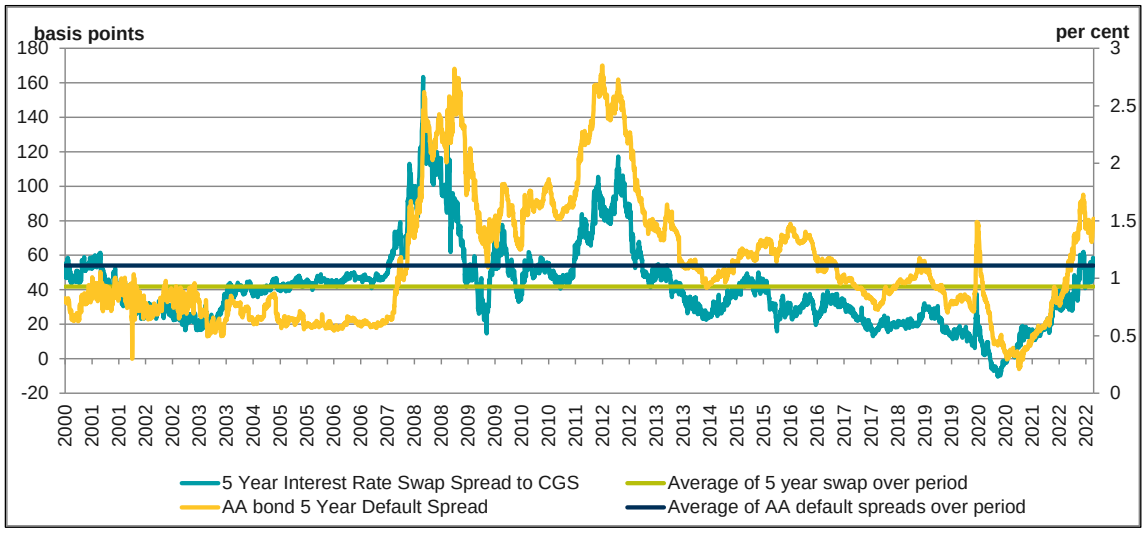
867. The ERA considers conditioning variables including:

- The AA bond five-year default spread, which provides the spread between AA Australian Corporate Bloomberg Fair Value Curve and a Commonwealth Government bond.
- The five-year interest rate swap spread, which provides the spread between the interest rate swap rate and a Commonwealth Government bond.
- Market dividend yields, which provide the All Ordinaries dividend yield as a ratio of dividends to the portfolio price.
- Implied market volatility, which is measured through the ASX 200 volatility index.

868. The ERA considers the current levels of conditioning variables relative to their historic averages and how these market conditions affect the market risk premium.

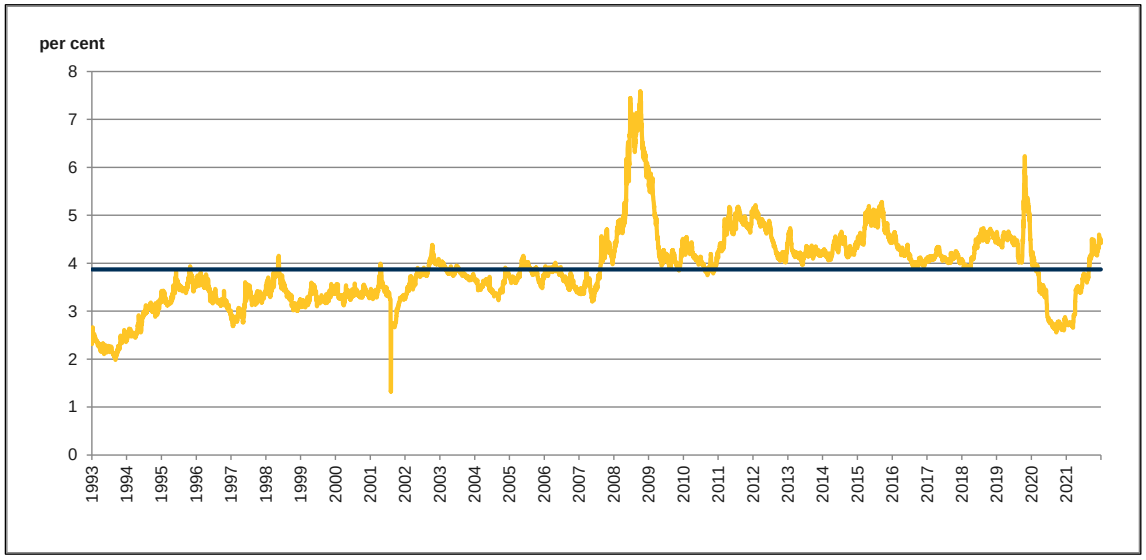
869. Each of these conditioning variables is presented in the following charts.

Figure 6: Five-year AA bond default spread and Five-year interest rate swap



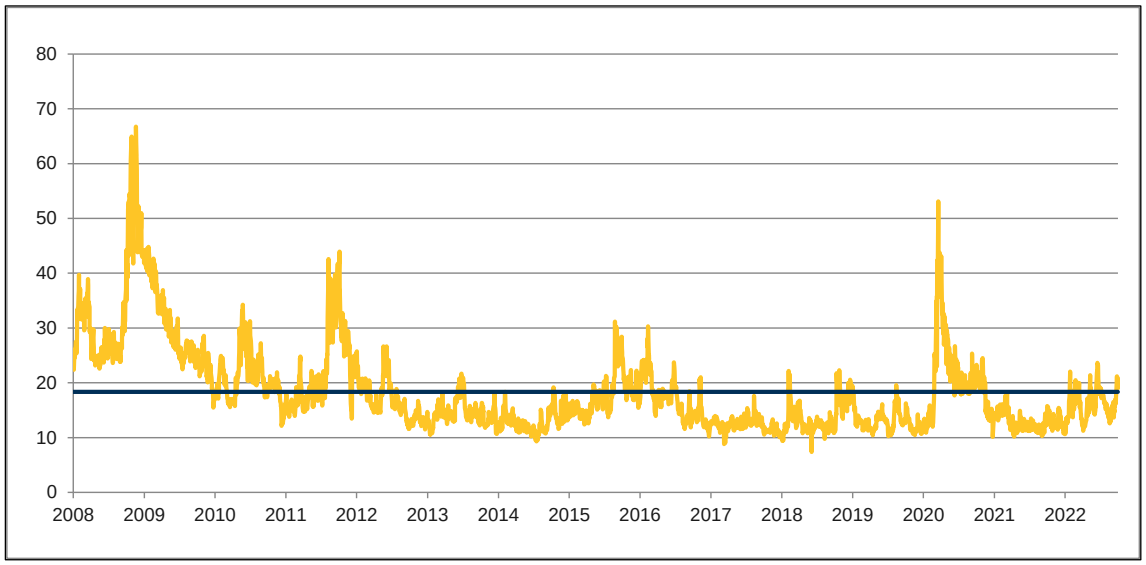
Source: Bloomberg

Figure 7: All Ordinaries Index annual dividend yield



Source: Bloomberg

Figure 8: Implied Volatility (ASX200 VIX)



Source: Bloomberg

870. The Independent Panel considered that both the ERA's usage and conclusions drawn from conditioning variables was reasonable. However, the Independent Panel noted that the ERA is vague on how these conditioning variables were applied, recommending that the ERA more fully describes how conditioning variables were to be incorporated into the gas instrument.

871. Submissions to the 2022 draft gas instrument had mixed views on conditioning variables. AGIG submitted that the ERA provide clearer explanations about how conditioning variables are used and how much weight was provided to their use. GGT submitted that conditioning variables should not be used at all. The CRG supported the ERA's 2022 draft gas instrument approach in using conditioning variables for the estimation of the market risk premium.

872. The ERA considers that conditioning variables provide information about the market environment. They are not used in a mechanistic or deterministic fashion, but current conditions are compared with past conditions. This relativity is used to guide the ERA's regulatory discretion in the following manner:

- If current conditioning variables are below historic levels, then the ERA is minded to exercise its discretion in a downwards manner.
- If current conditioning variables are around historic levels, then the ERA is minded to exercise its discretion in a neutral manner.
- If current conditioning variables are above historic levels, then the ERA is minded to exercise its discretion in an upwards manner.

873. As conditioning variables are not used in a mechanistic manner it is not possible to provide the weights used by the ERA.

874. GGT stated that there is no relationship between conditioning variables and the market risk premium. The ERA considers that market conditions and volatility are related to the expected market risk premium, but is unable to quantify the magnitude of these relationships. Accordingly, the ERA does not set or adjust its estimates of the market risk premium based on conditioning variables, but uses such information to guide the exercise of regulatory discretion.

875. On balance, for the 2022 final gas instrument the ERA considers that conditioning variables are currently around their historic averages and support a market risk premium at the midpoint of its range.

Relationship between the market risk premium and the risk free rate

876. The ERA considered the relationship between the market risk premium and the risk free rate.

877. Disagreement regarding the relationship between the market risk premium and the risk free rate is not new, and was considered as part of the 2018 gas instrument.

878. Any method used to estimate the market risk premium will result in an implicit assumption regarding the relationship between the market risk premium and the risk free rate. The three possibilities are that the relationship is either positive, negative or that there is no relationship.

879. Any relationship also affects the broader relationship between the return on equity and the risk free rate.

880. The ERA has previously examined this relationship. Stakeholders have proposed alternative approaches such as the Total Market Return method (or the Wright method), which implies a negative relationship between the market risk premium and the risk free rate.

881. The ERA has not previously accepted the Wright method, along with its implied negative relationship. This was most recently discussed in the 2018 gas explanatory statement.[510] Advice from Partington and Satchell indicated that the Wright approach:

- Has "no support based on any clear evidence in the Australian context."[511]
- "Runs contrary to the well accepted view that asset prices are inversely related to interest rates."[512]

882. On this basis, for the 2018 gas instrument, the ERA:

- Determined the market risk premium at a point in time for the start of the gas instrument using the Ibbotson historical method, the DGM and consideration of conditioning variables.
- Fixed the market risk premium for the term of the instrument, and therefore the market risk premium does not change with the risk free rate.

883. The ERA has considered the recent information provided in submissions and the AER's expert evidence session regarding the relationship between the market risk premium and the risk free rate.

884. The ERA notes CEPA's review of the relationship between the market risk premium and risk free rate:[513]

- The CEPA report added additional evidence to this consideration in the form of summaries of academic work, financial practice, regulatory use and some preliminary econometric analysis.
- CEPA suggested that there was preliminary evidence of a negative relationship between implied market risk premiums from dividend growth estimates and earnings yields with the risk free rate.[514]
- CEPA stated:[515]

  > Our assessment is that (i) there is acceptance that MRP is not stable and (ii) it is possible that there is an inverse relationship between the forward looking MRP and the RfR, and (iii) there is no good evidence that the MRP should be assumed to be independent of the RfR, the current implicit assumption of the AER's approach, and (iv) there is no conclusive theoretical basis for an assumption of independence or dependence.
  >
  > In judging evidence on MRP using historic data, the AER can choose whether to use:
  >
  > - An assumption that the MRP is fixed (current approach)
  > - An assumption that the TRMR is stable ("Wright approach")
  > - An approach that has regard to both measures. This could be for example a weighted average of the two measures that assumes that the MRP is related to the RfR, but the relationship is not one to one.

510 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 168-170.

511 Partington, G. and Satchell, S., *Report to the AER: Discussion of estimates of the return on equity*, April 2017, p. 28.

512 Partington, G. and Satchell, S., *Report to the AER: Cost of equity issues–2016 electricity and gas determinations*, April 2016, p. 31.

513 CEPA, *Relationship between RFR and MRP*, June 2021.

514 CEPA, *Relationship between RFR and MRP*, June 2021, p. 6.

515 CEPA, *Relationship between RFR and MRP*, June 2021, pp. 6-7.

885. The ERA notes that *ex-ante* expectations of the market risk premium are by definition difficult to measure. Though CEPA's analysis of the implied market risk premium from the DGM revealed a negative relationship with the risk free rate, the ERA has some concern that this does not reflect *ex-ante* expectations but rather is influenced by the nature of the DGM and methodological approach. Whilst submissions have been made and evidence tendered, the ERA remains doubtful that this matter can ever be scientifically estimated and applied for regulatory purposes, particularly if it is time varying.

886. Experts in the concurrent evidence session disagreed on the relationship between the market risk premium and the risk free rate. One expert submitted that it is difficult to estimate the direction of the relationship, let alone the magnitude of the relationship. In addition, this relationship may change over time.

887. The ERA did not receive any new submissions to the 2022 draft gas instrument regarding this matter. Accordingly, the ERA maintains its positions as articulated in the explanatory statement to the 2022 draft gas instrument, where the ERA considers that:

- The conditional market risk premium varies over time.
- 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.
- It is unclear about what conditions are necessary for the relationship to hold and the relationship itself is possibly time varying.
- This matter is a contested area of finance, where plausible explanations have been provided as to the theory for such relationships, but this has not been definitively established.

888. The ERA will not adjust the expected market risk premium for any relationship between the market risk premium and the risk free rate based on statistical or regression analysis. As the ERA has low confidence that such relationships can be econometrically identified, it will not rely on such adjustments.

889. Instead, to estimate the market risk premium the ERA uses multiple inputs, including forward looking DGM estimates and conditional variables, to develop the best estimate to apply for the gas instrument.

890. The ERA considers that the DGM estimates of the market return do not induce a mechanical negative relationship with the risk free. It attempts to recover whatever relationship may exist at the time of estimation given assumptions, where the DGM as a conditional estimator can be sensitive to short-term changes in the market risk premium. Currently, the ERA is agnostic as to what the relationship is at any point in time, but will incorporate what market expectations are signalling through the DGM estimate.

891. The ERA notes that the market risk premium is reset every four years under the ERA's requirement to review the gas instrument. These reviews evaluate the latest evidence on this matter and set an expected return

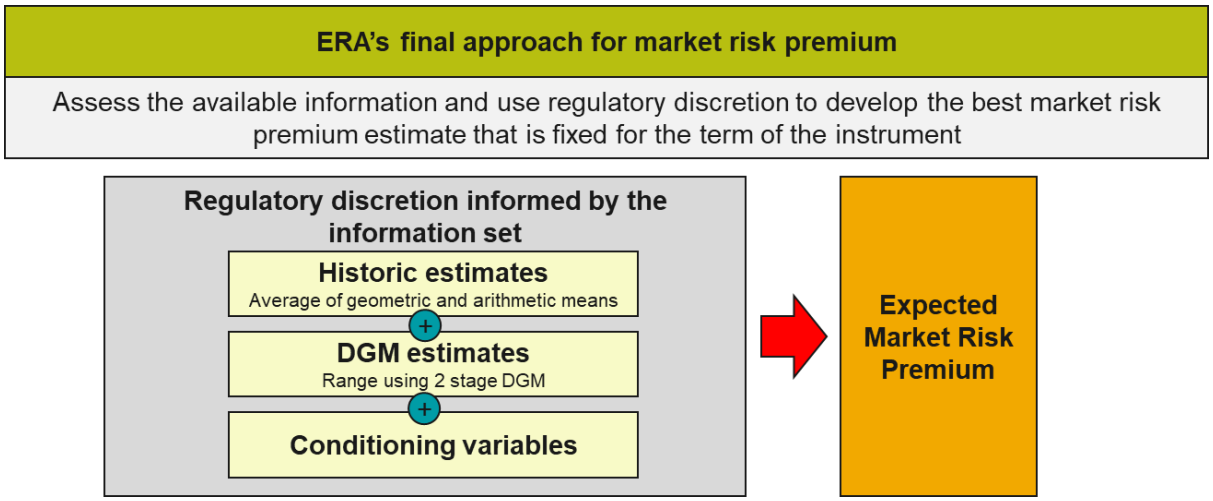
Determination of point estimate

892. For the 2022 final gas instrument when estimating the point estimate for the market risk premium the ERA will consider historic estimates, DGM estimates and conditional variables.

893. The ERA considers that the best estimate of the market risk premium is likely to be provided through the consideration of a range of inputs.

894. The ERA's approach for the 2022 final gas instrument to determining a market risk premium point estimate is summarised in Figure 9.

Figure 9: ERA's final approach to determining a market risk premium point estimate



895. To determine a point estimate for the market risk premium for the 2022 final gas instrument, the ERA:

- Places more reliance on the historic market risk premium estimate, relative to the DGM estimate.
- Determines a final point estimate of the market risk premium by using regulatory judgement, including considering conditioning variables.
- Rounds the final point estimate of the market risk premium to one decimal place.

896. The ERA maintains its preference for the historic market risk premium approach as it accords with a plausible model of investor behaviour, where investor expectations are shaped by past information (realised returns) and current practices (adopted methods). The historic market risk premium estimate can be considered as an unconditional estimate that informs the determination of the expected market risk premium.

897. It is consistent Australian regulatory practice that historical returns are considered when estimating the expected market risk premium. This also appears to be a consistent investor, market and academic practice. The ERA is not aware of any credible institutions which deliberately reject the historic market risk premium approach.

898. These factors form the basis for the ERA's reliance and relatively high weighting to the historic market risk premium.

899. The DGM receives less weight due to the ongoing concerns the ERA has about the proper implementation of the DGM given the issues surrounding input assumptions, forecasts and variability of outputs. Until these matters are resolved the ERA will continue to put more weight on the historical market return estimates. The DGM estimate can be considered to be a conditional estimate that helps inform the determination of the expected market risk premium.

900. The ERA will also use conditioning variables to inform its regulatory discretion in determining the point estimate of the expected market risk premium.

901. The historical market risk premium estimate (6.0 per cent) and the DGM estimate (6.6%) forms the information base for the exercise of the ERA's regulatory discretion. The ERA observes that the conditioning variables are currently around their historic averages and support a market risk premium at the midpoint of its range.

902. On the basis of all available information, together with its regulatory discretion, the ERA estimates a market risk premium of 6.1 per cent for the 2022 final gas instrument.

903. The ERA will fix the market risk premium for the term of the gas instrument.

904. Gas network service providers have submitted that the market risk premium be updated at each access arrangement determination. However, the CRG previously submitted that, as unexpected developments can affect the market risk premium, regulatory discretion is both necessary and appears effective in the Australian regulatory environment.[516]

905. The ERA notes that under a binding gas rate of return instrument any change to the market risk premium would have to be done in a mechanical way without the use of discretion.

906. After further consideration of both the fixing and updating approaches, the ERA maintains that there is no perfect method to estimate market returns and it is not possible to do this mechanically while being confident that all potential market conditions can be accommodated.

907. Therefore, the ERA considers that regulatory discretion is needed to best estimate the market risk premium and it is necessary to fix the market risk premium over the life of the gas instrument.

- The ERA holds concerns with the DGM and its sensitivity, and this detracts from its ability to be used in a mechanical way.
- The concerns regarding the DGM's reliability mean that fixed weights cannot be provided to that estimate, which further detracts from its ability to be used in a mechanical way.
- The ERA considers that there is no reliable method for the mechanical mapping of conditioning variables to the market risk premium.

908. Likewise, the ERA is not confident that it can completely and exhaustively document how regulatory discretion could be exercised under an instrument to deal with unexpected events. By their very nature, unexpected events are not predicted and any level of prescription would likely require potentially new methods and procedures to be utilised, which cannot be accommodated under a binding instrument.

[516] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 19-20.

909. The Independent Panel noted that the relationship between the market risk premium and the risk free rate remains a contentious and unresolved issue. The Independent Panel considered that the use of a constant market risk premium was appropriate and based on sound reasoning.[517]

910. In determining the best approach to estimate the expected market risk premium, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information or conditions; transparency and whether it can be implemented. The ERA considers that the simplification and amendment to its methods to estimate the market risk premium is fit for the purpose of the 2022 final gas instrument.

911. Based on the preceding reasoning, the ERA considers that the estimation method for the expected market risk premium set out in the 2022 final gas instrument will provide the best estimate of the value of the expected market risk premium over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation methods and parameter values that provide the best estimate of the value of expected market risk premium, in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the estimation method for the expected market risk premium set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

10.4. Equity beta

912. Risk is the degree of uncertainty about an event, for example the uncertainty around an investment's expected returns. This is a forward-looking concept. The risk-return trade off in finance theory provides that a risk averse investor will want a higher expected return when faced with higher risk.

913. The risk of an asset is typically thought of as the variance in asset returns. Total risk consists of systematic and non-systematic risk. Systematic risk is that part of total risk in a firm's returns that stems from the economy and markets more broadly. Systematic risk cannot be eliminated through diversification. Non-systematic risk is the risk stemming from unique attributes of the firm, which may be eliminated by an investor through diversification. For this reason, only systematic risk is compensated by the return on equity.

914. The equity beta is a parameter that measures the systematic risk of a security or a portfolio in comparison to the market as a whole.

915. Equity beta is the slope parameter β_i in the Sharpe-Lintner CAPM. The slope parameter β_i correlates a specific asset's return in excess of the risk free rate of return, to movements in the return on the market portfolio:

[517] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 38-42.

$$R_i = R_f + \beta_i (R_M - R_f)$$

Equation 15

where:

R_i is the required rate of return on equity for the asset, firm or industry in question

R_f is the risk free rate

β_i is the equity beta that describes how a particular portfolio i will follow the market which is defined as $\beta_i = cov(R_i, R_M)/var(R_M)$

$(R_M - R_f)$ is the market risk premium.

916. Two risk factors are generally considered to estimate the value of equity beta for a particular firm:

- The type of business, and associated capital assets, that the firm operates measured by asset or "un-levered" beta.
- The amount of financial leverage (gearing) employed by the firm which levers or "amplifies" the asset beta to arrive at equity beta.

917. This section outlines the ERA's reasoning for its final position on estimating equity beta for the 2022 final gas instrument.

10.4.1. Draft position

918. The 2018 gas instrument used an equity beta of 0.7.[518]

919. The equity beta was estimated from a domestic energy network sample over a five-year period using four statistical estimators. This equity beta was fixed for the term of the gas instrument.[519]

920. Following the receipt of stakeholder submissions on the discussion paper and the AER's concurrent expert sessions, the ERA considered that there was further value to be gained through further focused consultation on equity beta. The focused consultation addressed specific questions regarding the equity beta:

- In April 2022, the ERA published a paper, *Focused consultation for the 2022 gas rate of return instrument review Discussion paper*, outlining questions on equity beta and relevant background to these questions.
- In April 2022, the ERA conducted an online session with interested stakeholders on the questions addressed by the focused consultation.
- In May 2022, the ERA received written stakeholder submissions.

921. For the 2022 draft gas instrument the ERA maintained an equity beta of 0.7. The equity beta was to remain fixed for the term of the gas instrument.[520]

[518] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 34.

[519] ERA, *Final Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 229-236.

[520] ERA, *2022 Draft Gas Rate of Return Instrument*, June 2022, p. 18.

922. While the equity beta estimate was unchanged from the 2018 gas instrument, the delisting of some of the remaining Australian energy networks and current market volatility meant that the ERA refined its approach to estimating equity beta for the 2022 draft gas instrument. The ERA considered both domestic and international comparator firms and different timeframes.[521]

923. The determination of the 2022 draft gas instrument equity beta utilised the following methodology:[522]

- Used domestic and international comparator firms.
- Considered five-year and 10-year data periods.
- Mechanically estimated equity beta with OLS and LAD estimators.
- Pooled beta estimates by country.
- Examined the distribution of equity betas.
- Exercised regulatory discretion to determine the best point estimate.

10.4.2. Consultation

10.4.2.1. Independent Panel Report

924. The Independent Panel considered that the ERA's proposed equity beta was appropriate and based on sound reasoning.[523]

925. The Independent Panel:[524]

- Considered that the ERA's proposed simplifications to the sample, estimation window and estimator were appropriate and based on sound reasoning.
- Noted the stakeholder disagreement regarding the use of international comparators for the estimation sample. The Independent Panel viewed that this was unsurprising given the economic significance of the decision and that reasonable arguments could be made for and against their inclusion. The Independent Panel noted that submissions supportive of international comparators were generally supportive of the ERA's proposed jurisdictions and firms.
- Described the ERA's draft approach as being pragmatic, where the use of international comparators was appropriate and based on sound reasoning for country and entity selection. The Independent Panel suggested that the ERA further detail the sample selection for the next gas instrument. The Independent Panel noted that the presence of recent high volatility in equity markets relative to that exhibited in gearing levels and credit ratings, explained why the ERA adopted a differing benchmark sample for equity beta estimation compared to gearing and credit ratings.
- Considered that the ERA's draft decision to not adjust for low beta bias to be reasonable as the gas instrument seeks to approximate ex-ante expectations.

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521 ERA, Explanatory statement for the *2022 Gas Rate of Return Draft Instrument*, June 2022, p. 1.

522 ERA, Explanatory statement for the *2022 Gas Rate of Return Draft Instrument*, June 2022, pp. 155-175.

523 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 42-45.

524 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 42-45.

10.4.2.2. Stakeholder submissions

926. All of the submissions to the 2022 draft gas instrument provided stakeholder comments on equity beta.[525, 526, 527, 528, 529, 530]

927. Stakeholder submissions discussed multiple equity beta matters including:

- The use of international comparators
- Estimation methodology
- Determination of the equity beta point estimate.

928. Each equity beta matter is discussed below.

The use of international comparators

929. The CRG continued to oppose the use of international comparators for equity beta estimation: [531]

- Expressed concern that the ERA has not specified the exact criteria for justifying the retention of international firms.[532]
- Noted that the ERA has adopted an additional filter of comparators needing a material amount of regulated activities, but considers that this needs to be a dominant proportion being greater than 90 per cent.[533]
- Continued to submit that international comparators which have other business lines should be adjusted for.[534]
- Argued that evidence of comparability between domestic and international comparators have not been provided.[535]
- Referred to how domestic and international betas reacted differently post COVID-19 as evidence of insufficient comparability.[536]

930. All energy network service providers agreed with the usage of international comparators for equity beta estimation. [537,538,539,540,541]

525 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, pp. 5-8.
526 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 24-30.
527 CRG, Submission to Draft Gas Instrument, September 2022, pp. 24-33.
528 ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 22-28.
529 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 28-31.
530 Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1.
531 CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 29-30.
532 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 27.
533 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 26.
534 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 26.
535 CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 27,29.
536 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 30.
537 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 5.
538 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 25.
539 ENA, *Submission to Draft Gas Instrument*, September 2022, p. 22.
540 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 28-29.
541 Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1-2.

931. AGIG referred to past CRG submissions regarding the potential issues with using international comparators, but stated that the CRG has not provided evidence that these potential problems exist or were significant.[542]

- Disputed the CRG's arguments of an absence of statistical difference between foreign and domestic betas could allow one to conclude that there are differences, where such assertions are insufficient.[543]
- Submitted that the ERA had adequately dealt with the CRG's concerns and agreed with the Independent Panel's view.[544]

932. ATCO supported the use of international comparators. ATCO generally supported the proposed sample of international comparator firms and encouraged the ERA to provide more detail regarding the inclusion and exclusion criterion that was used.[545]

933. Energy Networks Australia strongly endorsed the use of international comparators when estimating beta, noting that other Australian economic regulators have regard to international evidence.[546] Energy Networks Australia:

- Submitted that whilst there may be some differences between domestic and international firms, they are likely to be broadly similar in terms of risks and have regulatory arrangements with similarities.[547]
- Noted the Independent Panel's conclusion on equity beta as being pragmatic and based on sound reasoning.[548]

934. GGT submitted that market circumstances necessitated the examination of international energy networks in the benchmark sample.[549]

935. Western Power agreed with the use of international comparators.[550]

Estimation methodology

936. ATCO submitted that the ERA should avoid using delisted comparators via omitting or providing less weight. ATCO pointed to the DUET Group stating that it contributed no further information on the prevailing conditions in the market for equity funds.[551] ATCO submitted that the ERA carefully explains how Spark Infrastructure and AusNet Services will be treated given their recent delisting.[552]

[542] AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 5.
[543] AGIG, *Submission to Draft Gas Instrument*, September 2022, pp. 5-6.
[544] AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 6.
[545] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 25.
[546] ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 22-25.
[547] ENA, *Submission to Draft Gas Instrument*, September 2022, p. 25.
[548] ENA, *Submission to Draft Gas Instrument*, September 2022, p. 26-28.
[549] GGT, *Submission to Draft Gas Instrument*, September 2022, p. 29.
[550] Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1.
[551] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 26.
[552] ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 29-30.

937. ATCO submitted that the use of 10 year equity betas is not necessary given the usage of LAD estimators, stating that the use of 10 year estimates is a significant change.[553] Further, ATCO submitted that the ERA clarify whether this is a permanent change that will continue in the 2026 gas instrument.[554]

938. ATCO submitted that a shorter window would capture a forward looking estimate better, noting evidence of how beta estimates vary through time.[555] ATCO continued to submit that US and Canadian equity betas have increased recently post COVID-19.[556]

939. ATCO continued to submit that firms affected by M&A activity should be completely removed from the sample.[557]

940. The CRG considered that a materially biased estimate with a low standard error is not useful.[558] Additionally, the CRG submitted that there was no need for the ERA to change its methodology:

- The ERA can increase the observations without using international comparators by using a longer estimation window.[559]
- Referred to AER beta evidence, where the sample with nine firms under the longest period showed evidence of long-term equity beta stability.[560]
- Referred to other regulators using a small domestic sample.[561]

Determination of the point estimate

941. Most stakeholders supported the 0.7 equity beta point estimate, with the exception of the CRG, ATCO and GGT.

942. ATCO did not support the ERA's 0.7 estimate and submitted that the ERA made a series of adjustments that downwardly bias the equity beta estimate. ATCO submitted that this downward bias was due to the use of 10 year estimates, country pooling, LAD estimates and placing additional weight on delisted domestic firms.[562] ATCO continued to submit that there was no reason to believe that domestic betas are lower than international betas, and accordingly the ERA should not use that reasoning when determining the point estimate.[563]

553 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 26.
554 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 27.
555 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 27.
556 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 28.
557 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 29-30.
558 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 29.
559 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 29.
560 CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 24, 30-31.
561 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 29.
562 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 25.
563 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 28-29.

943. The CRG disagreed with the use of international comparators, submitting that the greatest weighting should be placed on two delisted domestic firms (Spark Infrastructure and AusNet Services) which would result in an equity beta of 0.5.[564] The CRG submitted that the equity beta should be below 1, referring back to previous submissions regarding: [565]

- An inferred relationship between the proportion of regulated revenues and equity beta, where greater regulation is associated with lower beta.
- Conceptual analysis based on the notion that regulation decreases beta, coupled with the long term stability of beta.

944. GGT noted the 0.7 equity beta estimate generally, but considered that its specific characteristics should result in GGT receiving a higher equity beta. [566] GGT:

- Argued that a specific equity beta for GGT is not inconsistent with a benchmark approach or incentive-based regulation, but that it would be inconsistent to use a benchmark for one particular business to another different business.[567]
- Submitted that a gas distribution business with a large, diverse customer base was not the same as gas transmission to a small group of commodity exposed customers.[568]
- Continued to submit that the equity betas provided to assets in the Pilbara should also be provided to GGT. [569]

945. Most submissions generally agreed with the ERA's draft point estimate of 0.7 for equity beta.

946. AGIG accepted the number the ERA proposed for equity beta and provided some feedback on how to treat the evidence. AGIG detailed some potential ways to calculate a point estimate, including a method that chooses a beta from choosing bands of estimates with the highest degree of congruence and consistent with the largest amount of data, which supported an estimate of 0.7.[570]

947. AGIG discussed the process in which a point estimate was determined for equity beta.

- Submitted that the ERA needed to clearly and transparently moved from evidence to the point estimate such that stakeholders could understand the result. AGIG considered that the use of ranges within country estimates via confidence intervals would be a valid and transparent process.[571]
- Provided some feedback on the use of portfolio betas when estimating the point estimate.[572]

564 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 30.
565 CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 21-24.
566 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 30.
567 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 30.
568 GGT, *Submission to Draft Gas Instrument*, September 2022, p. 30.
569 GGT, *Submission to Draft Gas Instrument*, September 2022, pp. 30-31.
570 AGIG, *Submission to Draft Gas Instrument*, September 2022, pp. 1, 6-8.
571 AGIG, *Submission to Draft Gas Instrument*, September 2022, pp. 6-7.
572 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 8.

948. Energy Networks Australia noted that the 0.7 point estimate was at the lower end of the range of comparable regulators (other than the AER) due to the weight placed on domestic comparators.[573] Energy Networks Australia viewed that equity beta should be determined after having proper regard to all the evidence, which includes a set of comparator firms that include more than one live firm, along with consideration of estimates adopted by comparable regulators preforming the same tasks.[574] Energy Networks Australia also submitted that evidence from international comparators should receive proportionally more weight in the 2026 gas instrument as delisted comparators become further out of date.[575]

949. GGT submitted that the ERA's equity beta estimate made good use of the limited data available and the economic circumstances that underlie that data.[576]

950. Western Power submitted that the ERA reduces the weight it places on domestic comparators, claiming that it is 14 times that of international comparators.[577] Western Power also submitted that for the final decision that either domestic weights are reduced, or an explanation is provided as to how weights will be reduced over time to deal with the delisting of comparators.[578]

10.4.3. 2022 final approach

951. The 2022 final gas instrument applies an equity beta of 0.7.

952. The equity beta will remain fixed for the term of the gas instrument.

10.4.4. Reasoning

953. The reasoning for the ERA's final approach for estimating equity beta is consistent with its draft reasoning, informed by the Independent Panel and public submissions, and detailed below.

10.4.4.1. Developments since the 2018 gas instrument

Market volatility

954. Financial markets have been volatile and affected by COVID-19, particularly during February and March 2020:

- This impact was largely negative, with increased market volatility as the effects of the pandemic were felt in both the real and financial economy.
- However, towards the end of the 2020 there was a recovery to pre COVID-19 levels for the market.

[573] ENA, *Submission to Draft Gas Instrument*, September 2022, p. 26.
[574] ENA, *Submission to Draft Gas Instrument*, September 2022, p. 23.
[575] ENA, *Submission to Draft Gas Instrument*, September 2022, pp. 26.
[576] GGT, *Submission to Draft Gas Instrument*, September 2022, p. 30.
[577] Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1.
[578] Western Power, *Submission to Draft Gas Instrument*, September 2022, p. 1.

955. Financial markets have been volatile and affected by shocks such as the conflict in Ukraine from March 2022:

- Given the recency of the Ukraine conflict, there is insufficient data to understand whether this event will also have similar effects on the real and financial economy as COVID-19.

956. As equity beta is calculated through the observed covariance of the market return and an individual stock or portfolio, it is likely that these shocks may affect measured systematic risk due to the increased volatility:

- The extent of these effects depends on the co-movement of the company and market returns.
- It is likely that pre shock betas may be different to post shock betas due to differential industry effects and market reactions to the shocks.

957. A conceptual analysis would indicate that essential services such as energy networks would have been relatively more immune from shocks compared to other industries.

Acquisitions

958. Listed regulated and long-term infrastructure businesses in Australia have been actively sought after and acquired.

959. In 2021 there were takeover bids for both Spark Infrastructure and Ausnet Services.[579,580] The takeover bids for Spark Infrastructure and AusNet Services were successful, with both firms now delisted from the Australian Stock Exchange. There is now only one remaining listed domestic energy network (APA Group).

960. This reduction in listed domestic comparators affects the equity beta estimation sample given that it reduces the number of active firms to a single firm:

- This situation is similar to the circumstances of the 2018 gas instrument. While two firms may be delisted, a meaningful number of recent observations remains available for analysis.
- The APA Group may also be a future takeover target given investor interest in infrastructure assets.

961. These acquisition announcements and completions may affect historic share prices in a manner not indicative of changes in systematic risk:

- The timing of takeover announcements themselves may influence equity beta due to speculation and have implications on pricing once the acquisitions are complete.
- Additionally, the share price of the APA Group, the remaining listed energy network business may have been affected by its unsuccessful takeover offer for AusNet Services in 2021.

[579] AusNet Services, *Foreign Investment Review Board approval received in relation to proposed Scheme*, November 2021.

[580] Spark Infrastructure, *Scheme Booklet in relation to the proposed acquisition of Spark Infrastructure*, online.

Regulatory developments

962. The New South Wales Independent Pricing and Regulatory Tribunal (IPART) reviewed its equity beta approach in 2020. The approach can be summarised as:[581]

- Including international firms in the estimation.
- Using weekly data and all five possible reference days.
- Using OLS as the preferred regression technique with a Vasicek adjustment.
- Using a materiality and persistence test before it made a change to equity beta. Before revising any established beta value, it must be more than one standard deviation from the mean of the current sample and there must be persistent evidence of a changed beta.
- Making no adjustment for low beta bias.

963. The AER is examining equity beta as part of its 2022 rate of return instrument review. In 2021 the AER published its final omnibus paper, consolidating the thinking and reasoning for its proposed 2022 gas instrument approach.[582]

964. The AER has commissioned new consultant reports for equity beta, including:

- A review of international rate of return approaches by the Brattle Group where it examined eight regulators in six countries. Brattle found that international regulators tended to use international samples and shorter estimation windows.[583]
- A review of equity beta estimation for Australian energy networks by Economic Insights. This report detailed considerations required in estimating the Sharpe-Lintner CAPM, including:[584]
  - Estimation period and implications of recent market developments.
  - The firm comparator set.

Concurrent evidence

965. In February 2022 the AER held its concurrent evidence sessions, which included the consideration of beta.[585] Experts did show divergence of views on the equity beta.

966. Mr Kumareswaran summarised the challenge of best estimating equity beta along two dimensions, detailed in Figure 10.

581 IPART, *Estimating Equity Beta for the Weighted Average Cost of Capital, final report*, August 2020.

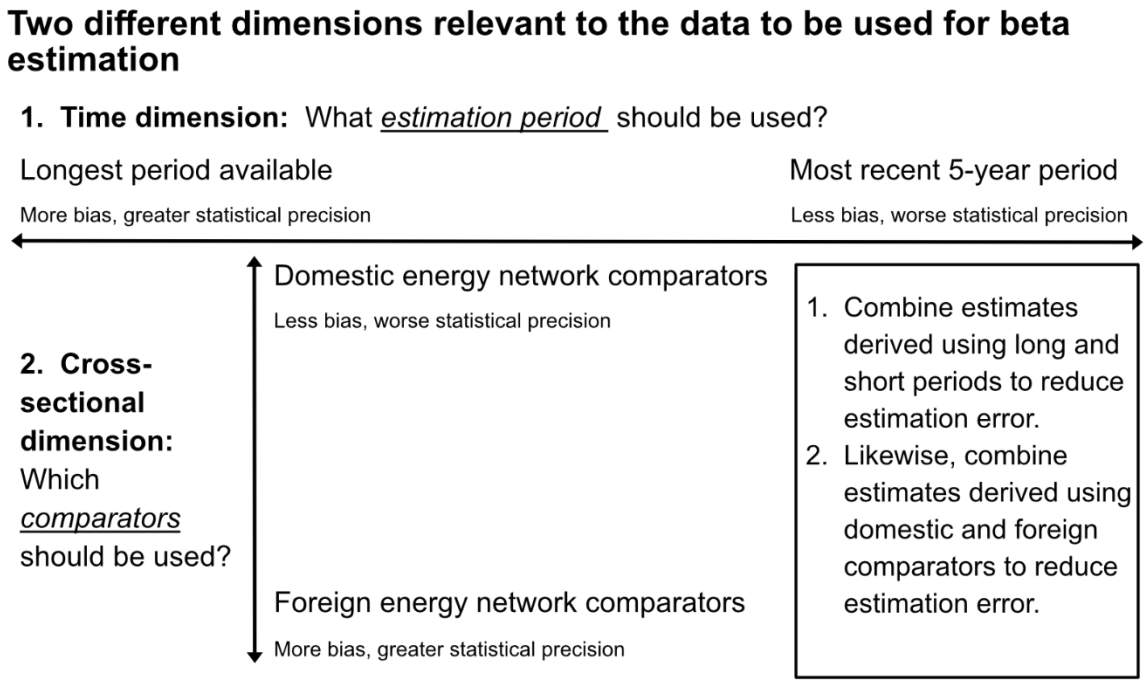
582 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final Working Paper,* December 2021.

583 Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020.

584 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses,* June 2021.

585 AER, *Rate of Return Instrument Concurrent Evidence Session 1 of 4*, February 2022.

Figure 10: The two dimensional challenges of estimating equity beta



Source: Dinesh Kumareswaran

967. Mr Kumareswaran stated that:

- It is necessary to consider the time dimension (length of data period) and cross-sectional dimension (size of sample) when considering equity beta.
- No approach was perfect and every approach requires trade-offs. There is no magic formula to guide practice and a regulator will need to use discretion to deal with the current situation. At the concurrent evidence session there was a recognition that current estimates of beta have been volatile, either driven by market shocks or acquisitions.

968. Experts differed in their views about how to best estimate equity beta:

- Some experts advocated using the longest available time period to estimate equity beta, while others favoured using a blend of time periods. In addition, there was some discussion of what the feasible period is as there were questions about structural breaks in the time series.
- Experts did not support the trimming/removing of market datasets to adjust for historic market events.
- With few listed domestic energy network comparators in the equity beta sample, there was support among the experts for the use of foreign comparators in the equity beta sample. However, no concrete suggestions were put forward on how to assign a weight to foreign comparators.
- There was general agreement that it was not necessary to adopt the international CAPM if using foreign comparators.
- 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.

10.4.4.2. Statistical estimation method

969. The ERA's approach for the 2022 gas instrument is to maintain a similar statistical equity beta estimation method to the 2018 gas instrument.

970. The ERA's considerations on the statistical equity beta estimation method are detailed below.

Sample period

971. To estimate equity beta the ERA must select an estimation window. That is, the time horizon over which the returns of firms and the market are observed.

972. The length of the estimation window involves a trade-off between relevance of the data and statistical robustness:

- Longer periods can include behaviour in the data that is no longer relevant due to changing economic and market conditions.
- Shorter periods may produce estimates that are less statistically robust.

973. As return on equity is a forward-looking concept, equity beta should ideally reflect expectations informed by prevailing market conditions. This suggests that a shorter estimation window should be used, as longer estimation windows introduce risks that structural breaks are present in the return series, which make estimated equity betas less useful.

974. The ERA notes that the current five-year window includes market shocks such as COVID-19 and the conflict in Ukraine. The ERA also notes that the current five-year window includes M&A activity for domestic energy networks, both currently listed or recently delisted.

975. To the extent that these shocks do not represent permanent changes to systematic risk and bias equity beta estimates, the consideration of a longer window can moderate the impact of these shocks. Therefore, the ERA will expand its considerations to include the 10-year window.

976. Submissions to the 2022 draft gas instrument were largely supportive of the ERA's proposed sample period methodology with the exception of ATCO and CRG.

977. ATCO submitted that the ERA revisit the use of 10-year equity beta estimates for the following reasons:[586]

- The use of 10-year estimates reduces the effect of rising beta values prior to March 2020.
- As LAD estimates are used to account for market shocks, it is unnecessary to use 10-year estimates.
- The use of 10-year estimates is inconsistent with the notion that the systematic risk of energy network service providers is stable.

[586] ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 26-27.

978. The CRG continued to support the use of a longer estimation window for the domestic sample, stating that increased observations can be achieved by using a longer estimation window than five years.[587]

979. The ERA maintains that the five-year estimates are still the primary estimates which are used for the determination of equity beta. 10-year estimates are used as additional information for the exercise of the ERA's regulatory discretion. It is not possible to assess claims regarding the effects of market shocks, volatility or stability without reference to additional information. The ERA considers that 10-year estimates are appropriate pieces of information. Whilst ATCO may consider that LAD estimates are sufficient to account for the issues raised above, the singular reliance on a robust estimator is not supported by the ERA. Accordingly, the ERA will use the information from five and 10-year estimates to set the best estimate of equity beta for the 2022 final gas instrument.

980. The ERA also maintains that in order to set a forward looking expected equity beta, the consideration of long-term estimates may not necessarily capture changes in systematic risk in a changing market environment. Accordingly, the use of both five and 10-year estimates provides the ERA with the evidence it needs to consider what the best expected equity beta point estimate is.

981. The ERA's approach for the 2022 final gas instrument is to retain the use of a five-year estimation window with weekly data, and to also estimate 10-year betas. [588]

982. The balance between relevance and statistical robustness still lies in favour of five-year estimation windows as the primary estimate:

- The ERA notes the findings from the Brattle Group's report that international regulators tend to favour shorter estimation windows.
- Concerns of market shocks are possibly moderated by the ERA's use of robust estimators.
- Shorter estimation windows require the use of higher frequency data to ensure that there are sufficient observations. The ERA considers that weekly data strikes the appropriate balance.

Statistical equity beta estimation method

983. The ERA largely adopts the estimation method and techniques as described in the explanatory statement for the 2018 gas instrument.[589]

984. The ERA has simplified its approach as described in the explanatory statement for the 2022 draft gas instrument in the interests of making it easier for all stakeholders to understand and replicate its approach.

985. For the 2022 final gas instrument the ERA will simplify its approach by using the total return index as calculated by Bloomberg for individual stocks and market index:

- Bloomberg provides total equity return data that combines price and dividend data into a single series.

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587 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 29.

588 Weekly returns strike the appropriate balance as daily estimates are too noisy, and monthly estimates reduce the number of observations given the five-year window. 10-year estimates will also use weekly returns for consistency.

589 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 216-224.

- Bloomberg's total equity return data is commonly used and is a high-quality data set.
- This approach creates consistency and replicability for stakeholders as it conducts analysis on standardised data.

986. The ERA's 2018 gas instrument approach to estimating equity betas used four differing techniques including:

- OLS
- LAD
- Maximum likelihood robust method (MM)
- Theil-Sen (T-S).

987. The ERA has used traditional OLS estimates in conjunction with robust estimators (LAD, MM, and T-S). Robust estimators are designed to deal with outliers which could affect OLS estimation. The ERA considered these techniques have differing characteristics and their combined consideration contributes to estimation of a robust equity beta.

988. The ERA continues to use the OLS estimator as it is commonly used to estimate equity beta.

989. The ERA will also continue to use the LAD estimator as its robust estimator to contribute to a more robust estimate of beta.

- The ERA considers that it is appropriate to use a robust estimator in addition to the OLS estimator. Robust estimators assist in situations where outliers may have a significant influence on the equity beta. This is useful in volatile market environments.
- The ERA has generally observed that the results from MM and T-S are highly correlated to the LAD. The LAD can be more easily verified by external parties using generally available statistical packages (compared to MM and T-S). The ERA will therefore now solely rely on the LAD for its robust estimator.
- The ERA has considered how market volatility and M&A transactions could affect the estimation of equity beta and potential methods to adjust for such matters. The ERA considers that the LAD is an estimator that can be used to provide robust estimates to account for volatility and M&A transactions.
- While the LAD may not have a perfect correspondence to the CAPM equity beta, it is sufficiently close in estimating the correlation between the market portfolio and an asset that justifies its inclusion in the estimators to be considered by the ERA.

990. Submissions to the 2022 draft gas instrument were largely supportive of the ERA's proposed statistical estimation methodology with the exception of ATCO. ATCO's support for the LAD estimate was conditional on the fact that it should be used where there is evidence that OLS estimates are affected by market shocks.[590]

[590] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 26.

991. The ERA maintains that both OLS and LAD estimates will be used unconditionally. Both estimates provide a measure of the covariance of a network service provider's return and the market portfolio. Further, the ERA notes that it is when there is a divergence between the two estimators that it is likely a market shock has occurred. This necessitates the estimation and usage of both estimators continually.

992. For the 2022 final gas instrument the ERA's approach uses both the OLS and LAD estimators for estimating equity beta.

Low beta bias

993. The ERA has given consideration to low beta bias. The low beta bias is an observation that *ex-post* returns from low beta stocks tend to outperform expected returns.

994. The ERA considered low beta bias for the 2018 gas instrument and concluded that:[591]

- Advice from Partington and Satchell was not supportive of the low beta bias being applied in economic regulation.
- Low beta bias is more of an *ex-post* observation than an *ex-ante* expectation.
- *Ex-ante* empirical results from implied cost of capital models were not reliable as they were subject to theoretical and empirical concerns.

995. Partington and Satchell found that no regard should be given to the low beta bias when estimating the forward-looking required return on equity.[592]

996. Submissions to the discussion paper and focused consultation have submitted that the ERA could consider low beta bias as part of its regulatory discretion when determining the point estimate for equity beta.

997. The ERA received no new evidence to support the consideration of low beta bias.

998. The Independent Panel considered that the ERA's draft decision to not adjust for low beta bias was reasonable as the gas instrument seeks to approximate ex-ante expectations.[593]

999. For the 2022 final gas instrument the ERA gives no consideration and makes no adjustment for low beta bias.

10.4.4.3. Selection of the benchmark sample

1000. The ERA's 2018 gas instrument benchmark sample included the DUET Group, Spark Infrastructure, AusNet Services and the APA Group.

1001. The ERA's sample of live Australian energy networks is reducing, with DUET already being delisted and Spark Infrastructure and AusNet Services delisted in 2022.

[591] ERA, *2018 Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 232-236.

[592] Partington G. and Satchell, S., *Report to the AER: Discussion of submissions on the Draft 2018 Guideline*, November 2018, p. 15.

[593] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 42-45.

1002. The ERA has some concern with the use of such a small sample, including that:

- A forward-looking equity beta requires live firms that can incorporate information into prices, where historical estimates cannot incorporate information due to being delisted.
- A sample that is largely reflective of one firm deviates from a benchmark approach to an actuals approach.
- A small sample may be overly affected by the idiosyncratic position of one firm and its changes over time.
- A sample largely reflective of one firm also may be statistically unreliable.

1003. However, the ERA considers that a small domestic sample may still provide useful and reliable equity beta estimates given the nature of energy network service providers.

- This problem was encountered in a more limited way in the 2018 gas instrument with the delisting of the DUET Group.
- 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.

1004. Given this small sample size the ERA undertook consultation and sought expert views on how to develop a benchmark sample best estimate equity beta.

1005. The ERA considered how the benchmark sample needs to change due to current market developments. In this consideration the ERA has evaluated options including:

- Only using a sample of Australian energy networks.
- Expanding the domestic sample to also include similar domestic infrastructure firms to energy networks.
- Expanding to an international sample of energy networks, alongside the existing domestic energy network sample.

1006. For the purposes of the 2022 final gas instrument the ERA estimates equity beta using a domestic and international energy network sample.

Domestic energy networks

1007. The ERA will largely maintain the 2018 gas instrument approach and include live and recently delisted Australian energy networks.

1008. The ERA will estimate equity beta using a combined domestic energy network sample using weekly returns.

1009. The firms in the combined domestic energy sample will be:

- APA Group
- AusNet Services (using the last available five years)
- DUET Group (using the last available five years)

- Spark Infrastructure (using the last available five years).

1010. While three firms may be delisted, they still have a meaningful number of observations for analysis and provide value in the estimation of equity beta.

1011. The ERA notes that other regulators, such as the AER, Ofgem and Ofwat, have a preference for using domestic samples, even with a small sample. The CRG has also expressed support for the use of small samples.

1012. The ERA considers that using a domestic energy network sample has the following advantages:

- The benchmark sample is kept within Australian capital markets and includes the closest, comparable pure-play energy networks.
- The approach is consistent with prior practice, regulatory approach and precedent.

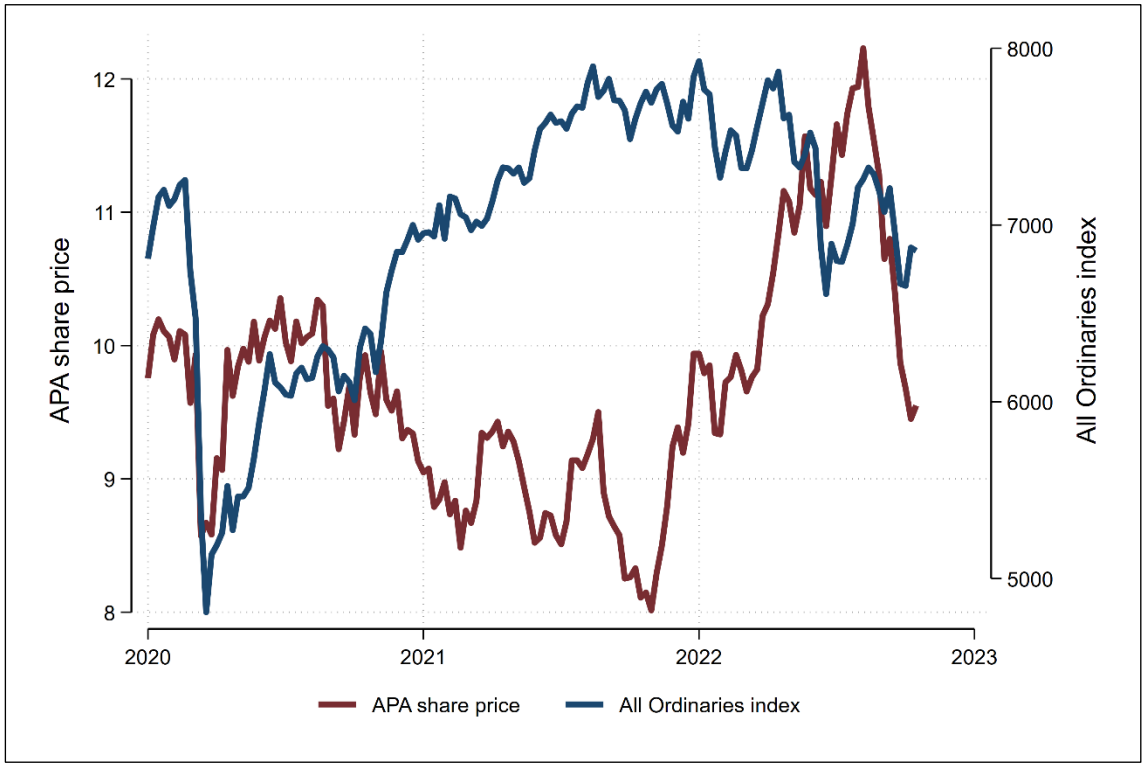
1013. However, the ERA recognises that using the domestic energy network sample has some disadvantages:

- There is only one live firm in the sample, the APA Group.
- The APA Group includes unregulated businesses, along with continuing efforts to diversify its operations.
- The approach relies heavily on the assumption that energy network service provider equity betas are stable and will not differ in the future from historical estimates.

1014. The ERA has previously analysed whether equity beta was stable, especially for the APA Group as the last listed domestic energy network.[594] Since the 2022 draft gas instrument APA's stock price relative to the All Ordinaries has exhibited even more volatility as displayed in Figure 11.

[594] ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, pp. 163-165.

Figure 11: APA Group and All Ordinaries share price/index levels



Source: ERA analysis.

1015. The ERA considers that APA's continued volatility necessitates the continued use of recently delisted firms.

1016. Accordingly, the ERA will include in its domestic benchmark sample recently delisted firms alongside the APA Group.

1017. Submissions to the 2022 draft gas instrument were largely supportive of the ERA's proposed domestic comparator methodology with the exception of ATCO and the CRG.

1018. ATCO considered that placing weight on delisted firms was inappropriate for the following reasons:[595]

- It reduces the relevance of the beta estimate in estimating expected returns.
- The DUET Group should be omitted or given less weight as it no longer contributes information on the prevailing conditions in the market for equity funds.

1019. The CRG submitted that the best estimate of equity beta can be obtained by giving most weight to the domestic estimates and expanding the sample to include more previously delisted energy networks. The CRG considered that most weight should be placed on the recently delisted Spark Infrastructure and AusNet Services as they are majority regulated firms.[596]

[595] ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 29-30.

[596] CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 30-32.

1020. The ERA maintains that examining recently delisted firms is meaningful and provides information regarding systematic risk. The ERA considers that systematic risk of network service providers is relatively static or time invariant, such that examining recently historical betas can still reliably provide estimates of the expected equity beta. Accordingly, it will not omit the DUET Group from the domestic energy network sample. However, extending the sample to include firms that have been delisted for significantly longer does create concerns with the relevance of the use of this historic information.

1021. The ERA also maintains that the sole reliance on a domestic energy network sample is not desirable given market realities for the reasons described above. The ERA notes that the CRG's submission would put a heavy degree of reliance on two recently delisted firms. The ERA does not consider that an equity beta determination based on two firms is consistent with a benchmark approach as there is a non-trivial possibility that the resulting equity beta estimate will be affected by sources of bias (sampling error, idiosyncratic factors or an omitted variable).

1022. On balance, for the purposes of equity beta estimation for the 2022 final gas instrument the ERA considers that maintaining the domestic energy sample in the near term will lead to the best estimate of equity beta.

Expanded domestic sample – Australian infrastructure

1023. Under the expanded domestic sample option, the ERA considered the use of other listed domestic infrastructure companies alongside energy networks.

1024. The ERA examined listed domestic infrastructure companies operating in rail, transportation, ports, airports and telecommunications. The companies evaluated by the ERA are listed in the discussion paper.

1025. Submissions to the ERA's discussion paper and focused consultation did not support this approach.

1026. The ERA considered that the expanded domestic sample option has the following advantages:

- It increases the sample of live firms, while retaining a sample that is based in Australia.
- It represents an extension of existing practice, regulatory approach and precedent.

1027. The ERA considered that the domestic infrastructure option has the following disadvantages:

- Such an approach moves away from the pure-play energy network benchmark approach. There is likely to be large additional idiosyncratic risks introduced, which may require adjustments.
- The risks of further delistings remains in this domestic industry sample, given investor interest for Australian infrastructure assets.
- When it examined the domestic infrastructure betas, the ERA did not have confidence that they were comparable to an energy network.

1028. On balance, for the purposes of equity beta the ERA considers that an expanded domestic sample is not appropriate and would move away from a process that sets efficient rates for energy networks.

International sample – International energy networks

1029. The ERA considered the use of a combined domestic energy network sample and the incorporation of international comparators that are similar to gas network service providers.

1030. The ERA notes that international comparators are commonly used by other regulators to estimate equity beta:

- IPART uses a broad selection of stocks that includes international firms as it considered that it is likely to be "more objective, more likely to yield statistically reliable estimates, and more resistant to problems caused by companies dropping out of the sample over time."[597]
- The QCA stated that there is not "a sufficient number of listed Australian firms for us to draw upon in order to determine reasonable betas" and any country-specific effects on beta estimates can "be limited by using a sample of relevant firms from a cross-section of countries where possible." [598]

1031. The ERA considered listed firms from jurisdictions that would be most comparable to Australia. Comparability was assessed on the basis of regulatory and market characteristics. The ERA has also considered submissions to the 2022 draft gas instrument.

1032. With regard to regulatory characteristics, the ERA looks to countries where energy networks operate under similar regulatory, legal and other institutional arrangements to those in Australia.

1033. With regard to market factors, the ERA looks to countries with capital markets that are sufficiently deep, liquid, large and informationally efficient.

1034. On this basis the ERA considers that Commonwealth countries such as the United Kingdom, Canada and New Zealand are close matches to Australia. The ERA considers that the United States is also comparable.

1035. Further, the ERA will consider jurisdictions where English is the language used for company disclosures to assist analysis and verification as this would improve transparency and replication by stakeholders.

1036. Additionally, the ERA considers that it should adopt 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.

1037. The ERA has examined listed firms operating energy networks in the United States, Canada, the United Kingdom and New Zealand.

1038. For the 2022 draft gas instrument the ERA developed an international comparator sample of 58 firms. The ERA considers that these firms are sufficiently comparable to the benchmark firm to contribute to the development of a robust estimate of equity beta for the purposes of the 2022 final gas instrument.

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[597] IPART, *Review of our WACC method*, February 2018, p. 7.

[598] QCA, *Final Report: Rate of Return Review*, November 2021, pp. 71-72.

1039. The ERA considers that using international comparators has the following advantages:

- An extended sample size results in equity beta estimates that are reliable and less sensitive to individual equity beta estimates of the Australian energy network sample.
- Using international samples is a more robust approach over time, given that there is currently only one listed Australian energy network.
- Other regulators have been using international comparators for their equity beta estimation, largely driven by the difficulty in finding a sufficient number of comparable businesses to estimate equity beta using a purely domestic sample.

1040. The ERA has previously had reservations about the use of international comparators.[599] The ERA considers that the international sample option has the following disadvantages:

- The use of international comparators presents a departure from existing practice, regulatory approach and precedent.
- The introduction of international comparators may introduce differences in market structure, regulation and economic factors that affect the estimated beta. If these differences are not quantifiable then they cannot be adjusted to make them comparable to domestic estimates which are the most suitable comparators.

1041. The ERA considers that market circumstances necessitate the examination of international energy networks in the benchmark sample. The filters described above are used to identify comparators with a similar degree of risk to the benchmark firm, to the extent possible given market realities.

1042. Comparators from non-Australian jurisdictions are likely to be different to domestic comparators on various dimensions on a theoretical and conceptual level. The ERA considers that by selecting comparators from appropriate jurisdictions and with a material degree of regulated activities will sufficiently control for differences that may exist between domestic and international comparators.

1043. The ERA notes that the divergence of firms from the benchmark entity is not unique to international comparators. The domestic energy sample is not exactly identical to the benchmark entity, especially with APA as the sole remaining listed comparator.

1044. The NZCC did not consider it necessary to make adjustments for beta estimates for differences in systematic risk due to regulatory differences by country when evaluating international samples.[600] Neither do other Australian regulators such as QCA or IPART.

1045. The ERA will also continue to estimate equity beta using a combined energy network sample approach that includes electricity and gas networks. The ERA notes that no new information has been provided on this except for GGT's submission. However, GGT's submission only indicated that this was a matter for future consideration.

[599] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 44-45, 230.

[600] NZCC, *Input Methodologies (Electricity distribution and gas pipeline services) – Reasons paper*, December 2010, pp. 540-542.

1046. The CRG continues to oppose the use of international comparators given their concerns regarding the differences in capital markets, the economic features of international firms, the presence of non-regulated activities and differences in regulatory arrangements.[601]

1047. AGIG provided a response to the CRG's concerns, stating that the CRG has not actually provided actual evidence of differences between jurisdictions, but only asserted that they exist. AGIG also considered that the ERA had adequately dealt with the concerns in the explanatory statement to the 2022 draft gas instrument and agreed with the Independent Panel's finding that it is a pragmatic solution. Further, AGIG noted that other regulators have adopted a similar solution.[602]

1048. The ERA maintains that market realities, both the reducing domestic sample and recent market volatility, justify the consideration of international energy networks in the benchmark sample. The differences that the CRG refers to are considerations that the ERA has had regard to when selecting international comparators. Additionally, the use of a material regulated activities filter further reduces the effect of differences that may exist between domestic and international estimates of equity beta. As the ERA does not pool or otherwise use international estimates in a mechanical fashion, the exercise of regulatory discretion is informed by the likelihood that some differences remain and must be accounted for by regulatory discretion.

1049. On balance, given the smaller and increasingly historical Australian domestic sample, the ERA will examine both domestic and international listed energy networks when estimating the equity beta for Australian energy networks.

1050. For the 2022 final gas instrument the ERA will:

- Use a domestic CAPM model for each country to estimate the equity beta. The use of an international CAPM would introduce complexity without substantial benefits as it relies on stronger assumptions than the domestic CAPM.[603]
- Only include firms where the majority of the observations are present in the estimation window.
- Check for material M&A activities involving selected firms.
- Consistent with the manner in which domestic equity beta estimates are unlevered and re-levered to the benchmark gearing level, perform the same procedure for international equity beta estimates.

Material regulated activities

1051. The ERA's 2022 draft gas instrument included a filter for international comparators such that only ones with material regulated activities would be included in the sample.

1052. The ERA considered that this was appropriate to achieve a close match with the benchmark entity such that observed comparators would likely have a similar degree of risk with the benchmark entity.

601 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 31.

602 AGIG, *Submission to Draft Gas Instrument*, September 2022, p. 6.

603 Partington, G. and Satchel, S., *Report to the AER: Alternative Asset Pricing Models*, June 2020, pp. 28-34.

1053. The ERA considers that the observed equity beta of a firm is equal to the weighted average of segment equity betas. This condition comes from the concept that a firm is equivalent to a portfolio with underlying assets being different business segments. Accordingly, firms with a material degree of regulated activities will likely have an observed equity beta that largely consists of the beta from the regulated segment. Theoretically, market values are the appropriate weights but are not observable as business segments are not traded separately to the combined entity.

1054. The CRG has submitted that revenues should be considered as the basis of materiality. While the ERA considers that revenue can be a useful proxy, it has limited value when there are other business segments present due to differential profitability. For example, a firm whose regulated activities may be a low percentage of total revenue may be a high percentage of profitability. The ERA considers that the market attaches value to profitability rather than revenue. Assets may suffer from similar problems as the market valuation of assets may not be the same as the book value.

1055. Given these matters, the ERA considers that materiality should be considered on a holistic basis with reference to some defined factors. The ERA will exercise regulatory judgement in considering the degree of material regulated activities instead of setting a quantitative threshold.

1056. The ERA will consider the following factors in its determination of materiality:

- Revenues
- Operating profits
- Assets.

1057. The ERA will consider Bloomberg data and company disclosures as the basis for the above factors.

10.4.4.4. Equity beta estimation

1058. The ERA's further considerations on the statistical equity beta estimation method are detailed below.

Market volatility

1059. The ERA analysed the effect of market volatility on equity beta in the explanatory statement to the 2022 draft gas instrument.[604]

1060. Since the 2018 gas instrument Australian markets have been affected by the COVID-19 pandemic, the conflict in Ukraine and merger announcements.

1061. These market developments have affected the three remaining listed energy networks. As the equity beta measures the correlation of a firm to the broader market, both changes in the returns of a firm and the returns to the market can affect an estimate of beta.

1062. The ERA notes that these market events affect the empirical estimates of equity beta in Australia.

[604] ERA, *Explanatory statement for the 2022 draft gas instrument*, June 2022, p. 169-170.

1063. The ERA's position on market volatility can be summarised by the following:

- An estimation window is intended to capture returns throughout the economic cycle which also includes downturns. Economic shocks are a natural part of the economic cycle and to remove these observations would be to affect the distribution of returns. Instead, the use of 10-year windows will also be considered with five-year windows.
- It is difficult to identify COVID-19 related shock events given the multiple waves and interventions that occurred during 2020 and continuing.
- The ERA's current approach of using robust estimators would moderate the impact of outliers, where events such as COVID-19 could be considered to be such an outlier.
- Past submissions by stakeholders did not support methods to remove market data to account for shocks. Most noted that shocks are unpredictable, with some supporting the use of longer estimation windows to potentially address the impact on equity beta. The unexpected nature of shocks makes it difficult to use mechanical approaches to handle such issues ex-ante, which requires the use of regulatory discretion.

1064. For the purposes of the 2022 final gas instrument the ERA's approach is that market shocks do not require an adjustment of the returns in the estimation sample, but will be analysed through the examination of five and 10-year beta estimates, consideration of robust estimations along with regulatory discretion.

Mergers and acquisitions (M&A)

1065. The ERA discussed the effect of M&A on equity beta in the explanatory statement to the 2022 draft gas instrument.[605]

1066. All firms in the Australian energy network sample have been the subject of takeover offers or have been part of takeover bids. This is also true for some firms in the international sample.

1067. Besides reducing the number of live firms through delisting a company, an acquisition transaction may affect the informativeness of returns around the announcement window and towards close:

- A firm's price that is subject to a takeover will be affected by the timing of acquisition news. This effect on the firm's price will affect its measured covariance with the market return that is idiosyncratic. Acquisitions are generally subject to large premiums on the current market price.
- Similarly, a firm's price post acquisition announcement may also be abnormal.
- It is likely price changes post announcement reflect changing expectations of takeover success, not systematic risk.
- An announced target price could create a floor and ceiling that reduces the price informativeness of future trading given the convergence of the share price to the offer price conditioning on success.

[605] ERA, *Explanatory Statement for the 2022 Gas Rate of Return Draft Instrument*, June 2022, pp. 171-172.

1068. The ERA's position on the effect of M&A can be summarised as:

- Returns on announcement dates likely reflect idiosyncratic news rather than systematic risk.
- It is unclear how returns pre-takeover and post-takeover announcement should be treated for transactions which result in delistings, where idiosyncratic takeover information may prevent both systematic and fundamental information being incorporated into prices.
- Stakeholders did not support methods such as winsorisation or trimming to deal with M&A.[606]
- The current estimation approach of using robust estimators would moderate the impact of outliers, where takeover announcements could be considered to be such an outlier.

1069. Some submissions to the 2022 draft gas instrument supported the entire removal for a firm from the benchmark sample if there were material M&A transactions. ATCO requested additional clarification regarding the treatment of M&A affected data.[607]

1070. The ERA considers that the removal of firms potentially affected by M&A to be unnecessary in the first instance. Instead, the ERA will check for material M&A activity for the firms in the benchmark sample.

1071. The ERA will use Bloomberg to screen for announced, completed and abandoned M&A events on the energy network sample in the capacity of both buyer and target.

1072. Materiality will be examined with reference to the enterprise value of the comparator. If material M&A activity is identified, the ERA will highlight those firms in the distribution of equity beta for the exercise of regulatory judgement.

1073. The ERA does not consider that the complete removal of potentially affected firms is necessary as suggested by ATCO. The effect of M&A on equity beta is ambiguous and a method that is biased toward removing firms will likely result in a null set over time. However, the selective removal of observations is also problematic as this would involve significant judgement in identifying returns which are "affected" and "unaffected" by M&A activity. The ERA does not consider that such identification can be done in a reliable manner.

1074. Accordingly, the equity beta will be estimated as per the methodology described above, but potentially affected firms will be highlighted in the distribution of equity beta estimates. This will allow the ERA to exercise its regulatory judgement in considering how much weight should be placed on estimates that may be affected by M&A activity.

1075. The ERA's approach for the 2022 final gas instrument is that securities that may be affected by M&A will be examined with the ERA assessing whether to exclude the firm from the sample. The ERA will not winsorise or trim observations.

1076. The ERA considers that the following international comparators may be affected by M&A as listed in Appendix 5.

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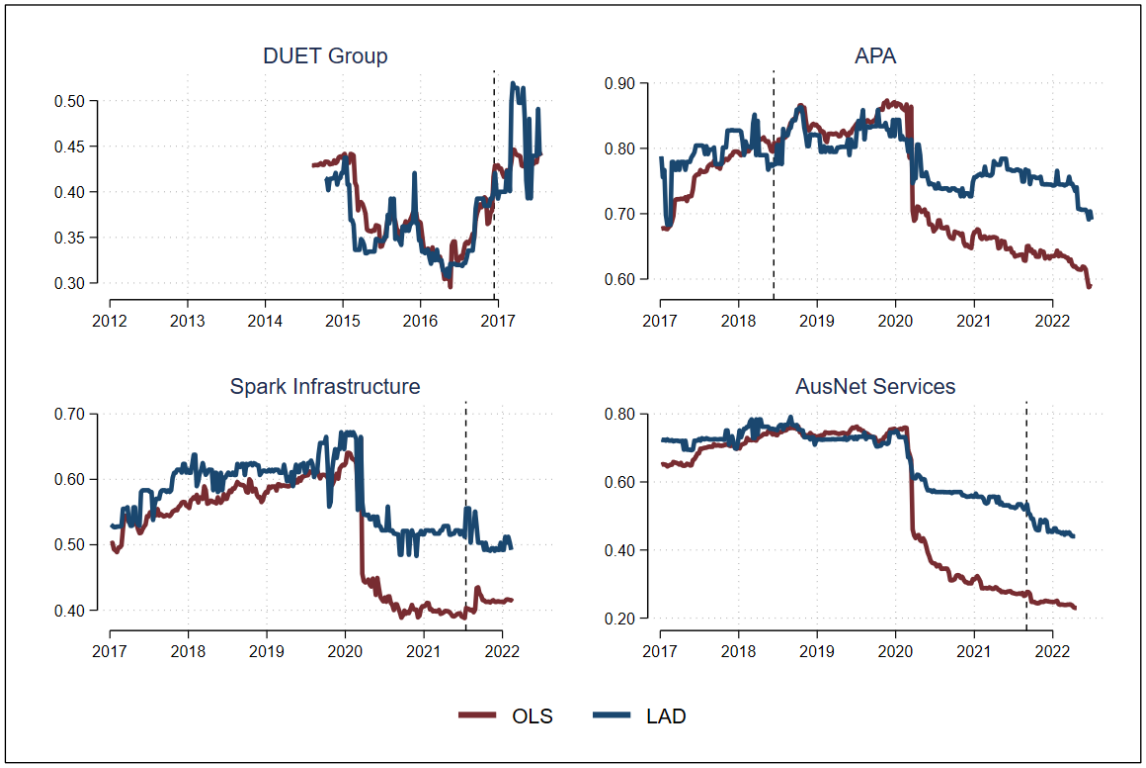
606 Winsorisation and trimming are approaches that address outliers in two separate ways. Winsorisation sets the values beyond a determined threshold point of the distribution (for example, observations less than the 5th percentile and greater than the 95th percentile) equal to that threshold point. By contrast, trimming removes outliers completely from the data set.

607 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 30.

1077. The ERA has further considered the potential impact of M&A on the domestic sample by analysing rolling equity betas alongside transaction announcement dates. This analysis is presented in Figure 12.

Figure 12: M&A analysis for domestic benchmark sample



Source: Bloomberg, company disclosures, ERA analysis.

Note: Dotted lines refer to transaction announcement dates for the respective company. Presented betas are not adjusted to the ERA's benchmark gearing level.

1078. The ERA considers that there is no identifiable systematic impact on equity beta that would justify the removal of firms from the domestic benchmark sample. The ERA notes that there are instances of stale trading towards transaction close for a delisting, where returns are zero per cent for target companies which would likely attenuate the beta estimate. However, this is likely moderated by transaction premiums that are likely to increase measured equity beta.

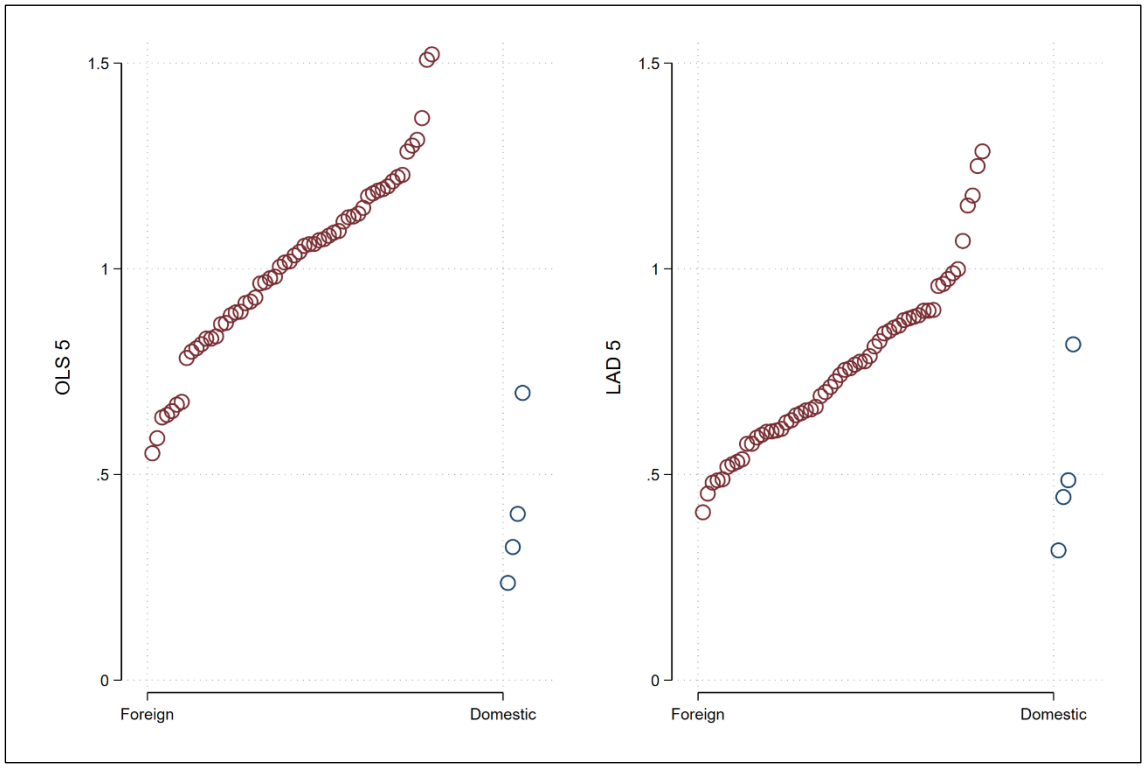
1079. Accordingly, the ERA will estimate the domestic energy network sample with all available information for both five and ten year windows, but will exercise regulatory discretion.

Differences in equity beta between domestic and international firms

1080. The ERA considers that differences in equity beta between domestic and foreign firms cannot be meaningfully answered in an empirical manner due to the number of observations that such analysis is being applied to.

1081. The domestic energy sample consists of four firms, where equity beta is not observed but estimated with some error. Whilst it may be possible to apply statistical tests to evaluate differences between the domestic and foreign estimates, the ERA notes that this does not remedy the fact that this analysis is attempting a comparison between four Australian and 58 international estimates. This is illustrated by the distribution analysis in Figure 13.

Figure 13: Distribution of equity beta for five year OLS and LAD estimates



Source: Bloomberg, ERA analysis.

1082. Accordingly, it is unsurprising that statistical tests are unable to reject the null hypothesis as they are likely to lack sufficient power and may not be meaningful.

1083. Comparators from non-Australian jurisdictions are likely to be different to domestic comparators on various dimensions on a theoretical and conceptual level. The ERA considers that selecting comparators from appropriate jurisdictions and using selection filters will sufficiently control for differences that may exist between domestic and international comparators.

1084. However, qualitatively the conceptual arguments raised by the CRG cannot be rejected. The ERA considers that this additionally requires the separate analysis of equity beta by country, where estimates cannot be pooled together. This also requires the use of regulatory discretion to consider the equity beta distributions when determining the equity beta point estimate.

1085. For the 2022 final gas instrument the ERA will not make adjustments to the international equity beta estimates, but will exercise its regulatory discretion when considering a point estimate from the foreign and domestic estimates.

10.4.4.5. Determination of the final point estimate

1086. The 2022 final gas instrument will provide the same equity beta to all gas network service providers.

- The gas instrument provides an efficient rate of return that best applies to regulated gas pipelines under the national gas framework.
- GGT's submission for a separate equity beta for its network to reflect its circumstances is inconsistent with the benchmark approach used by the regulators to set the rate of return. GGT's submitted approach would also be inconsistent with the concept of incentive-based regulation. As GGT is a covered pipeline, by definition it has characteristics which are shared by other gas network service providers that makes it subject to economic regulation under the National Gas Law. Accordingly, GGT has common characteristics with other covered gas pipelines such that a single benchmark approach is required.
- The decisions made under regulatory frameworks for rail and the Pilbara energy networks cannot be applied to gas network service providers covered under the 2022 final gas instrument. This is because the considerations, objectives and purpose under those regulatory frameworks have resulted in an equity beta method that was specific for those regulatory regimes.
- The rail access regime is a light-handed regulatory framework in which the regulator does not set revenues or prices. Additionally, the systematic risk of rail assets is unlikely to be substantially similar to gas network service providers.
- The Pilbara Networks Access Code (PNAC) is also a light-handed regulatory regime that is specific to Pilbara energy networks and is not directly used to set revenues and prices. Further, under the PNAC, the ERA was required to determine rate of return parameters that were specific to both Horizon Power and Alinta businesses taking into account their circumstances. The determinations made under the PNAC cannot be considered to be a benchmark approach.
- The ERA maintains that it is not appropriate for the results from one separate process to be substituted into another as the regulatory environments and risk profiles are entirely different.

1087. The ERA conducted consultation regarding methods to combine domestic and international estimates to form the point estimate for the gas instrument.

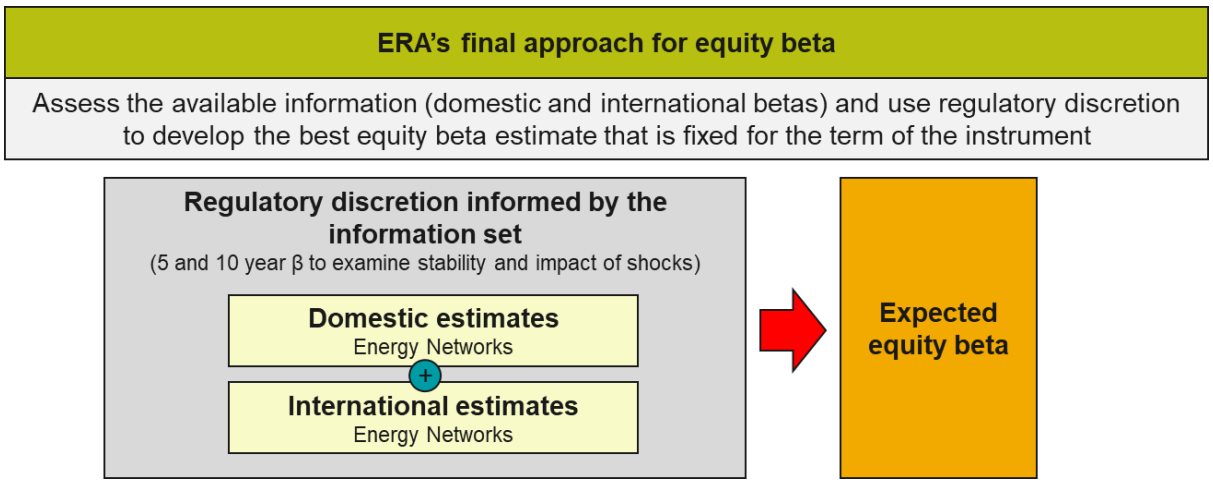
1088. The ERA put forward three approaches for discussion:

- *Full pooling* - Combining all estimates and equally weighting them.
- *Country pooling* - Separating estimates by country, estimating country means that they are then equally weighted.
- *Domestic anchoring* - Putting more weight on domestic estimates as an anchor, which is then modified by lower weightings on international estimates (either individually or by country).

1089. The ERA applies country pooling for the 2022 final gas instrument. The ERA considers that this approach allows for the examination of country specific effects that may not be apparent under a full pooling approach, along with visibility over any variability of estimates within each country. This may reveal differences between countries that would otherwise be difficult to quantify, allowing for adjustment via regulatory discretion.

1090. The ERA's approach to determining an equity beta point estimate for the 2022 final gas instrument is summarised in Figure 14.

Figure 14: ERA's approach to determining an equity beta point estimate



1091. To determine a point estimate for equity beta for the 2022 final gas instrument the ERA:

- Uses domestic and international comparator firms.
- Considers five-year and 10-year data periods.
- Mechanically estimates equity beta using the method described above, including the use of OLS and LAD estimators.
- Pools beta estimates by country.
- Examines the distribution of equity betas.
- Exercises regulatory discretion to determine the best point estimate.

1092. The equity beta will be fixed for the term of the instrument.

1093. The use of regulatory discretion in estimating equity beta means that a formulaic method that updates at each access arrangement determination is not possible. Accordingly, the equity beta will be determined and fixed in the instrument. Furthermore, the ERA considers that the expected equity beta exhibits short-term stability that makes it appropriate to be fixed for the term of the instrument.

2022 final gas instrument equity beta estimates

1094. On the basis of the above considerations, the ERA's equity beta estimation has been conducted on a domestic energy network sample and the international comparators detailed in Appendix 4.

1095. For the purposes of the 2022 final gas instrument the ERA uses a five-year (July 2016 to June 2022) and 10-year (July 2011 to June 2022) sample period.

1096. As the ERA is considering international comparators, the ERA has examined equity beta on a country-by-country basis.

1097. To arrive at an estimate of equity beta, the ERA will use its discretion informed by the estimates from all examined countries and time frames.

1098. The Australian domestic energy sample estimates are detailed in Table 13 and Table 14.

Table 13: Australian five-year equity beta estimates at benchmark leverage

	Assets					Portfolios			
Estimator	APA	AST	DUE	SKI	**Average of Assets**	Equal Weighted	Value Weighted	Average of Portfolios	**Average of Assets and Portfolios**
OLS	0.70	0.24	0.32	0.40	**0.42**	0.40	0.39	**0.39**	**0.40**
LAD	0.82	0.45	0.32	0.49	**0.52**	0.51	0.61	**0.56**	**0.54**
Mean All Methods	**0.76**	**0.34**	**0.32**	**0.45**	**0.47**	**0.45**	**0.50**	**0.48**	**0.47**

Source: ERA analysis.

Table 14: Australian 10-year equity beta estimates at benchmark leverage

	Assets					Portfolios			
Estimator	APA	AST	DUE	SKI	**Average of Assets**	Equal Weighted	Value Weighted	Average of Portfolios	**Average of Assets and Portfolios**
OLS	0.76	0.39	0.32	0.42	**0.47**	0.45	0.48	**0.46**	**0.47**
LAD	0.85	0.54	0.27	0.49	**0.54**	0.57	0.58	**0.58**	**0.56**
Mean All Methods	**0.80**	**0.47**	**0.29**	**0.46**	**0.51**	**0.51**	**0.53**	**0.52**	**0.51**

Source: ERA analysis.

1099. The Australian energy network sample produces a range of individual firm beta estimates from 0.2 to 0.9. The average beta estimate from the Australian energy network sample is 0.5.

1100. A summary of the domestic and international energy sample estimates is detailed in Table 15. Detailed beta estimates are provided in Appendix 6.

Table 15: Domestic and international equity beta estimates at benchmark leverage

Estimator	AUS	US	Canada	UK	NZ	Mean of all countries
Panel A: 5 year estimates						
OLS	0.40	1.03	0.94	0.92	0.65	0.79
LAD	0.54	0.74	0.86	0.77	0.64	0.71
Mean All Methods	**0.47**	**0.89**	**0.90**	**0.85**	**0.65**	**0.75**

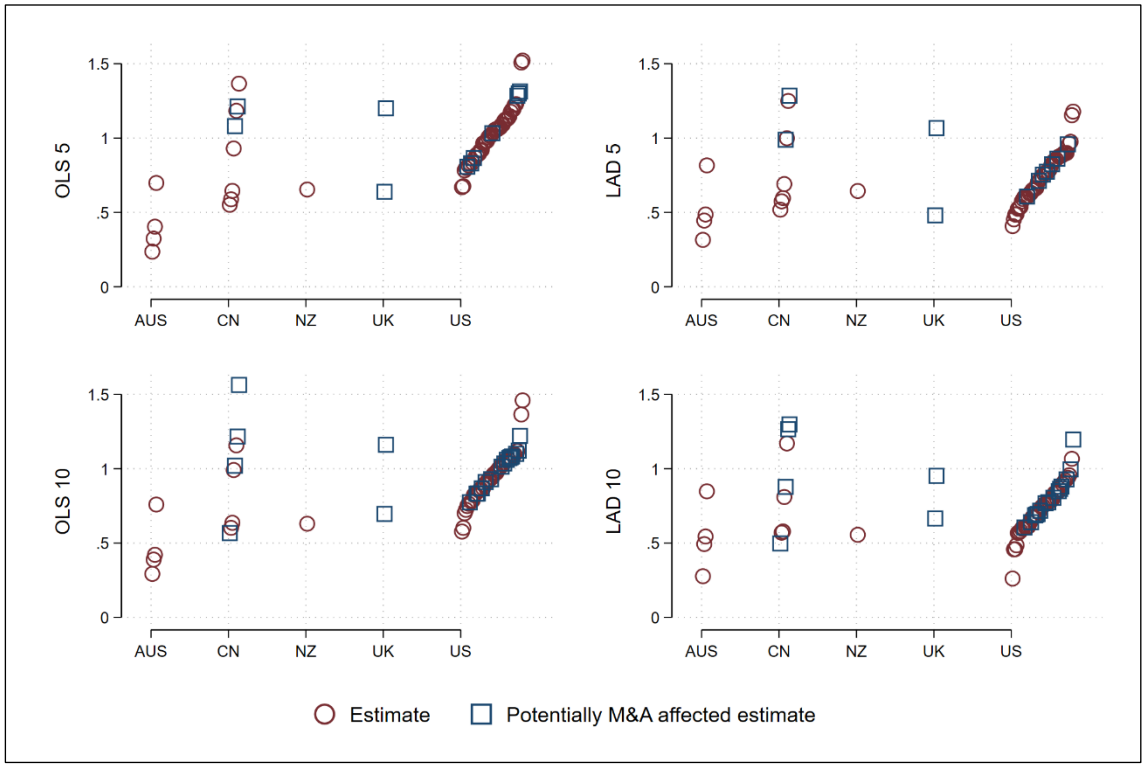
Estimator	AUS	US	Canada	UK	NZ	Mean of all countries
Panel B: 10 year estimates						
OLS	0.47	0.95	0.97	0.93	0.63	0.79
LAD	0.56	0.74	0.88	0.81	0.56	0.71
Mean All Methods	**0.51**	**0.84**	**0.93**	**0.87**	**0.59**	**0.75**

Source: ERA analysis.

1101. The ERA considers that the domestic energy sample provides a range of equity beta estimates from 0.4 to 0.6. When international comparators are examined, this provides a range of estimates from 0.6 to 1.0. The average beta estimate across all countries and estimation windows is 0.75.

1102. The ERA has considered the full distribution of five and 10-year equity beta estimates as illustrated in Figure 15, which identifies companies that may be affected by M&A.

Figure 15: Equity beta distributions at benchmark leverage



Source: Bloomberg, ERA analysis.

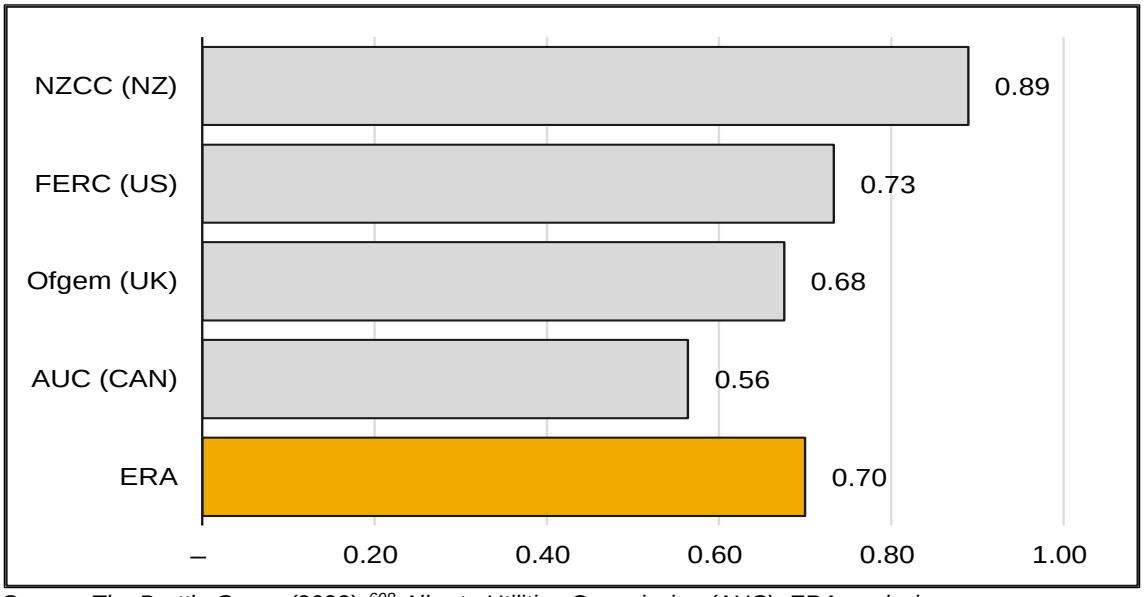
1103. To select a point estimate for equity beta, the ERA considers all available information and uses its discretion to select a point estimate. Given the imprecision in the estimation process the ERA will continue its practice of rounding to the nearest first decimal place.

1104. The ERA considers that 0.7 is the best estimate for equity beta for the benchmark network.

1105. As the international sample was selected based on legal, regulatory and institutional comparability, the ERA considers that the equity beta determinations from regulators in those jurisdictions can be considered as reference points.

1106. The ERA has made some adjustments, principally to benchmark leverage, to make equity beta estimates broadly comparable. The results of such adjustments are illustrated in Figure 16.

Figure 16: Other economic regulators' equity beta estimates standardised to ERA parameters



Source: The Brattle Group (2022),[608] Alberta Utilities Commission (AUC), ERA analysis.

Note: All equity betas are re-levered to ERA target leverage. As FERC utilises actual leverage a notional 40% gearing ratio was assumed before being re-levered to ERA assumptions.

1107. The ERA does not use such reference points in a mechanistic or deterministic manner. However, the ERA notes that the 0.7 point estimate lies within the range of equity beta determinations from comparable regulators.

1108. For the purposes of the 2022 final gas instrument, the ERA applies an equity beta of 0.7. The equity beta will remain fixed for the term of the gas instrument.

1109. In determining equity beta, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information or conditions. The equity beta estimate is transparent. The use of a fixed equity beta is readily implementable over the term of the instrument. The ERA considers that the use of an equity beta of 0.7 is fit for the purpose of the 2022 final gas instrument.

[608] The Brattle Group, *International Rate of Return Methods – Recent Developments*, September 2022.

1110. Based on the preceding reasoning, the ERA considers that the estimation method for equity beta set out in the 2022 final gas instrument will provide the best estimate of equity beta over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation method and parameter values that provide the best estimate of equity beta, in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the equity beta set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

11. Debt and equity raising costs

1111. Debt and equity raising costs and debt hedging costs are the administrative costs and other charges incurred by businesses when obtaining and hedging finance.

1112. Regulators across Australia have typically included allowances to account for the costs of raising finance in their regulatory decisions. Regulators take different approaches to the recovery of these financing costs through either:

- the rate of return
- operating expenditure

or

- the capitalisation of these costs.

1113. Australian regulators use benchmark estimates to determine debt-raising costs. To do so, regulators attempt to derive an estimate of the cost of obtaining finance that reflects the costs that would be incurred by a well-managed efficient benchmark business operating in a competitive market.

1114. This chapter outlines the ERA's reasoning for its final position on debt and equity raising costs as outlined in the 2022 final gas instrument.

11.1. Draft position

1115. The 2018 gas instrument set out that the rate of return included:[609]

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

1116. The ERA reviewed debt raising and hedging costs as part the 2022 gas instrument review. Consultation on debt raising and hedging costs was undertaking as part of the gas instrument discussion paper and further targeted consultation on a new report from Chairmont Consulting.[610]

1117. The Chairmont report updated estimates of debt raising and hedging costs for current market conditions and proposed to increase:[611]

- The debt-raising cost allowance from 0.100 per cent to 0.155 per cent per annum. This increase is largely due to the additional one-off costs included as part of operational expenses, the higher offshore issuance costs, inclusion of costs for a second credit rating and annual surveillance.
- The debt-hedging cost allowance from 0.114 per cent to 0.123 per cent per annum with the addition of an allowance for the costs involved in negotiating an International Swaps Dealers Agreement (ISDA) as part of one-off operational expenses.

609 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, pp. 35-36.

610 Chairmont, *Debt Raising and Hedging Costs*, December 2021.

611 Chairmont, *Debt Raising and Hedging Costs*, December 2021.

1118. The ERA considered that the debt-raising costs included in the rate of return should only include the direct cost components recommended by the Allen Consulting Group in its 2004 report to the ACCC.[612] The approach set out in this report had been adopted by Australian regulators over the last 10 years. The ERA considered that this approach was robust, still relevant and fit for purpose.

1119. The ERA gave further consideration to five additional areas raised by stakeholders:

- Higher arranger fees based on Bloomberg data
- Issue price discount
- Liquidity facilities costs
- Three-month refinancing fee
- Environmental, Social and Governance (ESG) costs.

1120. As a result of these considerations, and as part of its 2022 draft gas instrument the ERA:[613]

- Increased the Chairmont's arranger fee by 1 basis point per annum to provide some weight to additional Bloomberg information.
- Did not include the issue price discounts, liquidity facilities costs, three-month refinancing fee and the ESG costs in the debt raising cost estimate.

1121. The ERA accepted Chairmont's updated debt hedging costs and an allowance for debt hedging costs was provided to firms to compensate them for the costs of conducting hedging for exposure to movements in the risk free rate for the hybrid trailing average debt approach.

1122. The 2022 draft gas instrument applied:[614]

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

1123. The debt raising costs and debt hedging costs were added to the return on debt and remained fixed for the period of the instrument.[615]

1124. 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.[616]

[612] The Allen Consulting Group, *Debt and Equity Raising Transaction Costs: Final Report*, December 2004.

[613] ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, June 2022, p. 176.

[614] ERA, *2022 draft gas rate of return instrument*, June 2022, p. 19.

[615] ERA, *2022 draft gas rate of return instrument*, June 2022, p. 19.

[616] ERA, *2022 draft gas rate of return instrument*, June 2022, p. 19.

11.2. Consultation

11.2.1. Independent Panel Report

1125. The Independent Panel considered the ERA approach to debt and equity raising costs was appropriate and based on sounding reasoning.[617]

1126. The Independent Panel noted that the increase of debt raising and hedging costs have a much smaller impact than other inputs of the rate of return.[618]

1127. The Independent Panel supported the ERA's draft position on each of the debt raising cost components:[619]

- *Higher arranger fees*: Considered the addition of one basis point per annum to partially incorporate the insights available from the Bloomberg sample was appropriate.
- *Issue price discount*: Considered many factors cause trading prices to differ from issued prices, not all of which may be related to the fee paid by the issuers. The ERA's decision not to consider issue price discounts was appropriate.
- *Liquidity facilities costs*: Considered the decision to exclude liquidity facilities costs was appropriate but the Independent Panel suggested that the matter of liquidity facilities costs be clarified in future instrument reviews.
- *Three-month refinancing fee*: Considered that the ERA's decision to not make an allowance for the three-month financing fee in the debt raising costs was appropriate. Suggested that the ERA consider more fully exploring this issue in future reviews.
- *ESG costs*: Considered the ERA's decision to exclude ESG costs from the Instrument was appropriate. ESG trends may increase the cost of debt or the cost of raising debt for the benchmark firm, but at present the nature and extent of this impact was unknown.

11.2.2. Stakeholder submissions

1128. Four of the submissions to the 2022 draft gas instrument commented on the debt raising and hedging costs.[620,621,622,623]

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617 Independent Panel, *Independent Panel Review of the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 46.

618 Independent Panel, *Independent Panel Review of the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 46.

619 Independent Panel, *Independent Panel Review of the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, pp. 46-48.

620 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 18-19.

621 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 32.

622 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 42.

623 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 33.

1129. All four submissions supported the increase of debt hedging costs to 0.123 per cent per annum proposed in the 2022 draft gas instrument.[624,625,626,627]

1130. Three submissions supported the increase of debt raising costs of 0.165 per cent per annum proposed in the 2022 draft gas instrument.[628,629,630] ATCO provided partial support to the increased debt raising costs.[631]

1131. The CRG considered that the ERA has provided sufficient information to support its proposed increases for debt raising and debt hedging costs.[632]

1132. AGIG supported the ERA's proposed increase of debt raising costs to 0.165 per cent per annum, but raised some concern with three areas:[633]

- *Size of debt issued*: AGIG suggested the ERA further review the benchmark debt level, as it viewed that it was much larger than any business being regulated.
- *Liquidity facilities costs*: AGIG submitted that the ERA needs to further clarify liquidity facilities costs and whether these costs should be included.
- *Three-month refinancing fee*: Whilst agreeing with the ERA's position that the benchmark financing strategy minimises risk, AGIG considered that debt was still required to be refinanced before debt was due, instead of waiting until the day of expiry.

1133. While providing broad support for the ERA increasing debt raising costs, ATCO submitted that the ERA should consider increasing the debt raising cost allowance further to take account of the following additional costs:[634]

- *Higher arranger fees*: ATCO submitted that the ERA should reconsider the weight to the Competition Economists Group (CEG) estimate from Bloomberg. The final weighting should have greater regard to the lack of any transparency associated with Chairmont's confidential survey method and the AER's prior rejection of Chairmont's method and CEG's detailed exposition of its own replicable estimate.
- *Issue price discount*: ATCO recommended that the ERA review the issue price discount. ATCO supported CEG's analysis and maintained that the ERA should increase the allowance for issue price discount costs by 5.1 basis point per annum in accordance with its April 2022 submission.

624 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 18-19.
625 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 32.
626 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 42.
627 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 33.
628 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 18-19.
629 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 42.
630 GGT, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 33.
631 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 32.
632 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 42.
633 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 18-19.
634 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 32.

- *Liquidity facilities costs and three-month refinancing fee*: ATCO submitted that it would not be possible to maintain an investment grade credit rating without liquidity facilities or early refinancing. ATCO also submitted that there is no compensation in the ERA's working capital allowance for the costs of liquidity management associated with debt refinancing.

11.3. 2022 final approach

11.3.1. Debt raising costs

1134. The 2022 final gas instrument applies debt raising costs of 0.165 per cent per annum.

1135. The debt raising cost allowance will be added to the return on debt.

1136. The debt raising cost will remain fixed for the term of the instrument.

11.3.2. Debt hedging costs

1137. An annual swap allowance of 0.123 per cent is provided to firms to compensate for the cost of conducting hedging for exposure to movements in the risk free rate.

1138. The hedging cost allowance will be added to the return on debt.

1139. The debt hedging cost will remain fixed for the term of the instrument.

11.3.3. Equity raising costs

1140. The ERA will provide an allowance for equity raising transaction costs in the capital expenditure building block, and so these costs do not form part of the rate of return.

11.4. Reasoning

1141. The reasoning for the ERA's final approach for debt issuing and hedging costs is consistent with its draft reasoning, informed by the Independent Panel and public submissions, and detailed below.

11.4.1. Debt raising costs

1142. Regulators across Australia have typically included allowances to account for the costs of obtaining finance (debt raising) in their regulatory decisions.

1143. Many Australian regulators use benchmark estimates to determine debt-raising costs to derive an estimate of the cost of obtaining finance that reflects the costs that would be incurred by a well-managed efficient benchmark entity operating in a competitive market.

1144. The ERA considers that the recovery of debt-raising costs through the rate of return should only include the direct cost components recommended by the Allen Consulting Group in its 2004 report to the ACCC.[635] The approach set out in this report has largely been adopted by Australian regulators.

[635] The Allen Consulting Group, *Debt and Equity Raising Transaction Costs: Final Report*, December 2004.

1145. The ERA considers that direct debt-raising costs can be recompensed in proportion to the average annual issuance, and cover:

- *Gross underwriting fees*: This includes management fees, selling fees, arranger fees and the cost of an underwriter for the debt.
- *Legal and roadshow fees*: This includes fees for legal documentation and fees involved in creating and marketing a prospectus.
- *Company credit rating fees*: A credit rating is generally required for the issue of a debt raising instrument. A company is charged annually by the credit rating agency for the services of providing a credit rating.
- *Issue credit rating fees*: A separate credit rating is obtained for each debt issue.
- *Registry fees*: The maintenance of the bond register.
- *Paying fees*: Payment of a coupon and principal to the security holder on behalf of the issuer.

1146. In addition, in its report to the ACCC in December 2004, the Allen Consulting Group considered that some debt transaction costs would continue to be incurred for the whole value of the investment.[636] It also took the view that the most appropriate means of recovering these debt raising costs would either be as an addition to the estimated weighted average cost of capital or as a direct allowance to operating expenses.[637]

1147. The debt raising allowance is treated differently by different regulators. For example, the AER has considered this allowance as an operating expense, whereas state-based regulators, including the ERA, have generally incorporated this allowance in the rate of return calculations.

1148. The Allen Consulting Group's 2004 study determined debt raising costs based on long term bond issues, consistent with the assumptions applied in determining the costs of debt for a benchmark regulated entity. Debt raising costs were based on costs associated with Australian international bond issues and for Australian medium-term notes sold jointly in Australia and overseas.[638]

1149. The ERA and other comparable Australian regulators have adopted estimates of debt raising costs ranging from 8.0 to 15.0 basis points per annum in previous regulatory decisions (see Table 16).

[636] Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. xiii.

[637] Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. xix.

[638] Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. 53.

Table 16: Debt raising costs in Australian regulatory decisions

Regulator	Year	Allowance (bppa)
ESCOSA[639]	2016	12.5
IPART[640]	2018	12.5
ERA[641]	2018	10.0
AER[642]	2021	8.2
ESC[643]	2021	15.0
QCA[644]	2021	10.0
OTTER[645, 646]	2022	8.0

Source: ERA analysis

1150. The ERA engaged Chairmont to review debt raising costs for a regulated benchmark energy network that operates efficiently consistent with the ERA's debt approach. [647]

1151. Chairmont found that the allowance for debt raising costs should be increased from 0.100 per cent to 0.155 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.[648]

1152. Stakeholder submissions to the Chairmont report supported the proposed increase of debt raising costs.

1153. The ERA notes the submissions from AGIG commenting that the size of the benchmark debt issuance was too large and not reflective of covered gas pipelines.[649]

1154. The ERA considers that there are no clear relationships between the size of debt issuance and its cost. Under the incentive regulation, a regulator does not compensate a regulated service provider for its actual costs but compensates it as if it were operating and financed efficiently. Setting a regulatory allowance based on a firm's actual costs may also account for suboptimal decisions for its business or financial structure. In the next review of debt issuing costs the ERA will consider how to simplify the determination of debt raising costs.

639 ESCOSA, *SA Water Regulatory Determination 2016, Final Determination*, June 2016, p. 122.

640 IPART, *Review of our WACC Method, Final Report*, February 2018, p. 24.

641 ERA, *2018 Final Rate of Return Guidelines*, December 2021, p. 35.

642 AER, *Final Decision: Jemena Distribution Determination 2021-2026 Attachment 3 Rate of Return*, April 2021, p. 10.

643 ESC, *2023 Water Price Review: Guidance paper*, 26 October 2021, p. 40.

644 QCA, *Final Report – Rate of Return Review*, November 2021, p. 51.

645 OTTER, *Investigation into TasWater's Prices and Services for the Period 1 July 2022 to 30 June 2026 Draft Report*, February 2022, p. 67.

646 OTTER rate was informed by the AER's decisions on debt raising costs.

647 Chairmont consulting, *Debt Raising and Hedging Costs*, 21 December 2021.

648 Chairmont consulting, *Debt Raising and Hedging Costs*, 21 December 2021, p. 2.

649 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp.18-19.

1155. The ERA notes that stakeholder submissions to the Chairmont report sought the inclusion of five additional areas when setting the debt raising costs:

- higher arranger fee
- issue price discount
- liquidity facilities costs
- three-month refinancing fee
- ESG costs.

1156. The ERA responds to each of these areas in turn below.

11.4.1.1. Higher arranger fee

1157. Arranger fees are costs relating to bond issues, including setting the terms and price on the debt issue between the arranger or underwriter and a debt issuer.

1158. ATCO commissioned CEG to review debt issuing and hedging costs. CEG considered that an arranger, or an underwriter, is generally an investment bank that works with a debt issuer to both price and market the issuer's debt. An arranger and an issuer will form a view about the market value of a debt issue and set terms on the debt issue (for example, coupon and tenor). Both parties will negotiate an arrangement contract that includes the following factors:[650]

- The issue price at which the issuer will sell the bond, where that issue price will typically be at a discount to the expected market value of the bond for non-financial issuers.
- The direct arrangement fee which the arranger will retain from the issue proceeds for themselves. The fee is generally specified as a percentage of the issue price.

1159. ATCO and CEG submitted that the arranger fee for bond issues should be revised upward by 20 basis points (2.6 basis points per annum) from Chairmont's estimate.[651]

1160. CEG detailed an alternative method to estimate the arranger fee based on actual bond issuance data collected from Bloomberg. CEG considered that its method is transparent and replicable. In considering bond issuance data CEG also applied the following criteria to estimate the arrangement fees:[652]

- Debt issuance over the last ten years (since 1 January 2012).
- Debt issuance of at least $50 million.
- Debt issuances that were non-convertible to equity and non-perpetual.
- Debt issuances where Bloomberg had an estimate of the market value of the bond at the time of issuances.
- Firms that had Australia listed as both the country of risk and country of domicile on Bloomberg and had an investment credit rating.

650 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 9.

651 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, pp. 1-2.

652 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 13.

1161. After applying the criteria above, CEG identified 154 bonds in its dataset issued by 15 corporations, with the majority of those being issued by banks. CEG performed analysis on both non-banks and banks.[653]

1162. After CEG further restricted the bonds with an average tenor between eight to 12 years, the non-bank sample had decreased to 10 bonds by eight issuers. Based on this revised non-bank sample, CEG estimated an average arrangement fee of 55 basis points.[654]

1163. CEG considered that its method is transparent and replicable, in contrast to Chairmont's confidential survey.[655]

1164. CEG has previously submitted a similar method to the AER and noted that the AER favours the Bloomberg estimates for estimating the arranger fees.[656] The ERA understands that the AER uses Bloomberg estimates for the arranger fee and Chairmont's 2019 report for the remaining debt raising costs.[657]

1165. In reviewing the arranger fee estimates, CEG noted a few high outliers of arranger fees paid by bond issuers. While the AER's method excluded these outliers and derived its estimate based on the lower end of the observed arranger fees, CEG found that there was a strong relationship between arranger fees paid to underwriters and the subsequent loss, relative to the issue price, made by underwriters when selling those bonds to the public.[658]

1166. In its advice to the AER on debt issuing costs, Chairmont previously reviewed CEG's report and recognised CEG's use of Bloomberg data to calculate the arranger fee, but considered that:[659]

- An approach that was consistent with benchmarking of debt costs required factors such as term at issuance and credit rating to be included in the selection of bonds for the benchmarking process.
- One important principle of sound benchmarking was to have an appropriate proxy. The Bloomberg filters used for bond selection were not a good proxy for the 10-year benchmark debt instrument.

1167. In response to CEG's arranger fee estimation approach, Chairmont proposed that bond selection criteria should include filters for maturity, rating and non-published data that AER sourced from the industry. The bond selection criteria required the arranger fee to be published on Bloomberg otherwise it was excluded. This meant that only 3 per cent of the bonds that achieved all the other selection criteria (for example, non-convertible) were included in the data set. This filter skewed the data set, so it should be supplemented with additional data.[660]

653 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 14.

654 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 17.

655 CEG, *Debt arranging and liquidity management costs*, April 2022, p. 13.

656 CEG, *Debt arranging and liquidity management costs*, April 2022, p. 5.

657 AER, *Attachment 3: Rate of return – Fina decision – SA Power Networks 2020-25*, June 2020, pp. 3-14.

658 CEG, *Debt transaction costs and PTRM timing benefits*, January 2019, pp. 7, 8-10.

659 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, pp. 4-7.

660 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p.7.

1168. The Chairmont's recent estimate of the arranger fee is based on the ERA's current benchmark debt strategy, which assumes a benchmark debt issuance of $AUD 250 million for 10-year BBB+ corporate debt and $USD 100 million for offshore issuance. Based on informal interviews with financial market intermediaries and other service providers, Chairmont estimated that the arrangement fee would be between 30 basis points and 35 basis points for domestic issuance and approximately 37.5 basis points for offshore issuance. This compares to the CEG's estimate of an average arrangement fee of 55 basis points.

1169. the ERA notes that Chairmont and CEG undertook different approaches to calculate the arranger fee cost including:

- data source and transparency
- factors that affect the arranger fee
- benchmark debt issuance.

1170. The ERA recognises the merits and limitations of Chairmont's and CEG's methods in estimating the debt raising costs.

1171. CEG used market data from Bloomberg to estimate the arranger fee, both in its previous report to South Australia Power Networks and recent report to ATCO.

1172. Chairmont undertook informal interviews with several financial market intermediaries and service providers to assist with determining the debt raising costs.

1173. The ERA undertook further analysis of the CEG's proposed Bloomberg approach to estimate the arranger fee, including the application of the same CEG criteria and restriction of bonds. The ERA observed that:

- Changes to asset class, bond issue date and the date as placeholder can affect the sample size.
- Based on this approach, the non-bank sample comprises 11 bonds by nine issuers, comparing to 10 bonds by eight issuers as reported by CEG.
- While most of the bonds have arranger fees ranging from 35 basis points to 55.9 basis points, two bonds issued by Goodman Australia Finance have the arranger fees of 107 basis points.
- The two bonds issued by Goodman Australia Finance should be treated as outliers and excluded from the arranger fee estimate.
- Based on this revised sample, the ERA estimates an average arranger fee of 42 basis points. This compares to the CEG's estimate of an average arrangement fee of 55 basis points.

1174. The ERA considers that the Bloomberg analysis provides an additional source of public data on the arranger fee estimate that helps to supplement Chairmont's debt issuing cost analysis. However, this estimate is based on a bond sample comprising a broad range of firms, credit ratings and industries. The Bloomberg method appears sensitive to bond issuer and timings. The market data from Bloomberg indicates a higher arranger fee than the Chairmont's estimate by approximately 1 basis point per annum.

1175. On the basis of this analysis, consistent with the 2022 draft gas instrument, the ERA increases the Chairmont's arranger fee by 1 basis point per annum.

11.4.1.2. Issue price discounts

1176. CEG submitted that the arranger fee consisted of a second component, the issue price discount, that was not included in the Chairmont's review. This second component is the value of the discount to the market price of the bond issue retained by the arranger.[661]

1177. To calculate the issue price discount CEG uses Bloomberg data, and its filtered bond sample, and estimates of market prices for the bonds over five days. CEG estimates that the issue price discount was 39 basis points of the issuance amount and associated with a 5.1 basis point per annum increase in debt raising costs.[662] CEG argues that this is similar to the 35 basis points estimated by other research, based on the price discount in the United States for seasoned bond offerings (that is, bond issues by established companies with existing bonds on issue).[663]

1178. CEG stated that it is common for issuers and arrangers to substitute lower arranger fees for higher issue price discounts and vice versa.[664]

1179. Given the ERA's cost of debt method relies on bond yields in the secondary market, CEG considered that excluding the issue price discount from the arranger fee estimate would be incomplete and might undercompensate a benchmark firm by five basis points.[665]

1180. Chairmont has not reported issue price discount as part of the arranger fee estimate in its debt raising cost review for the ERA.

1181. As part of its response to CEG's 2019 analysis of arranger fees, Chairmont considered that for bonds allocated to the underwriter, any post issuance trading price difference was borne by the underwriter, rather than the issuer. Underwriters, or arrangers, were compensated for this risk through the underwriting fee which was included within the overall arranger fee.[666]

1182. The ERA reviewed Chairmont's previous analysis of debt raising cost and found that there are difficulties with accepting the approach proposed by CEG for issue price discounts.[667]

- The arranger fee is negotiated and agreed in the period before bond launch and issuance.
- The underwriter advised and had input into the issuance price prior to it being set.
- The underwriter did not allocate the bonds. The bonds were allocated by the issuer, not the arranger.
- The difference between issue price and trading price reflects a gain or loss for the underwriter, but it comes from market participants, not the issuer of the debt.

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661 CEG, *Debt arranging and liquidity management costs*, April 2022, pp. 5-6.

662 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, pp. 6, 17.

663 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 5.

664 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 5.

665 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 5.

666 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 16.

667 Chairmont Consulting, Debt Raising Costs, 29 June 2019, pp. 9, 16.

- For bonds allocated to the underwriter, any post issuance trading price difference was borne by the underwriter, rather than the issuer. Underwriters are compensated for this risk through the underwriting fee which was included within the overall arranger fee.
- There are a range of factors that can cause the trading price to differ from issued price that do not appear to affect the fee paid by the issuers. In this regard, the CEG approach utilised five days of data after the debt issuance. These factors include subsequent changes in interest rates and economic outlook.

1183. The ERA noted ATCO's reasoning to increase the allowance for issue price discount costs. ATCO restated CEG's 2019 analysis and submitted that:[668]

- CEG entirely agreed with Chairmont that for bonds allocated to the underwriter, any post issuance trading price difference was borne by the underwriter, rather than the issuer. Underwriters are compensated for this risk through the underwriting fee which was included within the overall arranger fee.
- CEG considered that if the issue price was set well below the market value of the bond, the arranger fee would be smaller (and vice versa) because the expected cost of bearing that market value risk is lower and/or negative.

1184. The ERA has reviewed the CEG's 2019 analysis as part of the 2022 draft gas instrument review process and found no further evidence from ATCO in its recent submission to support the inclusion of issue price discount.

1185. On the basis of the information above, the ERA considers that the issue price discounts should not be included in the debt raising cost estimate for the 2022 final gas instrument.

11.4.1.3. Liquidity facilities costs

1186. Liquidity facilities costs relate to the costs associated with maintaining a liquidity reserve sufficient to achieve an investment grade credit rating. These relate to the holding of undrawn committed facilities with banks to allow the firm to draw on that facility if required.

1187. Among the submissions received for the 2022 draft gas instrument, ATCO and AGIG raised the inclusion of liquidity facilities costs in the debt raising cost estimates.

1188. Chairmont has historically excluded the liquidity facilities costs from the debt issuing cost allowance and considered that this exclusion should continue in estimating the debt issuing costs.[669] Chairmont's previous analysis recognised that there were costs of establishing and maintaining liquidity facilities, but these costs should be considered as being part of the cost of debt, not debt raising costs.[670]

1189. The AER considered these costs as indirect costs and did not compensate for that in its previous regulatory decision on South Australia Power Networks.[671]

668 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 32.

669 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 6.

670 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 16.

671 AER, *Draft Decision – SA Power Networks 2020-25, Attachment 3: Rate of Return*, October 2019, p. 16.

1190. The ERA notes that Chairmont's previous analysis to the AER did not further explain how the liquidity facility costs should be included as part of the cost of debt. On the contrary, CEG considered that liquidity facility costs were related to debt raising and should be accounted for within the benchmark debt strategy.

1191. Based on the information above, the ERA recognises that liquidity facility costs may be incurred by an efficient prudent energy network.

1192. The ERA notes that the hybrid trailing average approach does not include liquidity facilities.

1193. The ERA notes Chairmont's previous analysis that rating agencies determined a rating by considering a range of factors. For example, a regulated entity can be a BBB+ rated firm and adopt industry best practice but this would not automatically contribute to an uplift in rating. It is therefore possible that the liquidity facilities costs are indirect costs which are not necessary to maintain a BBB+ credit rating.

1194. Consistent with the previous position, the ERA does not compensate indirect debt raising costs arising from the management of liquidity and refinancing risk. There is also no clear evidence to suggest that liquidity facilities costs are necessary for service providers to maintain a BBB+ credit rating.

1195. On this basis, the ERA considers that liquidity facilities costs should not be included in the debt raising cost allowance for the 2022 final gas instrument.

11.4.1.4. Three-month refinancing fees

1196. Rather than raising new debt to refinance existing debt on the day that debt matures, stakeholders have submitted that credit rating agencies require a policy that the refinancing debt is raised at least three months prior to maturity. Stakeholders considered this results in costs to the business in the form of the difference between the 10-year cost of debt and the three-month return on investing in a liquid asset.

1197. For issuers to issue debt at investment grade, CEG estimated that the liquidity management costs including both liquidity facilities and three-month refinancing fee equal to 11 basis points to 13 basis points per annum. CEG did not separately estimate these costs.[672]

1198. Chairmont's analysis excluded the three-month facility fee from the debt raising cost allowance.[673]

1199. While CEG noted that a reason for liquidity management costs was to maintain an investment grade credit rating, Chairmont noted that rating agencies determined a rating by considering a range of factors.[674]

1200. AGIG and ATCO submitted that debt was required to be refinanced in advance of its due date by the credit ratings agencies.

[672] ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 36.

[673] Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 6.

[674] Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 17.

1201. Chairmont recognised that business would face significant refinancing risk if they were to wait until existing debt matures before issuing new debt and noted that:[675]

- The refinancing debt policy should form part of the overall cost of debt as it reflects the how and when a corporate chooses to raise debt. This is a risk management decision, not a debt sourcing decision. That is, a corporate must firstly decide its approach to refinancing and once that has been decided, then it determines the type of debt transaction.
- Rating agencies apply greater penalties in their rating assessments to firms with short maturity schedules.
- In line with Australian market practice, when planning to refinance a bond, a corporate may seek to repurchase its own paper from the market.
- If the benchmark assumes that they have been refinanced then there is no need for the commitment, liquidity and three-month financing debt raising costs to be included in the benchmark.

1202. While CEG noted that a reason for liquidity management costs was to maintain an investment grade credit rating, Chairmont considered that rating agencies determined a rating by considering a range of factors.[676] It is therefore possible that the three-month refinancing fees are indirect costs which are not necessary to maintain a BBB+ credit rating.

1203. The ERA considers that the three-month refinancing fee is not an efficient cost consistent with the benchmark debt strategy. The benchmark debt strategy inherently minimises refinancing risks. In addition, there are other mechanisms available for a prudent and efficient firm to manage its refinancing risk earlier than the three-month timeframe, including the 10 per cent of debt being refinanced each year, the 20-trading day averaging period nominated by the regulated gas entities and the annual update of the debt risk premium through the tariff variation process. Even if debt was required to be refinanced in advance of its expiry it is unclear how close to the due date it would occur, the materiality of this given 10 per cent of debt would be refinanced in any year and/or the materiality of this rating factor amongst the many assessed by rating agencies.

1204. On this basis, the ERA considers that the three-month refinancing fee should not be included in the estimate of debt raising costs for the 2022 final gas instrument.

11.4.1.5. ESG costs

1205. ESG is a new developing area of finance and accountability. Shareholders, debt holders and the community are increasingly interested in environmental, social and governance responsibilities. ESG ratings and reporting are evolving.[677,678] In the long term, ESG investing may improve corporate practices given that investors better understand these factors.[679]

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675 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, pp. 17-18.

676 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 17.

677 OECD, *ESG Investing and Climate Transition: Market Practices, Issues and Policy Considerations*, 2021, p. 3.

678 Harvard Law School Forum on Corporate Governance, *Introduction to ESG*, 1 August 2020.

679 OECD, *ESG Investing and Climate Transition: Market Practices, Issues and Policy Considerations*, 2021, p. 10.

1206. Chairmont's analysis found that investor demand for more sustainable investment had increased demand for green, social and sustainability bonds. Credit agencies such as S&P Global have been establishing ESG principles and evaluation tools which affected a corporate credit rating. In addition, agencies are undertaking ESG ratings of businesses.[680]

1207. Chairmont submitted that ESG rating and investor requirements are starting to affect debt issuances and in time regulated entities may have to adopt these requirements to access markets. However, Chairmont concluded that at present there does not appear to be any material impact of ESG on debt raising costs. With ESG changes quickly spreading Chairmont suggested the ERA should closely monitor ESG developments and its impact on regulated entities.[681]

1208. The ERA notes the concern expressed by stakeholders that ESG changes may materialise during the period of the 2022 gas instrument and the access arrangement period to which it applies. However, these stakeholders also recognised that these costs are uncertain and that this should be monitored by the ERA.

1209. The ERA considers that it is important to note that ESG costs refer to the administrative costs of measuring, reporting and compliance relating to the ESG matter.

1210. Given the emerging nature of ESG reporting and standards the ERA considers that it is difficult and too early to quantify what these costs may be. In addition, ESG costs across business are likely to be divergent as these costs will depend on the individual ESG policies and targets.

1211. Furthermore, it is not clear that these costs solely relate to debt. ESG developments and a firm's ESG policies affect the whole organisation, rather than the debt level only.

1212. At this stage the ERA considers that there is not sufficient evidence to indicate that ESG will materially affect a firm's debt raising costs. Therefore, ESG costs should not be included in debt raising costs for the 2022 gas instrument.

1213. ESG reporting would appear to be better classified as operating expenditure. Therefore, should ESG reporting costs materialise, these costs may be justified as efficient as part of a gas pipeline's access arrangement.

11.4.1.6. Resulting estimate of debt raising costs

1214. The ERA maintains that debt raising costs should be based on direct costs consistent with established regulatory practices.

1215. The ERA considers that debt raising costs should be estimated using Chairmont's updated estimate of 0.155 per cent per annum and adjusted for a higher allowance for arranger fees.

1216. The ERA does not support the inclusion of new indirect costs being proposed by stakeholders.

1217. For the purposes of the 2022 final gas instrument, the ERA considers that debt raising costs of 0.165 per cent per annum are appropriate.

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680 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 20.

681 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 22.

1218. The debt raising cost allowance will be added to the return on debt.

1219. The debt raising cost will remain fixed for the period of the instrument.

1220. In determining the debt raising cost allowance, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information. The debt raising cost estimate is transparent. The use of a fixed debt raising cost is readily implementable over the term of the instrument. The ERA considers that the debt raising cost allowance is fit for the purpose of the 2022 final gas instrument.

1221. Based on the preceding reasoning, the ERA considers that the debt raising cost allowance will best deliver an efficient rate of return in the long-term interests of consumers. By adopting the estimation methods that provide the best estimate of the debt raising cost allowance in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the debt raising cost allowance in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

11.4.2. Debt hedging costs

1222. Interest rate swaps are derivative contracts, which typically exchange – or swap – fixed-rate interest payments for floating-rate interest payments. They provide a means to hedge and manage risk, but also have a cost.

1223. Hedging costs involved in converting from a typical 10-year fixed debt to the regulated five-year fixed rate will involve four legs:

- Swapping 10-year fixed for a base floating rate at the time of issuance – paying floating and receiving 10-year fixed.
- Swapping the base floating rate at the time of the regulatory reset for five-year fixed – receiving floating and paying five-year fixed.

1224. For each set of two legs, the following costs may be incurred:

- A credit and capital charge – compensates for the risk of the counterparty and will depend on the credit rating and the potential default loss.
- An execution charge – compensates the swap intermediary for the costs associated with transacting the swap.

1225. The benchmark efficient entity could engage in four different transactions in hedging the base of its portfolio of debt:

- Five-year floating to fixed Australian dollar swaps at the start of an access arrangement for the full amount of debt portfolio.
- Bond issuance potentially made up of three different issue types and hence requiring three different swap considerations.
- Foreign currency bonds, requiring a cross-currency swap into floating Australian dollars.
- Fixed-rate Australian dollar bonds, requiring a fixed-float Australian dollar swap.

1226. No swaps will be required for floating rate Australian dollar notes.

1227. The ERA engaged Chairmont to review debt hedging costs for a regulated benchmark energy network that operates efficiently consistent with the ERA's debt approach. Chairmont estimated the following costs based on its informal survey of market participants:[682]

- Five-year swap floating for fixed for the full amount of debt: the total market estimate is 3.5 basis points per annum.
- 10-year non-AUD debt issuance which is used for calculating the allowance for cross currency swaps: the total market estimate is 6.5 basis points per annum.
- 10-year fixed-float Australian dollar swaps for full amount of debt issuance: the total market estimate is 13.0 basis points per annum.

1228. The factors of each hedging cost component have been weighted as follows:[683]

- Five-year floating for fixed rate swap weighting is 100 per cent.
- Consistent with the ERA's current weighting, cross currency swaps at issuance is 35 per cent.
- 10-year swap at time of issuance is 65 per cent.

1229. Based on Chairmont's advice, the ERA calculates the weighted cost of hedging as follows (see Table 17):

Table 17: Weighted average hedging costs

Transaction	Basis point per annum (a)	Weighted factor (%) (b)	Hedging cost (a x b)
Five-year swap floating for fixed for the full amount of debt	3.5	100	3.5
10-year cross currency swaps	13.0	35	4.6
10-year fixed-float Australian dollar swaps for full amount of debt issuance	6.5	65	4.2
Total hedging costs			**12.3**

Source: Chairmont consulting; ERA analysis

1230. That sum gives a total cost of hedging of 12.3 basis points per annum.

1231. This compares to the ERA's allowance of 11.4 basis points per annum for the 2018 gas instrument. The higher estimate of hedging costs is the addition of an allowance for the costs involved in negotiating an ISDA as part of one-off operational expenses.

[682] Chairmont Consulting, *Debt Raising and Hedging Costs*, 21 December 2021, pp. 29-30.

[683] Chairmont Consulting, *Debt Raising and Hedging Costs*, 21 December 2021, p. 6.

1232. All submissions commenting on the debt hedging costs supported the increase of hedging costs to 0.123 per cent per annum proposed in the 2022 draft gas instrument.[684,685,686,687]

1233. Based on the information above, the ERA allows hedging costs of 12.3 basis points per annum for the 2022 final gas instrument.

1234. The hedging cost allowance will be added to the return on debt.

1235. The debt hedging cost will remain fixed for the period of the instrument.

1236. In determining the debt hedging cost allowance, the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information or conditions. The hedging cost estimate is transparent. The use of a fixed hedging cost is readily implementable over the term of the instrument. The ERA considers that the debt hedging cost allowance is fit for the purpose of the 2022 final gas instrument.

1237. Based on the preceding reasoning, the ERA considers that the debt hedging cost allowance will best deliver an efficient rate of return in the long-term interests of consumers. By adopting the estimation methods that provide the best estimate of the debt hedging cost allowance in addition to adopting the estimation methods that provide the best estimate of the other rate of return parameters, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the debt hedging cost allowance in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

11.4.3. Equity raising costs

1238. Firms may need to issue new equity in order to maintain the benchmark debt-to-equity ratio following increases in the regulated asset base.

1239. The issuance of new equity will have transaction costs, depending on the way in which the equity is raised.

1240. The ERA will account for these transaction costs as a part of the capital expenditure building block. Consequently, the ERA includes no allowance for equity raising costs in the rate of return.

684 AGIG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, pp. 18-19.

685 ATCO, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 32.

686 CRG, *Submission to the 2022 Draft Gas Rate of Return Instrument*, September 2022, p. 42.

687 GGT, *Submission to the 2022 draft gas rate of return instrument*, September 2022, p. 33.

12. Inflation

1241. Inflation is the rate of change in the general level of prices of goods and services.

1242. To invest, debt and equity investors will require compensation for inflation.

1243. A nominal rate of return incorporates the real rate of return, compounded with a rate that reflects expectations of inflation.

1244. The treatment of inflation and the setting of the rate of return are foundational in setting regulated revenues. The National Gas Rules require the ERA to determine a method that is likely to result in the best estimates of expected inflation:

> 75B(2)(b) the method that the [ERA] determines is likely to result in the best estimates of expected inflation

1245. The expected rate of inflation will be required:

- For the roll forward of the regulated asset base and for indexing purposes to determine annual depreciation allowances.
- To back out the expected inflation underpinning the nominal building block allowances in the tariff variation mechanism, to allow accounting for subsequent actual inflation.

1246. Gas network service providers receive:

- An *ex-ante* real return on assets set at the time of regulatory determination. To determine a real return, the expected forward-looking inflation underpinning nominal returns is removed.
- Compensation for movement in inflation because the regulated asset base is indexed to actual inflation. Actual inflation is used to ensure that regulatory assets remain fixed in real terms.

1247. The forecast of the expected rate of inflation will also allow stakeholders to observe the real rates of change in tariffs and in the real rate of return, which are important contributors to the real changes in tariffs.

1248. This chapter outlines the ERA's reasoning for its final position on the approach to determining the expected rate of inflation outlined in the 2022 gas instrument.

12.1. Draft position

1249. 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.[688]

1250. For the 2022 draft gas instrument the ERA maintained the use of the Treasury bond implied inflation approach for estimating expected inflation.[689]

1251. The term of the expected inflation rate was five years, consistent with the length of the access arrangement period.

[688] ERA, *Final Rate of Return Guidelines (2018),* December 2018, pp. 37-38.

[689] ERA, *2022 Gas Rate of Return Draft Instrument*, June 2022, p. 20.

1252. The Treasury bond implied inflation approach uses the Fisher equation and the observed yields of:[690]

- Five-year Commonwealth Government Securities, which reflect a market-based estimate of the nominal risk free rate.
- Five-year Treasury indexed bonds, which reflect a market-based estimate of a real risk free rate.

1253. In this approach, estimates of both the nominal and real risk free rates of return are directly observed from the financial markets, so reflect the market expectation for inflation.

1254. The expected inflation rate is estimated at a time consistent with the averaging period.

1255. The approach uses linear interpolation to derive the daily point estimates of both the nominal five-year risk free rate and the real five-year risk free rate, for use in the Fisher equation.[691]

12.2. Consultation

12.2.1. Independent Panel Report

1256. The Independent Panel considered that the ERA's proposed approach to estimate inflation was appropriate and based on sound reasoning.[692]

1257. The Independent Panel considered the following points supported the adoption of the ERA's approach to estimating inflation in the 2022 draft gas instrument:[693]

- Market-based approaches for measuring inflation expectations such as the Treasury bond approach have advantages compared to survey and forecast-based measures.
- Theoretically, inflation swaps likely have an advantage over inflation-linked bonds as a measure of inflation expectations because they involve no exchange of funds at initiation and are therefore less affected by a liquidity premium. However, the Australian inflation swap market is relatively small and illiquid and therefore deriving expectations using the Treasury bond implied inflation approach is the preferable measure.
- The ERA's approach to estimating inflation can be readily replicated.

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690 The formal Fisher equation is: $1 + i = (1 + r)(1 + \pi^e)$.
where: i is the nominal interest rate, r is the real interest rate and π^e is the expected inflation rate.

691 It is not common to observe a Commonwealth Government Security bond with an expiry date that exactly matches that of the regulatory period end. To overcome this, two bonds are selected that fall on either side of the end day of the regulatory period. The dates on these bonds are referred to as the 'straddle' dates. Linear interpolation estimates the yields on the regulatory period end date by assuming a linear increase in yields between the straddle dates on the two bonds observed.

692 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 49.

693 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 49.

1258. The Independent Panel concluded that a five-year term for inflation would provide the best estimate of expected inflation over the regulatory period.[694]

12.2.2. Stakeholder submissions

1259. Four of the submissions to the draft gas instrument provided shareholder comments on inflation.

1260. AGIG, ATCO and the CRG supported the adoption of the Treasury bond implied inflation approach to estimate inflation:[695] [696] [697]

- AGIG considered that the Treasury bond implied inflation approach delivers a more timely forecast of inflation than one based on RBA forecasts.[698]
- AGIG considered that the term for inflation is unrelated to the term of the risk free rate for equity or debt, and considered the Independent Panel's suggestion of an inconsistency between the terms for inflation and equity is not relevant given the way regulatory models operate.[699]
- AGIG supported a five-year term for inflation because this term matches the inflation that is taken out of the nominal WACC and the actual inflation that is included in the regulated asset base through indexation.[700]
- ATCO stated its view that market expectations provide the best estimates of expected inflation for the regulatory period.[701]
- ATCO supported a five-year term for inflation based on its view that this term best estimates the inflation to be added to the asset base when it is rolled forward to the next access arrangement period.[702] ATCO also stated that given the role that inflation plays in setting regulated returns in the post-tax revenue model framework the estimation period for inflation should be independent of the terms for debt and equity.[703]
- The CRG supported a term of inflation matching the term of the regulatory period and stated that this will help ensure the NPV=0 condition is met.[704]
- The CRG agreed with the ERA 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 expectations.[705]

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694 Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 49.

695 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, pp. 1, 4, 20.

696 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 35-36.

697 CRG, Submission to Draft Gas Instrument, September 2022, pp. 42-43.

698 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, p. 20.

699 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, p. 20.

700 Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, p. 20.

701 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 35.

702 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 35-36.

703 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 36.

704 CRG, Submission to Draft Gas Instrument, September 2022, p. 43.

705 CRG, *Submission to Draft Gas Instrument*, September 2022, p. 43.

- The CRG stated that the RBA approach to estimating inflation provides an estimate of a policy target rather than a market-based estimate of expected inflation. In addition, given the lag inherent in the RBA approach, the RBA approach can yield a negative real risk free rate that may not be appropriate.[706]

1261. GGT also supported the Treasury bond implied inflation approach and suggested some revisions to the wording. GGT recommended that the ERA refine the existing wording to state more clearly:[707]

- The inputs to the expected rate of inflation calculation (yields on Australian Government bonds with five years to maturity, and yield on Australian Government indexed bonds).
- The methodology for estimating expected inflation by application of the Fisher equation.
- GGT suggested that reference to the risk free rate in paragraph 139 of the 2022 draft gas instrument should be removed as the risk free rate is the rate of return on the hypothetical riskless asset of the Sharpe-Lintner CAPM.[708]

12.3. 2022 final approach

1262. The ERA will apply the Treasury bond implied inflation approach for estimating expected inflation. This will be applied as follows:

- Estimating the expected inflation rate based on a term of five years.
- Using the yields on two types of bonds:
  - Commonwealth Government Treasury bonds.
  - Commonwealth Government Treasury-indexed bonds.
- Two issues of each type of bond will be selected for the estimation of expected inflation. For each type of bond, the selected bond issues will have a maturity that will fall either side of five years from the end day of the averaging period. As there is rarely a bond that matures exactly five years from the end day of the averaging period, the selected bond issues will be those with maturity dates falling closest to five years before and after the end day of the averaging period.
- Linear interpolation will be used to derive the daily point estimates during the averaging period of:
  - The nominal five-year risk free rate, based on the yields on the selected Commonwealth Government Treasury bonds.
  - The real five-year risk free rate, based on the yields on the selected Commonwealth Government Treasury-indexed bonds.
  - The average yield for each type of bond will be calculated as a simple average of the interpolated daily point estimates derived in the previous step.

[706] CRG, *Submission to Draft Gas Instrument*, September 2022, p. 43.

[707] Goldfields Gas Transmission Pty Ltd, *Submission to Draft Gas Instrument*, September 2022, pp. 34-35.

[708] Goldfields Gas Transmission Pty Ltd, *Submission to Draft Gas Instrument*, September 2022, p. 35.

- The average yields derived in the previous step will be substituted into the Fisher equation to solve for the estimate of expected inflation. The Fisher equation is:

$$1 + i = (1 + r)(1 + \pi^e)$$

Equation 16

where:

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

12.4. Reasoning

12.4.1. Term of inflation

1263. The ERA maintains its view, outlined in the 2022 draft gas instrument, that the term of expected inflation should be five years, consistent with the length of the access arrangement period. This term provides the best estimate of what inflation is expected to be over the access arrangement period.

1264. The revenue model takes the best estimate of the five-year inflation forecast out (of the nominal WACC) and puts back in the actual inflation over the five-year access arrangement period (through the indexation of the RAB).

1265. Using an inflation term that is not the regulatory cycle does not correctly align with investor's expected inflation rates for the years within the regulatory cycle, and therefore there will be a present value error.[709]

12.4.2. Estimation method

1266. 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 expectations.

1267. The ERA considered methods for best estimating expected inflation for the 2022 gas instrument including:

- Treasury bond implied inflation approach.
- The RBA inflation forecast approach that uses a combination of the short term RBA inflation forecast and the inflation target band.[710]

1268. The ERA maintains its view, outlined in the 2022 draft gas instrument, that the Treasury bond implied inflation approach provides the best estimate of inflation expectations for a regulatory period.

1269. AGIG, ATCO, the CRG and GGT support the continued adoption of the Treasury bond implied inflation approach.

[709] Dr Lally, M., *Review of the AER's inflation forecasting methodology*, July 2020, pp. 4-9.

[710] The RBA inflation forecast approach was described in paragraphs 1251 – 1253 of the 2022 draft instrument.

1270. The advantages of the Treasury bond implied inflation approach are that:

- It is a market-based approach. The rationale for using a market-based approach is that market prices reflect the aggregation of expectations of diverse market participants that invest and commit money. The forecasts of many different market participants are considered to contain more information and be more relevant than any one particular forecast model or method.
- The method is a dynamic market measure that is updated daily.
- The method is consistent with market forecasts built into other WACC parameters.
- The method is relatively easy to calculate.

1271. The ERA considers the Treasury bond implied inflation approach will yield better estimates of expected inflation during the operation of the 2022 gas instrument than the RBA approach because:

- It uses both nominal and real risk free rates directly observed in the market, which includes information on the market's view of the expected inflation rate.
- It is a dynamic market measure that is updated daily.
- It is not anchored by static policy targets. Domestic inflationary outcomes since 2014 have shown that inflation can deviate significantly from the RBA's target range for extended periods.
- Uncertainty around future inflation is high.

1272. The description of the estimation method for expected inflation contains additional detail compared to the description in the 2022 draft gas instrument. The ERA considers that these further specifications to the estimation method fulfil GGT's request to provide greater clarity on the estimation method for expected inflation.

1273. In determining the best approach to estimate the expected inflation the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's approach has been determined considering relevant economic and finance principles and current market information; transparency and whether it can be implemented. The ERA considers the estimation method for expected inflation is fit for the purpose of the 2022 final gas instrument.

1274. Based on the preceding reasoning, the ERA considers that the estimation method for expected inflation set out in the 2022 final gas instrument will provide the best estimate of expected inflation over regulatory periods covered by the 2022 final gas instrument. This method is therefore in the long-term interests of consumers, because it would likely promote efficient investment in, and use of, gas network services. The ERA therefore considers that the estimation method for inflation in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

1275. For illustrative purposes, the five-year expected inflation forecast was 2.51 per cent for the 20 trading days to 30 September 2022.

13. Value of imputation credits (gamma)

1276. The imputation tax system prevents corporate profits from being taxed twice. Under the Australian imputation tax system, franking credits are distributed to investors at the time that dividends are paid and provide an offset to those investors' taxation liabilities.

1277. 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.

1278. The ERA factors the value of imputation credits into its regulatory determination allowances via adjustments to the taxation building block and market risk premium.

1279. This chapter outlines the ERA's reasoning for its current position on determining gamma outlined in the 2022 final gas instrument.

13.1. Draft position

1280. The 2018 gas instrument applied a gamma of 0.5, which was fixed over the period of the instrument.[711]

1281. The 2022 draft gas instrument maintained a gamma of 0.5, fixed over the period of the instrument.[712]

1282. The ERA applied the utilisation approach to estimating the post company value of imputation credits. The ERA interpreted the value of imputation credits as an estimate of the proportion of company tax, which is expected to be returned to investors through utilisation of credits.

1283. The ERA estimated a gamma of 0.5 using the Monkhouse formula as the product of the distribution rate and the utilisation rate:

$$\text{Gamma} = \text{Distribution rate} \times \text{Utilisation rate}$$

Equation 17

1284. The ERA considered that the distribution rate, was the proportion of a firm's imputation credits that are distributed, is a firm-specific, rather than a market-wide, parameter.

1285. This was based on Lally's estimate of the distribution rate based on the financial reports of the 50 largest ASX-listed firms (0.887), rounded to one decimal place. Further, the ERA considered that Dr Lally's finding that the distribution rate may be slightly higher with the removal of foreign operations supports that the distribution rate should be at least 0.9.

1286. The ERA's estimate of the distribution rate was 0.9.

[711] ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 40.

[712] ERA, *2022 Gas Rate of Return Draft Instrument*, June 2022, p. 21.

1287. The ERA's estimate of the utilisation rate was derived using the equity ownership approach to determine the value-weighted percentage of domestic investors in the Australian equity market. The ERA considered that the utilisation rate is a market-wide parameter. Utilisation rates for individual investors are one if they can fully use franking credits to reduce their personal tax obligations and zero if they cannot use the credits.

1288. The ERA's estimated utilisation rate was from the national accounts of the Australian Bureau of Statistics (ABS), based on a five year average to March 2021 and rounded to the first decimal point. The ERA considered that the ABS data is the best available data to estimate the utilisation rate.

1289. The ERA's estimate of the utilisation rate was 0.6.

13.2. Consultation

13.2.1. Independent Panel Report

1290. The Independent Panel considered that the ERA's use of a gamma of 0.5 in the 2022 draft gas instrument was appropriate and based on sound reasoning.[713]

1291. The Independent Panel noted that whether the ASX 50 is representative of the benchmark efficient firm is open to debate. For future reviews the Independent Panel recommended that the ERA further consider:[714]

- Whether the firms comprising the ASX 50 are representative of the benchmark efficient firm.
- Whether the distribution rate differs significantly between ASX 50 and non-ASX 50 firms.

13.2.2. Stakeholder submissions

1292. Four of the submissions to the 2022 draft gas instrument provided stakeholder comments on the estimation of gamma.

1293. The CRG and GGT supported the methodology used to estimate gamma and the estimate of gamma (0.5) in the 2022 draft gas instrument.[715, 716]

1294. AGIG did not provide a specific comment on gamma, however, it noted that the Independent Panel's suggestion that the ERA examine whether the benchmark efficient entity is an ASX 50 firm may assist the ERA in analysing gamma.[717]

[713] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 50.

[714] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 50.

[715] CRG, *Submission to Draft Gas Instrument*, September 2022, pp. 43-44.

[716] Goldfields Gas Transmission Pty Ltd, *Submission to Draft Gas Instrument*, September 2022, p. 36.

[717] Australian Gas Infrastructure Group, *Submission to Draft Gas Instrument*, September 2022, p. 20.

1295. ATCO did not support the ERA's approach to gamma in the 2022 draft gas instrument:

- ATCO considered that the ERA's estimate of gamma was internally inconsistent given the distribution rate was based on one group of shareholders (the 50 large firms comprising the ASX 50) and the utilisation rate was based on a different group of shareholders (all equity, including unlisted firms). ATCO therefore considered that the estimate of gamma in the 2022 draft gas instrument was not the best possible estimate.[718]
- ATCO advocated for the use of ATO tax statistics to estimate gamma as franking credits redeemed divided by franking credits created. ATCO considered that this method requires fewer parameters to be estimated and therefore is subject to less estimation error.[719] ATCO cited ENA's December 2017 submission to the AER to support the reliability of the ATO tax statistics:

  > The Company Tax item is the total company tax collected by the ATO during the relevant period and the Credits Redeemed item is the total amount of credits redeemed via the filing of personal tax returns. These two data items are 100% reliable as they are figures that relate directly to ATO tax collections. There is no reason to question the ATO's records of the amount of corporate and personal tax it has collected.[720]

- ATCO considered that the ATO's concerns regarding the use of tax statistics in time series analysis for gamma are not a relevant factor for disregarding the use of the ATO tax statistics. ATCO cited Hathaway, who has noted that similar concerns exist for nearly all finance and economic data.[721] ATCO considered that the ATO is the primary source of imputation tax statistics and there is no other source of the data.[722]
- ATCO accepted that there are two minor issues in the ATO's credits created field tax statistics. These issues arise because some tax paid does not create imputation credits due to it being paid by non-resident companies and because the ATO reports tax owed and some taxpayers may default on tax owed. ATCO considered that a Hathaway June 2018 memorandum confirmed that these two issues are very minor and immaterial.[723]

13.3. 2022 final approach

1296. The ERA determines gamma based on the utilisation approach using the Monkhouse formula as the product of the distribution rate and the utilisation rate.

1297. The 2022 final gas instrument applies a gamma of 0.5.

1298. Gamma will remain fixed for the term of the gas instrument.

[718] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 37.

[719] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 38.

[720] Hathaway, *Capital Research Memorandum*, December 2017, p. 38, cited in ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 38.

[721] Hathaway, *Capital Research Memorandum*, June 2018, p. 6, cited in ATCO, *Submission to Draft Gas Instrument*, September 2022.

[722] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 38

[723] ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 39.

13.4. Reasoning

1299. Over the course of its reviews of electricity, gas and rail rates of return, the ERA has considered gamma. The ERA's current approach to gamma is based on:

- Contemporary Australian Competition Tribunal and Federal Court judicial reviews, which supported the use of the utilisation approach.
- Consideration of available data, including reviewing the limitations of ATO data for the estimation of gamma.
- Expert reports and analysis, which presented new methods and numbers to inform improved calculations of gamma.

1300. The ERA has used a gamma of 0.5 for its most recent rate of return determinations.[724, 725, 726, 727,728]

1301. The ERA considers that its final approach provides the best possible estimate of gamma and therefore is in the long-term interest of consumers, because it will likely promote efficient investment in, and use of, gas network services.

1302. The ERA's estimate of gamma is derived by applying the Monkhouse formula.

1303. The ERA has separately estimated the distribution rate and utilisation rate.

13.4.1. Distribution rate

1304. The ERA considers that the distribution rate, being the proportion of a firm's imputation credits that are distributed, is a firm-specific, rather than a market-wide, parameter.

1305. The ERA's estimate of the distribution rate is 0.9. This has been based on Lally's estimate of the distribution rate based on the financial reports of the 50 largest ASX-listed firms (0.887), rounded to one decimal place.[729]

1306. For the next review the Independent Panel recommended that the ERA consider whether the firms comprising the ASX 50 are representative of the benchmark efficient firm, and whether the distribution rate differs significantly between ASX 50 and non-ASX 50 firms.[730]

[724] ERA, *Final decision on proposed revisions to the Dampier to Bunbury Natural Gas Pipeline Access Arrangement 2021 to 2025*, April 2021, p. 312.

[725] ERA, *Final decision on proposed revisions to the Goldfields Gas Pipeline Access Arrangement for 2020 to 2024*, December 2019, p. 154.

[726] ERA, *Final decision on proposed revisions to the Mid-West and South-West Gas Distribution Systems Access Arrangement for 2020 to 2024*, November 2019, p. 296.

[727] ERA, *Final Decisions on Proposed Revisions to the Access Arrangement for the Western Power Network – Appendix 5 Return on Regulated Capital Base,* September 2018, p. 104.

[728] ERA, *Final Determination 2018 and 2019 Weighted Average Cost of Capital for the Freight and Urban Networks and Pilbara Railways*, August 2019, Chapter 9.

[729] Dr Lally, M., *Estimating the Distribution Rate for Imputation Credits for the Top 50 ASX Companies*, June 2021, p. 3.

[730] Independent Panel, *Independent Panel Report on the ERA's 2022 Draft Gas Rate of Return Instrument*, August 2022, p. 50.

1307. As described in paragraph 65, 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 firms in the ASX 50 are Australian exchange-listed large capitalisation companies which between them operate across a range of different industries. The ERA acknowledges that there are differences between the benchmark efficient entity and the firms in the ASX 50 including industry and size but does not consider that these differences would give rise to significant differences in the distribution rate. The ERA considers that Lally's estimate of the distribution rate, being the average distribution rate across a large group of large, listed companies which can be assumed to operate efficiently due to the governance of shareholder ownership, provides a reasonable estimate of the distribution rate for the benchmark efficient entity.

13.4.2. Utilisation rate

1308. The ERA considers it appropriate to base its estimate of the distribution rate on listed equity due to the different considerations regarding dividend policy in listed and unlisted businesses.

1309. Dr Lally has found that many unlisted companies are sole traders that have incorporated to reduce their tax rate (but only if they retain rather than distribute their profits), and many others are closely-held entities with dividend policy considerations quite different to those for listed companies.[731] Further, all of the privately owned regulated gas businesses in Western Australia are majority-owned or wholly-owned subsidiaries of listed firms.[732]

1310. The ERA's estimate of the utilisation rate is derived using the equity ownership approach to determine the value-weighted percentage of domestic investors in the Australian equity market. The ERA considers that the utilisation rate is a market-wide parameter. Utilisation rates for individual investors are one if they can fully use franking credits to reduce their personal tax obligations and zero if they cannot use the credits.

1311. The ERA's estimated utilisation rate is from the national accounts of the ABS, based on a five-year average to March 2021 and rounded to the first decimal point. The ERA considers the ABS data is the best available data to estimate the utilisation rate.

1312. The ERA's estimate of the utilisation rate is 0.6.

13.4.3. Gamma estimate

1313. The ERA's estimate of gamma is derived by applying the Monkhouse formula as the product between the distribution rate and the utilisation rate.

1314. The ERA's estimate of gamma is 0.5.

[731] Dr Lally, M., *Gamma and the ACT Decision*, May 2016, p. 26.

[732] The Dampier to Bunbury Natural Gas Pipeline is ultimately owned by CK Infrastructure Holding, which is listed in Hong Kong. The Goldfields Gas Pipeline is ultimately majority-owned by the Australian-listed APA Group. The Mid West South West Gas Distribution System is owned by ATCO Gas Australia which is ultimately owned by the ATCO Group, which is Canadian-listed.

1315. ATCO's submission to the 2022 draft gas instrument suggested using ATO data to estimate gamma. ATCO suggested that gamma could be estimated directly as the ratio of total credits redeemed to total credits created, where each component is obtained from ATO taxation statistics.[733]

1316. In the explanatory statement to the 2022 draft gas instrument the ERA cited a discrepancy in the ATO taxation statistics previously noted by one author (Hathaway) as issues undermining the reliability of the ATO data for estimating gamma.[734] Specifically, the ERA had cited that Hathaway had found that the franking account balance data and dividend payment data within the ATO data gives two significantly different estimates of the distribution rate.[735] ATCO submitted that a memorandum by Hathaway later (June 2018) confirmed that the ATO tax statistics can be used to estimate a 'utilisation gamma' as the ratio of credits redeemed to credits created, which would not require the calculation of a distribution rate.[736]

1317. In the explanatory statement to the 2022 draft gas instrument the ERA concluded that the ATO tax statistics should not be used for the estimation of gamma given issues with the reliability of ATO tax statistics. Related to this, the ERA cited ATO advice supplied to the AER in May 2018 that its taxation statistics data should not be used for detailed time series analysis of the imputation system due to the dynamic nature of the tax system and factors such as entries and exits, churn within tax-consolidated groups and other complexities arising from taxation rules. The ATO did not recommend using taxation statistics data as the basis of a detailed macro analysis of Australia's imputation system.[737]

1318. In December 2018, the ATO issued another note to the AER affirming and expanding on the statements of May 2018.[738]

> As noted previously a time series reconciliation of the franking account balance is also flawed because of the 'wastage' of franking credits locked up in companies which no longer lodge (because they were absorbed into a consolidated group, went into administration or were wound up etc.). Using income tax return lodgement data, we think there are approximately 1% - 2.5% of total available franking credits for distribution lost each year by companies who no longer lodge income tax returns. This impact accumulates over time, producing a more pronounced error effect with any attempt to reconcile the franking account balance.

1319. The ATO issued a further note in October 2021 outlining that:[739]

- Of the net franking credits distributed, approximately 40 per cent to 50 per cent are not claimed back through the tax system and are potentially distributed to non-residents or non-lodgers.

733 ATCO, *Submission to Draft Gas Instrument*, September 2022, pp. 37-38.

734 ERA, *Explanatory Statement for the 2022 Gas Rate of Return Draft Instrument*, June 2022, paragraph 1304.

735 ERA, *Explanatory Statement for the 2022 Gas Rate of Return Draft Instrument*, June 2022, paragraph 1304.

736 Hathaway, *Capital Research Memorandum*, June 2018, cited in ATCO, *Submission to Draft Gas Instrument*, September 2022.

737 ATO, *Note to the AER regarding imputation*, May 2018.

738 ATO, Note to the AER regarding imputation, December 2018.

739 ATO, Note to the AER regarding franking account reconciliation, October 2021.

- The ATO does not have data on franking credits distributed to non-residents, and uses a residual approach to estimate the percentage of franking credits distributed to non-residents. Using this residual approach and based on data from the 2012 to 2018 years inclusive, the ATO estimated that approximately 35 per cent to 40 per cent of total franking credits paid out by companies per year are distributed to non-residents.
- The ATO's October 2021 note does not provide further clarification on the issue of reconciling the franking account balance.

1320. ATCO considered that the ATO's concerns regarding the use of tax statistics in time series analysis for gamma are not a relevant factor for disregarding the use of the ATO tax statistics. ATCO considered that the ATO is the primary source of imputation tax statistics and there is no other source of the data.[740]

1321. ATCO accepted that there are two minor issues in the credits created field ATO tax statistics. These issues arise because some tax paid does not create imputation credits due to it being paid by non-resident companies and because the ATO reports tax owed and some taxpayers may default on tax owed. ATCO considered that Hathaway June 2018 memorandum confirmed that these two issues are very minor and immaterial.[741]

1322. The ERA maintains its view that the ATO taxation statistics should not be used for the estimation of gamma given issues with the reliability of the data. Significantly, this view takes into account the advice by the ATO itself that the taxation statistics should not be used for the estimation of gamma.

1323. Further, the ERA maintains that the taxation data, being self-reported data, is prone to inaccuracy. The ATO has also not provided its detailed data or methodology for preparing the taxation statistics.

1324. The ERA maintains its view from the explanatory statement to the 2022 draft gas instrument that the data from financial statements of listed firms does not have the same problems as the ATO data for the following reasons outlined by Lally:[742]

- The financial statement data has undergone statutory audit, as opposed to being self-reported figures.
- Researchers can identify the source data underlying the financial statements, rather than having to rely upon the aggregation carried out by the ATO.
- Financial statement data is internally consistent, that is, there are no unexplained discrepancies in the financial statement data whereas there are inconsistencies that remain unaccounted for in the ATO data.
- Data from listed firms will not include the effects of dividend policies associated with unlisted firms.

1325. The ERA considers that its existing methodology is robust and widely supported by stakeholders.

1326. For the 2022 final gas instrument the ERA applies the Monkhouse formula and sets a gamma of 0.5.

740 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 38.

741 ATCO, *Submission to Draft Gas Instrument*, September 2022, p. 39.

742 Lally, M., *Estimating the distribution rate for imputation credits*, July 2015, p. 3.

1327. In determining the value of imputation credits the ERA considered the general guiding principles to inform its regulatory judgement of the evidence before it. The ERA's estimate has been determined considering relevant economic and finance principles and current market information. The gamma estimate is transparent. The use of a fixed gamma is readily implementable over the term of the instrument. The ERA considers the gamma estimate is fit for the purpose of the 2022 final gas instrument.

1328. Based on the preceding reasoning, the ERA considers that the estimation method for gamma and the estimated values of the distribution rate and utilisation rate set out in the 2022 final gas instrument will provide the best estimate of the value of imputation credits over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation method and parameter values that provide the best estimate of the value of imputation credits. The ERA therefore considers that the gamma estimate set out in the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

14. Overall summation

1329. The ERA is satisfied that, consistent with section 30(3) of the National Gas Law, the 2022 final gas instrument will, or is most likely to, contribute to the achievement of the national gas objective to the greatest degree possible.

1330. The ERA's review of the gas instrument included multiple rounds of consultation including a discussion paper, focused consultations and the release of a 2022 draft gas instrument with an accompanying explanatory statement. The ERA considered expert views, academic literature, market data, and stakeholder submissions.

1331. A CRG was established to provide a consumers' perspective on the rate of return. The CRG has been an active participant throughout the ERA's consultation.

1332. The ERA also established an Independent Panel, which has reviewed the 2022 draft gas instrument in detail. The Independent Panel review process was intended to give the ERA the benefit of an independent review and further promote confidence in the ERA's assessment among stakeholders. The Panel found that the 2022 draft instrument was appropriate and based on sound reasoning, and that the draft instrument can achieve the national gas objective.

1333. Having fully considered all information gathered through this process, the ERA's 2022 final gas instrument largely maintains or refines many of the approaches set out in the 2018 gas instrument.

1334. However, new market and regulatory developments have meant that the ERA has decided to change some of its approaches to the return on equity to ensure that the 2022 final gas instrument continues to deliver efficient forward-looking rates of return. These parameters are the term for equity, market risk premium and equity beta.

1335. The ERA considers the 2022 final gas instrument establishes a methodology for calculating efficient financing costs, consistent with the risks involved in providing regulated gas pipeline services. The ERA targets the setting of an efficient rate of return to promote efficient investment in, and efficient operation and use of, gas network services in the long-term interests of consumers. The ERA considers that the promotion of the long-term interests of consumers and the efficiency objectives of the national gas objective and the revenue and pricing principles are best achieved through this approach.

1336. The revenue and pricing principles require gas network service providers to be provided with a reasonable opportunity to recover at least the efficient costs they incur. The ERA considers that the 2022 final gas instrument best sets a rate of return to remunerate efficient financing costs of the service providers over the lives of the assets, in terms of net present value.

1337. Given efficient rates of return are not readily observable, the ERA has considered the information, including stakeholder input, and used its regulatory discretion to set, what it believes is, the best approach to estimating an efficient rate of return and its associated parameters.

1338. The ERA considers it has selected rate of return estimation methodology that is:

- Reflective of economic and finance principles and market information – The estimation approach is consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.

- Fit for purpose – The estimation approach uses financial models, market data and other evidence that is consistent with the original purpose for which it was compiled and has had regard to the limitations of that purpose.
- Transparent – The estimation method is clear and supported by robust and transparent analysis, incorporating stakeholder feedback.
- Implementable and replicable – The estimation approach can be implemented by stakeholders and results can be replicated.
- Sufficiently flexible as to allow for changing market conditions – The estimation approach allows for changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.

1339. The ERA's primary rate of return objective is to meet the regulatory obligations under the NGL and NGR, particularly to achieve the national gas objective and revenue and pricing principles. As discussed above, the ERA seeks to determine its best estimate of an efficient rate of return, consistent with the risks involved in providing regulated gas pipeline services.

1340. The ERA considers that the 2022 final gas instrument has established the best approach to estimating and efficient rate of return, and its underlying parameters.

- The ERA considers that the return on debt regulatory approach best approximates the NPV=0 principle while also recognising interest rate risk, refinancing risk and the staggered nature of debt portfolios.
- The ERA considers that the return on equity approach best approximates the NPV=0 principle by applying an accepted asset pricing model that compensates network service providers for bearing risk, recognising investor expectations and considers the opportunity cost of capital in the market for equity funds.
- The ERA considers that the other rate of return parameters also provide the best estimations and support setting an efficient rate of return.

1341. Table 18 summarises illustrative numbers for the rate of return and its parameters as at the end of September 2022. Market parameters are calculated at the beginning of each access arrangement review. For illustrative purposes the 2022 final gas instrument provides a nominal WACC of 7.2 per cent for September 2022. These numbers are subject to market changes at the time of individual access arrangement determinations.

Table 18: Illustrative rate of return and parameters as at September 2022

	2022 final gas instrument
Return on debt	
5-year interest rate swap (%)*	4.070%
Debt risk premium (%)^	2.140%
Debt issuing + hedging cost (%)	**0.288%**
Nominal return on debt	**6.50%**
Cost of equity parameters	
Nominal risk free rate*	3.78%
Equity beta	0.70
Market risk premium	6.10%
Nominal after tax return on equity	**8.05%**
Other parameters	
Debt proportion (gearing)	55.00%
Forecast inflation rate*	2.51%
Forecast credits (gamma)	0.50
Corporate tax rate	30%
Weighted Average Cost of Capital	
Nominal after-tax WACC	**7.20%**
Real after-tax WACC	4.57%

** Market parameter that will be updated at the time of an access arrangement.*

^ This number represents the latest 10-year trailing average debt risk premia reported in DBP's access arrangement, the DRP annual updates and the DRP estimate as at the end of September 2022. The trailing average DRP is influenced by the historic DRPs allowed for each gas pipeline. The trailing average DRP is updated annually.

1342. The ERA has conducted sensitivity analysis to evaluate how the 2022 final gas instrument might perform under different market conditions. The results are illustrated in Table 19.

Table 19: Sensitivity analysis

	Low	Mid	High
Return on debt			
Nominal return on debt	4.42%	6.50%	8.57%
Return on equity			
Nominal after tax return on equity	6.17%	8.05%	9.93%
Other parameters			
Forecast inflation rate	1.00%	2.51%	4.02%
Weighted Average Cost of Capital			
Nominal after-tax WACC	5.21%	7.20%	9.18%
Real after-tax WACC	4.17%	4.57%	4.96%

Source: ERA analysis.

Note: The mid case refers to the parameters as at 30 September 2022. The low and high case refer to parameters which are two standard deviations below and above the mid case respectively.

1343. With the September 2022 illustrative parameters as the central case, the ERA has chosen other parameter values that are two standard deviations above and below the central case to be the high and low case respectively. These values are chosen to evaluate the stability and performance of the 2022 final gas instrument's methodology under different market conditions to the illustrative central case.

1344. The ERA considers that the 2022 final gas instrument is robust to a wide range of market conditions. Further, the ERA considers that the corresponding WACCs are likely to allow for efficient forward-looking rates of return for gas network service providers:

- The output of the sensitivity table does not result in unexpected outcomes, indicating that the methodology can accommodate a variety of market conditions.
- The outputs provide plausible estimates of forward rates of returns under different cases and assumptions.

1345. Therefore, the 2022 final gas instrument can effectively accommodate changing market conditions at the start of an access arrangement, whilst providing a degree of certainty over an access arrangement period.

1346. Accordingly, the ERA considers as a whole the methodology established for the 2022 gas instrument is likely to promote the national gas objective to the greatest extent possible.

1347. The ERA has also considered other reference points and information that is detailed in the respective chapters of the relevant rate of return parameters.

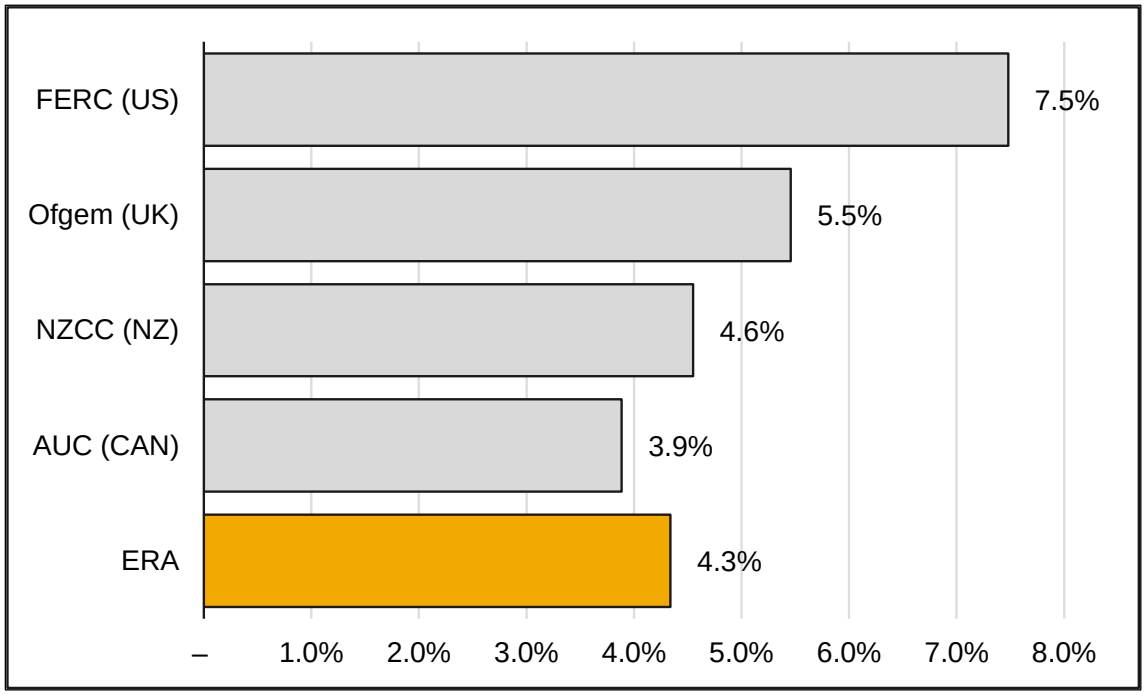
1348. The ERA considers that the approach for debt provides an efficient and implementable strategy which naturally results in efficient costs being recovered by gas networks service providers.

1349. When estimating the return on equity the ERA targets an efficient forward-looking return on equity expected by investors. In assessing the return on equity as a whole the ERA has considered the values provided by other regulators as reference points.

1350. For the return on equity, the ERA considers that an appropriate reference point is the equity premium (equity beta multiplied by the market risk premium) of other regulators

given the differences in risk free rate approaches. The results are illustrated in Figure 17.

Figure 17: Equity premium provided by other regulators



Source: The Brattle Group (2022)[743],Alberta Utilities Commission (AUC), ERA analysis

Note: Equity premium calculated by adjusting other regulator's equity beta to the ERA's benchmark leverage.

1351. As a high-level cross-check, the ERA views that the return on equity for the 2022 final gas instrument is within the reasonable range that has been provided by other regulators.

1352. Based on the reasoning detailed in this 2022 final gas instrument explanatory statement, the ERA considers that the overall rate of return framework established by the 2022 final gas instrument, and each of its component parts will provide the best estimate of the rate of return over regulatory periods covered by the 2022 final gas instrument. By adopting the estimation method and parameter values that provide the best estimate of the rate of return, the ERA considers that the regulated rates of return for gas network service providers will approximate the returns required by investors in view of the costs and risks associated with regulated gas pipelines. The ERA therefore considers that the 2022 final gas instrument is aligned with the Revenue and Pricing Principles and will satisfy the National Gas Objective to the greatest degree.

[743] The Brattle Group, *International Rate of Return Methods – Recent Developments*, September 2022.

Appendix 1- Acronyms

Table A1.1: List of acronyms

Acronym	Definition
APA	APA Group
ATCO	ATCO Gas Australia Pty Ltd (owner of the Mid-West and South-West Gas Distribution Systems)
AST	AusNet Services
ABS	Australian Bureau of Statistics
AER	Australian Energy Regulator
AGIG	Australian Gas Infrastructure Group (owner of the Dampier to Bunbury Natural Gas Pipeline)
APGA	Australian Pipelines and Gas Association
ASX	Australian Securities Exchange
ATO	Australian Taxation Office
BHM	Brailsford, Handley and Maheswaran
CAPM	Capital Asset Pricing Model
CEPA	CEPA Ltd.
CEG	Competition Economists Group
CPI	Consumer Price Index
CRG	Consumer Reference Group
DRP	Debt risk premium
DGM	Dividend growth model
DUE	DUET Group
ERA	Economic Regulation Authority
EICSI	Energy Infrastructure Credit Spread Index
ENA	Energy Networks Australia
ESG	Environmental, Social and Governance
ERP	Equity Risk Premium
ESCOSA	Essential Services Commission of South Australia
ESC	Essential Services Commission of Victoria
GGT	Goldfields Gas Transmission Pty Ltd (owner of the Goldfields Gas Pipeline)
IPART	Independent Pricing and Regulatory Tribunal of New South Wales

Acronym	Definition
ISDA	International Swap Dealers Agreement
LAD	Least Absolute Deviation
MRP	Market Risk Premium
MM	Maximum Likelihood Robust Method
M&A	Merger and Acquisition
NGL	National Gas Law (as implemented in Western Australia by the National Gas Access (WA) Act 2009)
NGR	National Gas Rules
NZCC	New Zealand Commerce Commission
OTTER	Office of the Tasmanian Economic Regulator
OLS	Ordinary Least Squares
QCA	Queensland Competition Authority
QTC	Queensland Treasury Corporation
RAB	Regulated Asset Base
RBA	Reserve Bank of Australia
SKI	Spark Infrastructure Group
T-S	Theil-Sen
WACC	Weighted Average Cost of Capital
WATMI	Weighted Average Term to Maturity at Issuance

Appendix 2- List of Tables

Appendix 3- List of Figures

Appendix 4- Selection of comparator firms for equity beta

Table A4.1: Comparator firms considered for 2022 final gas instrument equity beta

Ticker	Company Name
Canada	
ALA CN Equity	ALTAGAS LTD
AQN CN Equity	ALGONQUIN POWER & UTILITIES
CU CN Equity	CANADIAN UTILITIES LTD-A
EMA CN Equity	EMERA INC
FTS CN Equity	FORTIS INC
H CN Equity	HYDRO ONE LTD
TRP CN Equity	TC ENERGY
ENB CN Equity	ENBRIDGE INC
United Kingdom	
NG/ LN Equity	NATIONAL GRID PLC
SSE LN Equity	SSE PLC
New Zealand	
VCT NZ Equity	VECTOR LTD
United States	
AEE US Equity	AMEREN CORPORATION
AGR US Equity	AVANGRID INC
ALE US Equity	ALLETE INC
ATO US Equity	ATMOS ENERGY CORP
AVA US Equity	AVISTA CORP
BKH US Equity	BLACK HILLS CORP
CMS US Equity	CMS ENERGY CORP
CNP US Equity	CENTERPOINT ENERGY INC
CPK US Equity	CHESAPEAKE UTILITIES CORP
D US Equity	DOMINION ENERGY INC
DTE US Equity	DTE ENERGY COMPANY
DUK US Equity	DUKE ENERGY CORP
ED US Equity	CONSOLIDATED EDISON INC
EIX US Equity	EDISON INTERNATIONAL
ES US Equity	EVERSOURCE ENERGY
ETR US Equity	ENTERGY CORP
EVRG US Equity	EVERGY INC
EXC US Equity	EXELON CORP
FE US Equity	FIRSTENERGY CORP
HE US Equity	HAWAIIAN ELECTRIC INDS
IDA US Equity	IDACORP INC
KMI US Equity	KINDER MORGAN INC
LNT US Equity	ALLIANT ENERGY CORP
MGEE US Equity	MGE ENERGY INC
NEE US Equity	NEXTERA ENERGY INC
NFG US Equity	NATIONAL FUEL GAS CO
NI US Equity	NISOURCE INC
NJR US Equity	NEW JERSEY RESOURCES CORP
NWE US Equity	NORTHWESTERN CORP
NWN US Equity	NORTHWEST NATURAL HOLDING CO
OGE US Equity	OGE ENERGY CORP

Ticker	Company Name
OGS US Equity	ONE GAS INC
PCG US Equity	P G & E CORP
PEG US Equity	PUBLIC SERVICE ENTERPRISE GP
PNM US Equity	PNM RESOURCES INC
PNW US Equity	PINNACLE WEST CAPITAL
POR US Equity	PORTLAND GENERAL ELECTRIC CO
PPL US Equity	PPL CORP
RGCO US Equity	RGC RESOURCES INC
SJI US Equity	SOUTH JERSEY INDUSTRIES
SO US Equity	SOUTHERN CO/THE
SR US Equity	SPIRE INC
SRE US Equity	SEMPRA ENERGY
SWX US Equity	SOUTHWEST GAS HOLDINGS INC
UTL US Equity	UNITIL CORP
WEC US Equity	WEC ENERGY GROUP INC
XEL US Equity	XCEL ENERGY INC

Appendix 5- Potentially M&A affected international comparators

Table A5.1: Comparators potentially affected by mergers and acquisitions

Ticker	Potentially M&A affected	
	5 year estimates	10 year estimates
AQN CN Equity	Yes	Yes
ALE US Equity	No	Yes
ALA CN Equity	No	Yes
AGR US Equity	Yes	Yes
CNP US Equity	Yes	Yes
D US Equity	Yes	Yes
ENB CN Equity	Yes	Yes
EXC US Equity	No	Yes
H CN Equity	No	Yes
KMI US Equity	No	Yes
NG/ LN Equity	Yes	Yes
NJR US Equity	No	Yes
NEE US Equity	Yes	Yes
NI US Equity	No	Yes
NWE US Equity	No	Yes
PPL US Equity	Yes	Yes
SRE US Equity	No	Yes
SJI US Equity	Yes	Yes
SWX US Equity	Yes	Yes
SSE LN Equity	Yes	Yes
WEC US Equity	No	Yes

Appendix 6- Beta estimates for comparator sample

Table A6.1: Equity beta estimates

Ticker	Company Name	5 year equity betas			10 year equity betas		
		Gearing	OLS	LAD	Gearing	OLS	LAD
Canada							
ALA CN Equity	ALTAGAS LTD	55%	1.37	1.00	47%	1.56	1.30
AQN CN Equity	ALGONQUIN POWER & UTILITIES	37%	1.08	0.99	39%	1.02	0.88
CU CN Equity	CANADIAN UTILITIES LTD-A	50%	0.93	0.69	46%	0.99	0.81
EMA CN Equity	EMERA INC	56%	0.55	0.52	52%	0.60	0.57
FTS CN Equity	FORTIS INC	42%	1.21	1.29	42%	1.22	1.27
H CN Equity	HYDRO ONE LTD	51%	0.64	0.60	52%	0.64	0.58
TRP CN Equity	TC ENERGY	47%	0.59	0.57	47%	0.57	0.50
ENB CN Equity	ENBRIDGE INC	46%	1.18	1.25	45%	1.16	1.17
	Mean	**48%**	**0.94**	**0.86**	**46%**	**0.97**	**0.88**
United Kingdom							
NG/ LN Equity	NATIONAL GRID PLC	49%	0.64	0.48	47%	0.70	0.67
SSE LN Equity	SSE PLC	39%	1.20	1.07	34%	1.16	0.95
	Mean	**44%**	**0.92**	**0.77**	**41%**	**0.93**	**0.81**
New Zealand							
VCT NZ Equity	VECTOR LTD	43%	0.65	0.64	43%	0.63	0.56
	Mean	**43%**	**0.65**	**0.64**	**43%**	**0.63**	**0.56**
United States							
AEE US Equity	AMEREN CORPORATION	36%	0.98	0.77	38%	0.87	0.78
AGR US Equity	AVANGRID INC	33%	0.87	0.71	33%	0.83	0.69
ALE US Equity	ALLETE INC	32%	1.19	0.85	34%	1.08	0.85
ATO US Equity	ATMOS ENERGY CORP	28%	1.07	0.90	32%	0.97	0.91
AVA US Equity	AVISTA CORP	43%	0.89	0.45	44%	0.82	0.48
BKH US Equity	BLACK HILLS CORP	48%	1.11	0.66	45%	1.06	0.77
CMS US Equity	CMS ENERGY CORP	43%	0.92	0.66	46%	0.78	0.57
CNP US Equity	CENTERPOINT ENERGY INC	48%	1.28	0.86	49%	1.12	0.72
CPK US Equity	CHESAPEAKE UTILITIES CORP	29%	0.90	0.79	28%	0.93	0.90
D US Equity	DOMINION ENERGY INC	42%	1.07	0.65	41%	0.96	0.61
DTE US Equity	DTE ENERGY COMPANY	48%	0.80	0.41	47%	0.70	0.46
DUK US Equity	DUKE ENERGY CORP	38%	0.83	0.61	39%	0.77	0.60
ED US Equity	CONSOLIDATED EDISON INC	45%	0.68	0.49	43%	0.60	0.46
EIX US Equity	EDISON INTERNATIONAL	48%	1.02	0.89	42%	0.97	0.79
ES US Equity	EVERSOURCE ENERGY	39%	1.13	0.77	39%	0.99	0.76
ETR US Equity	ENTERGY CORP	53%	0.97	0.54	53%	0.85	0.60
EVRG US Equity	EVERGY INC	41%	1.04	0.63	41%	0.93	0.68
EXC US Equity	EXELON CORP	48%	1.06	0.90	47%	0.93	0.93
FE US Equity	FIRSTENERGY CORP	51%	0.87	0.59	55%	0.72	0.58
HE US Equity	HAWAIIAN ELECTRIC INDS	36%	0.82	0.76	37%	0.77	0.74
IDA US Equity	IDACORP INC	28%	1.23	0.74	31%	1.12	0.84

Ticker	Company Name	5 year equity betas			10 year equity betas		
		Gearing	OLS	LAD	Gearing	OLS	LAD
KMI US Equity	KINDER MORGAN INC	47%	1.18	1.18	47%	1.22	1.20
LNT US Equity	ALLIANT ENERGY CORP	35%	1.13	0.86	36%	1.01	0.78
MGEE US Equity	MGE ENERGY INC	19%	0.92	0.81	19%	0.94	0.84
NEE US Equity	NEXTERA ENERGY INC	28%	1.30	0.96	34%	1.06	0.87
NFG US Equity	NATIONAL FUEL GAS CO	35%	0.89	0.90	31%	1.06	1.07
NI US Equity	NISOURCE INC	50%	0.84	0.66	49%	0.83	0.69
NJR US Equity	NEW JERSEY RESOURCES CORP	34%	1.09	0.96	32%	1.08	1.00
NWE US Equity	NORTHWESTERN CORP	42%	1.22	0.84	43%	1.07	0.77
NWN US Equity	NORTHWEST NATURAL HOLDING CO	40%	0.78	0.70	40%	0.75	0.71
OGE US Equity	OGE ENERGY CORP	34%	1.51	0.98	33%	1.36	0.92
OGS US Equity	ONE GAS INC	34%	1.06	0.88	34%	1.03	0.94
PCG US Equity	P G & E CORP	55%	1.52	1.15	47%	1.46	0.96
PEG US Equity	PUBLIC SERVICE ENTERPRISE GP	37%	1.19	0.88	34%	1.10	0.84
PNM US Equity	PNM RESOURCES INC	47%	1.13	0.49	48%	1.00	0.60
PNW US Equity	PINNACLE WEST CAPITAL	40%	1.15	0.52	37%	1.09	0.67
POR US Equity	PORTLAND GENERAL ELECTRIC CO	40%	1.02	0.60	41%	0.91	0.64
PPL US Equity	PPL CORP	45%	1.31	0.82	47%	1.10	0.70
RGCO US Equity	RGC RESOURCES INC	32%	0.67	0.53	29%	0.58	0.26
SJI US Equity	SOUTH JERSEY INDUSTRIES	52%	0.81	0.77	45%	0.87	0.88
SO US Equity	SOUTHERN CO/THE	46%	0.96	0.63	43%	0.86	0.61
SR US Equity	SPIRE INC	41%	1.09	0.73	39%	1.04	0.77
SRE US Equity	SEMPRA ENERGY	45%	0.83	0.57	44%	0.79	0.61
SWX US Equity	SOUTHWEST GAS HOLDINGS INC	44%	1.03	0.75	40%	1.01	0.80
UTL US Equity	UNITIL CORP	41%	1.00	0.88	42%	0.89	0.75
WEC US Equity	WEC ENERGY GROUP INC	33%	1.06	0.60	34%	0.91	0.64
XEL US Equity	XCEL ENERGY INC	39%	0.98	0.61	41%	0.83	0.57
	Mean	**40%**	**1.03**	**0.74**	**40%**	**0.95**	**0.74**

Source: ERA analysis.