Economic Regulation Authority

Explanatory statement for the 2022 draft gas rate of return instrument

17 June 2022

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About this instrument and review

The Economic Regulation Authority is undertaking a review of the current gas rate of return instrument.

The expected rate of return on capital provides a business with funds to service the interest on its loans and give a return to shareholders.

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 ERA published its current gas instrument on 18 December 2018.

The ERA is required to complete a review of the gas instrument every four years and its next gas instrument is required to be published by 18 December 2022.

The NGL requires the ERA to publish a draft gas instrument and explanatory information for the draft instrument before publishing a final gas instrument.

This document is the explanatory information for the draft instrument. This explanatory statement sets out the ERA's reasoning for its proposed positions on the method for calculating the allowed rate of return and its components.

The ERA is seeking stakeholder feedback on its proposed positions in the draft instrument.

The ERA will consider these submissions in the development of its 2022 final gas instrument, which is expected to be published in December 2022.

Invitation to make submissions

Submissions are due by 4:00 pm WST, Friday, 2 September 2022

The ERA invites comment on this paper and the *2022 Gas Rate of Return Draft Instrument* which it accompanies. The ERA encourages all interested parties to provide comment on the matters discussed in these papers and any other issues or concerns not already raised in either paper.

We would prefer to receive your comments via our online submission form https://www.erawa.com.au/consultation

You can also send comments through:

Email: publicsubmissions@erawa.com.au
Post: Level 4, Albert Facey House, 469 Wellington Street, Perth WA 6000

Please note that submissions provided electronically do not need to be provided separately in hard copy.

All submissions will be made available on our website unless arrangements are made in advance between the author and the ERA. This is because it is preferable that all submissions be publicly available to facilitate an informed and transparent consultative process. Parties wishing to submit confidential information are requested to contact us at info@erawa.com.au.

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1. Executive summary

The ERA is undertaking a review of the 2018 gas rate of return instrument. The gas instrument sets out the approach to determining the rate of return on capital for gas transmission and distribution service providers in Western Australia. The ERA must publish a new final gas instrument by 18 December 2022.

The 2022 final gas instrument will be a binding instrument, applying to all regulatory determinations made while the 2022 gas instrument is in force.

This document is the explanatory statement for the 2022 draft gas instrument, which is published concurrently to this explanatory statement.

The 2022 draft gas instrument sets out the ERA's positions on the rate of return, and its components, necessary to calculate the allowed rate of return.

This explanatory statement outlines how the ERA has reached the positions detailed in the 2022 draft gas instrument.

The gas instrument review provides an opportunity to undertake a comprehensive review of 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.

Throughout the review, the ERA has considered a range of information including expert views, academic literature, market data, stakeholder submissions and other information.

As required by the National Gas Law, the ERA has established a Consumer Reference Group (CRG), to provide insight on the rate of return from the perspective of consumers. The ERA has also established an Independent Panel, which will review the 2022 draft gas instrument in detail.

Having fully considered all information gathered so far, the ERA's 2022 draft gas instrument largely maintains or refines many of the approaches set out in the 2018 gas instrument.

New market and regulatory developments have meant that the ERA has considered whether some of its past approaches should be continued in the 2022 draft gas instrument.

The ERA has decided to change some of its approaches to the return on equity to ensure that the rate of return continues to deliver efficient forward-looking rates. 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 6.2 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 will now consider both domestic and international comparator firms and different timeframes.

Table 1 summarises the approaches for the parameters of the rate of return adopted in the 2022 draft gas instrument.

Table 1: Summary of 2022 draft approach for rate of return parameters

WACC component	2022 draft approach	Explanatory statement chapter
Form of the rate of return	Unchanged from 2018 gas instrument. The 2022 draft approach is to adopt a nominal vanilla weighted average cost of capital.	Chapter 5
Cross-checks on the rate of return	Unchanged from the 2018 gas instrument. The 2022 draft approach does not adopt cross-checks on the rate of return.	Chapter 6
Averaging period process	The averaging window for the annual debt risk premium update will be between seven and three months before the start of the regulatory year in order to allow more time for the annual reference tariff variation calculations. Otherwise the averaging period process is unchanged from the 2018 gas instrument.	Chapter 7
Gearing	Unchanged from 2018 gas instrument. The 2022 draft approach adopts a 55% gearing level.	Chapter 8
Return on debt - Estimation method	Unchanged from 2018 gas instrument. The 2022 draft approach adopts a hybrid trailing average.	Chapter 9.1
Return on debt - Debt risk free rate	Unchanged from 2018 gas instrument. The 2022 draft approach adopts the prevailing five-year interest rate swap rate as the estimate of the risk free rate for the return for debt.	Chapter 9.2
Return on debt - Term of debt	Unchanged from 2018 gas instrument. The 2022 draft approach will apply 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 2018 gas instrument. The 2022 draft instrument assumes a benchmark credit rating of BBB+.	Chapter 9.4
Return on debt - Debt risk premium	Unchanged from 2018 gas instrument. The 2022 draft approach applies the revised bond yield approach to determine the debt risk premium.	Chapter 9.5
Return on equity - Return on equity model	Unchanged from 2018 gas instrument. The 2022 draft approach applies the Sharpe-Lintner capital asset pricing model to estimate the return on equity.	Chapter 10.1

WACC component	2022 draft approach	Explanatory statement chapter
Return on equity - Term for equity	Changed from 2018 gas instrument. The 2022 draft approach will use a ten-year term for the return on equity. This change reflects the ERA view that: * The expected return on equity should reflect a competitive market rate. * Investors consider long-term cashflows in setting their return expectations for long-lived infrastructure assets.	Chapter 10.1
Return on equity - Equity risk free rate	Changed from 2018 gas instrument. The 2022 draft approach will maintain the same proxy instrument (Commonwealth Government Security bonds) as the 2018 gas instrument, however consistent with the term for equity will use ten-year rather than five-year bonds.	Chapter 10.2
Return on equity - Market risk premium	Changed from 2018 gas instrument. The 2022 draft approach will apply a fixed market risk premium of 6.2 per cent. * The approach largely reflects the 2018 approach to determining a point estimate, which utilises the historic market risk premium, the dividend growth model and conditioning variables. * The 2022 draft updates for current market conditions and the 10-year term for equity. * It incorporates some refinements and simplifications to the historical market risk premium calculation. * It averages dividend growth model estimates over six months.	Chapter 10.3
Return on equity – Beta	Changed from 2018 gas instrument. The 2022 draft approach will apply an equity beta value of 0.7, which is unchanged from 2018. This estimate has resulted from the use of an expanded set of comparators including both domestic and international comparators due to a lack of domestic comparators.	Chapter 10.4
Debt and equity raising costs and debt hedging costs	Changed from 2018 gas instrument. The 2022 draft approach will include allowances for: * Debt raising costs of 0.165 per cent per annum * Debt hedging costs of 0.123 per cent per annum * 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 2018 gas instrument. The 2022 draft approach will apply the Treasury bond implied inflation approach and a five-year term for inflation.	Chapter 12
Value of imputation credits (gamma)	Unchanged from 2018 gas instrument. The 2022 draft approach will apply a value of gamma of 0.5.	Chapter 13

Table 2 summarises illustrative numbers for the rate of return and its parameters as at the end of April 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 draft gas instrument are both calculated using the same period. If we apply the 2018 instrument now a nominal WACC of 6.21 per cent is calculated, which compares to 6.42 per cent for the 2022 draft gas instrument. These numbers are subject to market changes at the time of individual access arrangement determinations.

Table 2: Illustrative rate of return and parameters as at April 2022.

	2018 gas instrument	2022 draft gas instrument
Return on debt		
5-year interest rate swap (%)*	3.120%	3.120%
Debt risk premium (%)^	2.259%	2.259%
Debt issuing + hedging cost (%)	**0.214%**	**0.288%**
Nominal return on debt	**5.59%**	**5.67%**
Cost of equity parameters		
Nominal risk free rate*	2.77%	3.01%
Equity beta	0.70	0.70
Market risk premium	6.00%	6.20%
Nominal after tax return on equity	**6.97%**	**7.35%**
Other parameters		
Debt proportion (gearing)	55.00%	55.00%
Forecast inflation rate*	2.80%	2.80%
Forecast credits (gamma)	0.50	0.50
Corporate tax rate	30%	30%
Weighted Average Cost of Capital		
Nominal after-tax WACC	**6.21%**	**6.42%**
Real after-tax WACC	3.32%	3.53%

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

^ This number represents the latest 10-year trailing average reported in DBP's access arrangement. The trailing average DRP is influenced by the historic DRP's allowed for each gas pipeline. The trailing average DRP is updated annually.

The ERA considers that the 2022 draft gas instrument best delivers an efficient rate of return that supports the long-term interest of consumers. The ERA aims to promote efficient investment in, and operation of, regulated gas pipelines, and the efficient use of gas pipelines. The ERA considers that these positions best deliver the requirements of the National Gas Law and National Gas Rules, including the national gas objective, and the revenue and pricing principles.

The ERA now invites submissions on the 2022 draft gas instrument and this explanatory statement, and will publish the report prepared by the Independent Panel once available.

The ERA will consider stakeholder submissions, the findings of the Independent Panel report, and any other material the ERA considers relevant to develop the 2022 final gas instrument.

2. 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 and National Gas Rules 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.

4. The ERA published its current instrument on 18 December 2018 (referred to throughout this document as the 2018 gas instrument).

5. 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.

6. The ERA must review the 2018 gas instrument and publish the 2022 gas instrument by 18 December 2022.

7. The gas instrument reviews provide an opportunity to undertake a comprehensive review of 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.

8. The ERA encourages all interested parties to provide submissions on the 2022 draft gas instrument and the explanatory statement.

9. The ERA will consider the submissions received regarding the 2022 draft gas instrument and the explanatory statement in formulating the 2022 final gas instrument.

[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.

2.1 The requirement

10. The NGL requires the ERA to publish a draft gas instrument and explanatory statement for the draft gas instrument before publishing a final gas instrument.[2]

11. The *2022 Gas Rate of Return Draft Instrument* (referred to throughout this document as the 2022 draft gas instrument) sets out the ERA's current position on determining the allowed rate of return on capital.

12. This document, the *Explanatory Statement for the 2022 Gas Rate of Return Draft Instrument* (referred to throughout this document as the 2022 explanatory statement) provides the ERA's reasoning supporting the positions set out in the 2022 draft gas instrument. The ERA's reasoning considers a range of evidence including academic literature, market data and developments, submissions during the review, expert views and other relevant information.

13. Section 30E of the NGL sets out the required content of a rate of return instrument:

> **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.

14. When finalised, the gas instrument is a binding instrument on the ERA and gas network 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.

2.2 Application of gas instrument

15. Rule 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

[2] NGL, chapter 2, part 1, subdivision 2, cl. 30J and 30L.

(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.

16. 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).

17. 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 (once published) will be determined at each subsequent access arrangement review.

3. 2022 gas rate of return instrument review process

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

19. During the review process, the ERA will consider a range of information, including stakeholder submissions, academic literature, expert views, market data and developments, information arising from the review consultation processes and any other relevant information.

20. The 2022 gas instrument review approach is 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.

21. 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.

22. The ERA has previously published a paper setting out the engagement process for the review. This engagement document did not discuss substantive technical rate of return matters.[3]

23. The intent of the Consumer Reference Group is to provide direct and ongoing feedback to the ERA during the review to represent broad consumer perspectives. The Consumer Reference Group has the opportunity to make submissions throughout the review. The ERA has considered submissions made by the Consumer Reference Group in the 2022 draft gas instrument.

24. The Independent Panel will review the 2022 draft gas instrument and this explanatory statement. The Independent Panel will report on whether it is supported by sound reasoning, based on the available information, such that it is capable of promoting achievement of the national gas objective. The Independent Panel process is intended to give the ERA the benefit of an independent review, and to promote confidence among stakeholders that the ERA's proposed approach for the gas instrument is robust.

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

25. Throughout the review, the ERA will consider the views of experts, including as part of concurrent expert evidence. Concurrent evidence involves the ERA receiving expert advice on specific rate of return matters to assist in its consideration. Considering expert evidence will assist the ERA to make decisions that result in a gas instrument that will, or is most likely to, contribute to the achievement of the national gas objective. The ERA gathered expert evidence from the concurrent evidence sessions conducted by the Australian Energy Regulator (AER) in February 2022.

26. 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 stakeholder feedback on the discussion paper in February 2022.

27. In March 2022, the ERA also undertook additional consultation on debt raising and hedging costs. The ERA received stakeholder feedback in April 2022.

28. 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 two components of the rate of return. The ERA conducted this consultation in April and May 2022. The focused consultation addressed specific questions regarding the equity beta and 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 these questions and relevant background to these questions.[4]
    - 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.

29. To develop the 2022 draft gas instrument, and as detailed in this explanatory statement, the ERA has considered a broad range of information, including stakeholder submissions, academic literature, market data and developments, information arising from the review consultation processes and expert views.

30. The ERA's 2022 draft gas instrument, and its explanatory statement, will be subject to:

    - the review of the Independent Panel
    - further submissions from the Consumer Reference Group and all stakeholders.

[4] The paper on the focused consultation is available online.

31. Indicative 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 regarding 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 (which this document accompanies) and explanatory information (this document).	June 2022
Independent Panel report	The Independent Panel will provide a report, which will be published on the ERA's website, including the panel's assessment of 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 will invite public submissions on the 2022 draft gas instrument and the Independent Panel report.	September 2022
2022 final gas instrument	The 2022 gas instrument and explanatory statement will be published and will be a binding instrument, applying to all regulatory determinations made while it is in force.	December 2022

4. The regulatory framework

32. 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.

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

34. 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.

4.1 The National Gas Law

4.1.1 Rate of return

35. 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.

36. The NGL sets out the content of a gas instrument, stating that the instrument may include 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.

37. 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.

38. Additionally, the NGL requires that the ERA publish explanatory information for a rate of return instrument:

> **30L Publication of explanatory information**
>
> The [ERA] must publish explanatory information for a rate of return instrument on its website when the instrument is published under section 30N.

4.1.2 Objectives under National Gas Law

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

> **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.
>
> (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.

40. 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.

41. 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.

[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.

42. The revenue and pricing principles in the NGL give effect to the national gas objective.[7] The revenue and pricing principles establish that the national gas objective is to be promoted by targeting economically efficient outcomes, through effective incentives.[8] 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.

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

44. 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.[9] 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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7 Holloway, P., *Second Reading Speech: National Gas (South Australia) Bill 2008, Parliamentary Debates (SA),* Legislative Council, 30 April 2008.

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

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

4.2 The National Gas Rules

45. The NGR detail how the rate of return is applied when determining regulated revenues.

46. 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)).

47. 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.

48. 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;

4.3 Implications for the ERA

49. To come to a regulatory decision, the ERA needs to 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.

50. 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.

51. 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. 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.[10]

52. 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.

53. It is common regulatory practice to use a benchmark efficient entity to inform the 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.

54. For the 2022 gas instrument, the ERA intends to select 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.

55. The ERA will estimate 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 to achieving the ERA's legislative objectives. The ERA considers the degree of risk involved in providing regulated gas pipeline services when estimating the expected rate of return.

56. The ERA will estimate an expected rate of return that is applied to a benchmark gas network service provider. The ERA does not determine the returns of a specific gas network service provider based on all its individual circumstances.

57. 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.

58. 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.[11]

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

11 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.

59. If the expected rate of return deviates from the 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, the service provider's gas pipelines. These inefficient outcomes would not be in the long-term interests of consumers.

60. 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.
- Consumers will pay higher prices than is efficient, which may distort downstream and upstream investment decisions.

61. 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.

62. The ERA will aim to determine 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 that is neither too high nor too low. 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, because market data reflects the aggregate expectations of investors.

63. The ERA considers that this approach supports efficient investment in 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.

4.4 Use of regulatory judgement

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

65. 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 consultation.

66. 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.

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

68. The ERA's decisions must satisfy the relevant law and rules, which state:[12]

> 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.

69. The ERA will therefore apply 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 will examine a broad range of evidence including financial market data, financial models, expert views, investment practices and stakeholder views.

70. 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.

71. When using its regulatory discretion on rate of return matters, the ERA's decisions will also be informed by the following set of guiding principles. The ERA will select rate of return estimation methods that are:

- reflective of economic and finance principles and market information
- fit for purpose
- transparent
- implementable and replicable
- sufficiently flexible as to allow for changing market conditions.

72. These guiding principles provide a framework through which the ERA is able to inform its regulatory judgement of the evidence before it.

73. The ERA considers that the rate of return is more likely to achieve the national gas objective and revenue and pricing principles when decisions are informed by these principles.

74. The 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:[13]

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12 NGL, chapter 2, part 1, division 1A, subdivision 2.

13 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.

"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."

75. The first five of the assessment criteria recommended by the CRG are the same as the general guiding principles the ERA outlined in its discussion paper.[14]

76. The ERA has not explicitly adopted the sixth through ninth assessment criteria proposed by the CRG. However, the ERA considers that its approach in applying the regulatory framework has to consider these general factors when exercising regulatory discretion:

- By having regard to the national gas objective and revenue and pricing principles when making the rate of return instrument, the ERA considers that it will ensure efficient use of the gas pipelines it regulates. Therefore, the ERA's existing approach for applying the regulatory framework will fulfil the efficiency objective of the sixth and eighth assessment criteria proposed by the CRG.
- The ERA's reasoning has considered a range of evidence including academic literature, market data and developments, expert views, submissions received in connection with the review to date and other relevant information. The current positions in the 2022 draft gas instrument reflect the ERA's consideration of this range of evidence. Where the positions in the 2022 draft gas instrument deviate from the positions in the 2018 gas instrument the ERA has considered the materiality of evidence supporting this change. Therefore, the ERA's existing approach for applying the regulatory framework will fulfil the objective of the seventh assessment criteria proposed by the CRG.
- The ERA considers that by fulfilling the consultation requirements specified by the NGL (outlined in Chapter 3) ensures that gas instrument best meets the national gas objective. Therefore, the ERA's decision-making will fulfil the objective of the ninth assessment criteria proposed by the CRG.

77. The ERA's reasoning in the 2022 draft gas rate of return instrument will be subject to:

- the review of the Independent Panel
- submissions of the Consumer Reference Group and all stakeholders.

78. The Independent Panel will review the 2022 draft gas instrument, and accompanying explanatory statement, and report on whether it is supported by sound reasoning based on the available information such that it is capable of promoting achievement of the national gas objective.

[14] ERA, *2022 Gas Rate of Return Instrument Review Discussion Paper*, December 2022, p. 12.

79. When finalised, the gas instrument is a binding instrument on the ERA and gas network 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.

4.5 The impact of the regulatory framework on risk

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

81. Central to this approach is the development/calculation of 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.

82. The ERA has determined the positions in the 2022 draft 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.

83. In doing so the ERA has considered a gas pipeline business and its regulatory framework, along with the associated risk characteristics.

84. 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.[15] Regulation has the effect of capping the potential monopoly revenue stream and therefore its level of profit.

85. A regulated monopoly is still exposed to some risk, albeit that risk may be low. 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.

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

87. The ERA considers that the following characteristics of the regulatory framework applying to Western Australia's gas pipelines affect their risk relative to firms operating in the competitive market:

- Periodic resets of allowed revenue, which provides some revenue certainty.
- Consumer Price Index tariff adjustment mechanisms to reflect actual inflation, which mitigate inflation risk.
- Recovery of capital expenditure once the asset base has been approved. Assets are not typically written off, rather firms can often accelerate depreciation.
- Fixed principles where if the regulator approves a fixed principle the regulator must abide by that principle.
- Inclusion of pass-through of costs related to tax or law changes.

[15] 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.

- The hybrid trailing average approach to estimating the cost of debt, which mitigates interest rate risk.
- Allowance for debt hedging instruments and costs, which helps reduce interest rate risk.
- Treatment of material unexpected adverse events.

88. 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.

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

90. The regulatory framework does limit a monopoly's ability to maximise profit. However, incentive mechanisms built into the regulatory framework provide regulated businesses with incentives, often over the short term, to increase efficiency.

91. For example, a regulated business is financially rewarded when increasing operating efficiencies so that expenditure levels are below those approved over its access arrangement. In this case, the entity gets to retain some of this reduction in operating expenditure over a fixed period. These reductions in operating expenditure flow to consumers over time through reductions in required revenue and therefore tariffs.

92. This combination of limited downside risk and potential for short-term upside benefit explains the risk-reward trade-off of a regulated monopoly business. These risk-reward characteristics are incorporated into credit ratings and equity market valuations. Relative to competitive businesses, lower levels of risk for regulated monopolies are reflected in higher credit ratings from ratings agencies and lower betas from market valuations.

5. The rate of return framework

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

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

95. 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.

96. The national gas framework sets out the revenue building blocks, which includes an allowance for taxes.[16]

5.1 2018 position

97. The 2018 gas instrument applies a nominal vanilla WACC to develop the rate of return for the benchmark efficient entity.

98. 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.

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

100. The vanilla form of the WACC adopted was expressed as:[17]

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

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.

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

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

101. 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.[18]

5.2 Working views in the discussion paper

102. The ERA's working view was to continue to apply a nominal vanilla WACC.

5.3 Consultation

103. Four of the submissions to the discussion paper provided comments on the rate of return framework.

104. South32 supported the use of a nominal vanilla WACC.[19]

105. The CRG recognised that the nominal vanilla WACC as used by the ERA and other Australian regulators is a relevant default starting point method for setting an allowed rate of return. However, the CRG submitted that there is a need to consider the extent to which the regulatory arrangements themselves affect the assumptions of the WACC method and its parameters.[20]

106. ATCO supported the application of a nominal rate of return framework.[21]

107. ATCO also submitted that the ERA should consider transitioning from the current approach of delivering a real revenue model to a nominal revenue model. ATCO considered that nominal modelling would be a way to deal with uncertainty in the energy market from decarbonisation. ATCO submitted that the ERA should consider a transition to a nominal revenue modelling approach as part of this review given the intergenerational impacts to customers (that is, future customers pay for today's inflation cost) and to reduce the uncertainty of the timing of the recovery of efficient costs.[22]

108. ATCO submitted that the current revenue modelling framework has the following deficiencies:[23]

- It results in a real return on the regulated asset base rather than the nominal return. ATCO considered that, at any point in time, nominal cash returns were required to compensate both debt and equity investors.
- It requires a forecast of inflation to be made, which adds another source of potential error to the return estimate.
- It breaches the NPV=0 principle because efficiently incurred debt costs are nominal and do not vary with actual inflation.

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18 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.

19 South32, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 1.

20 Consumer Reference Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p.39.

21 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 2.

22 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 2.

23 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 3-4.

109. ATCO considered that a nominal revenue modelling approach would:[24]

- Reduce complexity compared to the real revenue modelling because, under a nominal revenue modelling approach, inflation and real returns do not have to be estimated and indexation of the regulatory asset base does not have to be calculated.
- Provide better investment signals by allowing regulated gas networks to recover efficient financing costs through eliminating period to period windfall gains and losses, thus supporting the NPV=0 principle.
- Better serve the long-term interests of consumers by improving the equity of the intergenerational allocation of costs over time in a market that is not growing and by lowering the lifetime cost of gas to consumers.

110. AGIG noted a recent paper that suggests that it is appropriate for regulators to use a WACC estimate above the mean under most circumstances because of the consequences on consumer surplus (including the value of lost load) of producing an estimate which turns out to be too low. AGIG considered that this paper extends an earlier literature which formed the basis by which the New Zealand Commerce Commission formalised its approach of choosing the 67th percentile of its beta estimate, rather than its mean.[25]

111. In response to AGIG's submission the CRG considered that choosing a WACC estimate materially above the mean in order to ensure sufficient incentive to invest and continue to supply is not likely to be necessary and would be contrary to the long term interests of consumers if there is no evidence that efficient investment has been deterred.[26]

5.4 2022 draft approach

112. The ERA's position for the 2022 draft gas instrument is that the rate of return will take the form of a nominal vanilla WACC.

113. The form of the weighted average cost of capital (WACC) will be the same as Equation 1.

5.5 Reasoning

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

115. Amendments made in 2019 as part of the legislative review of the national gas framework removed the explicit requirement in the NGR that the allowed rate of return was to be determined on a nominal vanilla basis. However, the ERA's approach maintains the nominal vanilla basis for the WACC because it is:

- Transparent.

[24] ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 3-4

[25] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 3.

[26] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, p. 5.

- Consistent with the proposed approach for the 2022 draft gas instrument 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 generally support, and the practice of other regulators, including the AER.

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

117. To develop the rate of return approach laid out in the 2022 draft gas instrument, the ERA has had to satisfy itself of how the overall framework and each of its components best meets the requirements of the national gas objective. These considerations are detailed throughout the explanatory statement. The ERA considers that the approaches and methods laid out in the 2022 draft gas instrument and explanatory statement best meet the national gas objective.

118. A nominal vanilla WACC is used for both nominal and real revenue modelling.

119. The consideration of nominal and real revenue modelling relates to the treatment of inflation within the regulatory revenue models and the resulting recovery of cashflows overtime. Therefore, ATCO's proposed transition to a nominal revenue model better relates to the consideration of proposed revisions to its access arrangement. Any proposed change by ATCO would have to be sufficiently justified and considered in that future process.

6. Cross-checks on the rate of return

120. 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.

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

6.1 2018 position

122. The ERA considered the use of cross-checks during its review process to establish the 2018 gas instrument.

123. During this review process, stakeholders submitted that:

- Financeability assessments could be useful in ensuring that the allowed return was sufficient to support the credit rating that was assumed in deriving that allowed return.
- High energy business values and regulatory asset base multiples had been driven by an unreasonably high WACC.
- Actual financial performance on an *ex-post* basis could be used to help confirm the reasonableness of the overall return on equity.

124. The ERA concluded that:[27]

- The application of financeability analysis under a binding rate of return framework may be limited, as such analysis would likely involve the use of discretion.
- There was no clear understanding of the links between an energy business's regulated asset base multiple and its allowed rate of return. Therefore, the ERA would not directly link an energy network business's regulated asset base multiple to its allowed rate of return.
- Actual financial performance of a firm is affected by many factors beyond the rate of return. In addition, a review of financial performance on an *ex-post* basis would be inconsistent with an incentive-based regulation framework.
- The gas instrument should not make any adjustments to the rate of return based on cross-checks.

6.2 Working views in the discussion paper

125. In the discussion paper the ERA did not discuss or express a working view on the use of cross-checks and how these measures might inform the overall rate of return.

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

6.3 Consultation

6.3.1 Discussion paper

126. Three of the submissions to the discussion paper provided comments on cross-checks on the rate of return.

127. AGIG submitted that cross-checks are important sense checks on the return on equity and the ERA should give serious consideration to their use. AGIG suggested that cross-checks could be used to test the regulatory cost of equity by:[28]

- Calculating a fixed equity risk premium.
- Calculating the cost of equity under a wide range of different risk free rates.
- Using these estimates to assess whether they align with estimates that the ERA would make, absent of any binding rate of return instrument, and give the most efficient prices in the prevailing market conditions.

128. AGIG suggested that the use of cross-checks could be automated to a degree. AGIG submitted that Energy Networks Australia's (ENA) model facilitates cross-checks. AGIG considered that ENA's model was a useful way of testing a proposition such as a fixed equity risk premium.[29]

129. AGIG also suggested applying the more formal approach for the return on equity proposed by Australian Pipelines and Gas Association (APGA) to the AER. This approach uses the ranges of multiple competing inputs or models to determine the maximum overlapping range that is used to inform a return on equity estimate. AGIG suggested some practical refinements to this approach, including how weights might be assigned to the different cross-checks used to apply the approach.[30]

130. Referring to the findings from the Brattle Group's report to the AER, ATCO considered that relying on multiple return on equity models, or a cross-check based on alternative models, allowed a regulator to consider a broader set of information about market conditions and the industry.[31]

131. The CRG submitted that the ERA should use various measures or information as a cross-check on the overall rate of return.

- For estimating the debt risk premium, the ERA should consider whether the Energy Infrastructure Credit Spread Index (EICSI) under development by the AER could be used as cross-check on its cost of debt estimates.[32]
- The CRG considered that there was evidence that the market value of listed energy firms exceeded the value of the regulated asset base for listed network energy businesses and that this might indicate investors were able to receive rates of return above the required rate.[33]

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28 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 30-31.

29 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 31.

30 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 31-32.

31 ATCO, *Submission to Discussion Paper*, February 2022, pp. 42-43.

32 CRG, *Submission to Discussion Paper*, February 2022, p. 11.

33 CRG, *Submission to Discussion Paper*, February 2022, p. 40.

6.4 2022 draft approach

132. The 2022 draft gas instrument does not incorporate the use of cross-checks.

6.5 Reasoning

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

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

135. In the 2022 draft gas instrument the ERA considers various pieces of information to best estimate the various parameters of the rate of return.

136. These considerations are specific to the individual rate of return parameter and include assessing relevant models, market information and other information.

137. The ERA considered the following broad cross-checks:

- financeability
- regulated asset base multiples
- historical profitability.

6.5.1 Financeability

138. 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.

139. Various stakeholders have raised the topic of financeability metrics in several AER rate of return review processes.

140. 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.[34]

141. 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.

142. 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 discretionary decisions.

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

143. 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. This outcome may suggest that a financeability test can be used as a diagnostic tool.

144. 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.

145. 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. Additionally, there is a high degree of subjectivity involved in implementing financeability testing. The application of financeability analysis under a binding rate of return framework would therefore likely involve considerable judgement and discretion.

146. Based on the information above, the ERA will not use financeability metrics as a cross-check to inform the overall the rate of return for the 2022 draft gas instrument.

6.5.2 Regulatory asset base multiples

147. Regulated asset base multiples are the enterprise value of a firm divided by its regulatory 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.

148. 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.[35] Similarly, 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.[36]

149. 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:[37,38]

- Buyers overpaying through their irrational exuberance or the "winner's curse".[39]
- 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.

150. In the AER's 2022 concurrent evidence session on cross-checks, the experts also expressed reservations on the use of regulated asset base multiples to inform the rate of return, including:[40]

- 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.

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

36 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.

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

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

39 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.

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

- 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.

151. Regulated asset base multiples may also fluctuate overtime and according to factors idiosyncratic to an individual network business. McGrathNicol found that regulated asset base multiples were only relevant for a limited period following the transaction, becoming less relevant as time passes.[41]

152. The ERA considers that 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.

153. The ERA will not use regulated asset base multiples as a cross-check to inform the overall the rate of return for the 2022 draft gas instrument.

6.5.3 Historical profitability

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

155. 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.

156. In the AER's recent 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:[42]

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

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41 McGrathNicol, *Response to submissions on performance measures*, April 2018, p.16. Available at the AER website.

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

- Profitability measures based on accounting profits are prone to manipulation, with evidence indicating that monopolies adopt accounting practices to reduce the appearance of profitability.

157. 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.

158. The ERA therefore does not include profitability as a cross-check to inform the overall the rate of return for the 2022 draft gas instrument.

7. Averaging period process

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

160. 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.

161. 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.

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

7.1 2018 position

163. The 2018 gas instrument set out that the averaging periods for the risk free rates used to estimate the return on debt and the return on equity:[43]

- Will have a duration of 20 consecutive trading days.
- Will be as close as possible to the expected access arrangement final decision for the regulatory period and prior to any of its dates taking place.
- Will be nominated by the respective gas network service providers. Where the averaging period is not nominated by a gas network service provider within 30 business days following an access arrangement draft decision, the ERA will use a default averaging period of the 20 consecutive trading days one month prior to the access arrangement final decision for the regulatory period.

164. The 2018 gas instrument specified 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.[44]

165. For the annual update of the debt risk premium, the 2018 gas instrument set out that the averaging period for the bonds in the benchmark sample:[45]

- Will be 20 consecutive trading days as close as practical to the start of the relevant regulatory year.

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43 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 21.

44 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 38.

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

- Will be nominated by the respective gas network service provider. Where the averaging period is not nominated before the start of the regulatory period, the ERA will use a default averaging period of the 20 consecutive trading days ending two months prior to each regulatory year.
- Must fall within a window at least two months prior to, but no longer than six months before, the regulatory period.
- Will be confidential.

166. The averaging periods for the risk free rates on debt and equity and inflation remain confidential until the period has passed and are then disclosed in the final decision. The annual debt risk premium averaging periods generally remain confidential.[46]

7.2 Working views in the discussion paper

167. The ERA has implemented averaging periods in line with the requirements of the 2018 gas instrument for three gas network service providers' access arrangements since the 2018 gas instrument came into effect.[47]

168. The ERA has annually updated the debt risk premium as part of the annual tariff variation process for the three gas network service providers.

169. In the discussion paper, the ERA proposed small adjustments to the averaging process to clarify and standardise the process. The discussion paper detailed:
    - 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.

170. The ERA's working view was 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.

171. While the ERA's working view was to maintain averaging periods of 20 trading days, the ERA sought views on allowing averaging periods of up to 40 trading days to help mitigate the effects of market volatility.

[46] In some instances, gas network service providers have disclosed their nominated averaging periods in their public tariff variation proposals.

[47] These access arrangements are the access arrangement for the Dampier to Bunbury Natural Gas Pipeline for the 2021-2025 access arrangement period (published April 2021), the access arrangement for the Goldfields Gas Pipeline for the 2020-2024 access arrangement period (published December 2019) and the access arrangement for the Mid-West and South-West Gas Distribution Systems for the 2020-2024 access arrangement period (published November 2019).

7.3 Consultation

172. Five of the submissions to the discussion paper provided comments on the proposed averaging period process.

173. Stakeholder submissions were generally supportive of the proposed averaging process detailed in the discussion paper.

174. South32 supported the ERA's working views on the averaging period process.[48]

175. AGIG supported the ERA's working views on the averaging period process.[49]

- AGIG supported the standardised approach for estimating the market rates that are fixed at the start of the regulatory period.
- AGIG supported the standardised approach for the annual debt risk premium update. AGIG also asked that the ERA consider how the proposed timings affect other annual tariff variation processes and whether the timing should be optional, rather than mandated.

176. GGT supported the ERA's working views on the averaging process. GGT commented that the changes proposed make the requirements for setting of the averaging periods more specific without departing from current practice. GGT continued to favour an average period of 20 trading days.[50]

177. ATCO generally supported the ERA's working view on averaging process.[51]

- ATCO expressed support for extending the averaging period to up to 40 days.
- ATCO did not support the ERA's proposal to change the end date for the averaging period window for the debt risk premium from two months prior to three months prior to the end of the calendar year. ATCO considered that the averaging window in the 2018 gas instrument, which concludes two months before the end of the relevant regulatory year, should remain unchanged because:
  - This window has not caused difficulties for ATCO to complete the tariff variation mechanism.
  - Tariff variation mechanism calculations cannot be completed until relevant inflation data is available.
  - An averaging window ending two months before the end of the relevant regulatory is closer to the relevant regulatory year.

48 South32, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 2.

49 Australian Gas Infrastructure Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 3, 10.

50 Goldfields Gas Transmission Pty Ltd, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 11.

51 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 13.

178. The CRG supported the ERA's working view on the approach to the averaging periods. The CRG also submitted that:[52]

- Longer averaging periods typically do not make a material difference and a shorter averaging period would provide an estimate more reflective of current conditions.
- The ERA discussion paper did not explain why the debt risk premium was updated annually, and why this approach was different to the approach for the market return parameters which are fixed for five years. The CRG requested the ERA to clarify this point.[53]

7.4 2022 draft approach

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

180. 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.

7.4.1 Market rates for WACC parameters

181. 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 within 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.[54]
- 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.
- If an averaging period is not nominated within 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.

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52 Consumer Reference Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 6, 44.

53 Consumer Reference Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 44.

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

- The averaging periods for these market rates will remain confidential until the period has passed and will then be disclosed in the final decision.

7.4.2 Annual debt risk premium

182. 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 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 within 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.[55]
- 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.

7.5 Reasoning

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

184. Most elements of the draft 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.

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

- Confidentiality of the annual debt risk premium averaging periods.

185. 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.

186. 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 CRG supported this view in its submission to the discussion paper.[56]

187. 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 trading days for these parameters will therefore provide reliable estimates of the efficient rates of return for gas network service providers.

188. The ERA considered adopting a longer trading window of 40 days, but concluded that this would not provide materially better outcomes in terms of managing volatility, compared to a trading window of 20 days. A longer period might result in parameters being under-stated or over-stated in periods when markets are rising or falling. The CRG and GGT supported this view in their submissions to the discussion paper.[57] ATCO supported the extension of the averaging periods to 40 days.[58] However, the ERA did not find sufficient support that adopting this change would provide more reliable estimates of the parameters being estimated.

189. The ERA's draft 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.

190. 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.

191. The ERA considers this change 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.

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56 Consumer Reference Group for the 2022 Rate of Return Instrument Review, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 44.

57 Consumer Reference Group for the 2022 Rate of Return Instrument Review, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 44; Goldfields Gas Transmission Pty Ltd, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 11.

58 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 13.

192. 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.

193. The ERA acknowledges ATCO's statement that the averaging window for the annual debt risk premium in the 2018 gas instrument has not caused issues for the timely completion of ATCO's tariff variation mechanism calculations. ATCO also submitted that an averaging window concluding two months before the end of the relevant regulatory year allows for the debt risk premium estimate to be undertaken closer to the relevant regulatory year.[59]

194. ATCO also submitted that maintaining the end date of the averaging period for the debt risk premium as two months before the relevant regulatory period causes no additional delay because the annual reference tariff variations cannot be calculated until relevant inflation data become available.[60] The ERA acknowledges that the calculation of the annual reference tariff variation requires relevant inflation data, however once this data is available it can be input into the reference tariff variation calculations without further processing or adjustment.

195. The ERA considers that its proposed change to the averaging window will not yield less reliable estimates for the annual debt risk premium than would be obtained under the current averaging window. 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.

196. The CRG requested that the ERA clarify why the debt risk premium is updated annually, and why this approach is different to the approach for the market return parameters, which are fixed for five years.[61] The debt risk premium is updated annually so that the estimate of the debt risk premium best reflects current debt market conditions. Under the hybrid trailing average approach, the regulator assumes that the benchmark entity enters into an assumed benchmark efficient debt strategy whereby it implements a staggered portfolio of 10-year fixed rate debt with 10 per cent refinanced each year. Updating the debt risk premium annually provides the best estimate of the cost of debt for the portion of the benchmark entity's debt that is assumed to be refinanced each year.

59 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 13.

60 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 13.

61 Consumer Reference Group for the 2022 Rate of Return Instrument Review, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 44.

8. Gearing

197. 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

198. 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.

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

200. 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.

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

8.1 2018 position

202. The 2018 gas instrument applied a gearing level of 55 per cent, which was fixed over the period of the instrument.[62]

203. The average gearing of a benchmark sample of energy networks informed the benchmark efficient level of gearing.[63]

204. 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.[64]

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

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

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

8.2 Working views in the discussion paper

205. In the discussion paper, the ERA reviewed current information on the gearing of energy networks.

206. The ERA's working view in the discussion paper was that a gearing level of 55 per cent should be maintained for the 2022 gas instrument.

207. The ERA identified the relatively recent issuance of new hybrid securities. The ERA sought stakeholder views on how to recognise and adjust gearing for hybrid securities.

8.3 Consultation

208. Five of the submissions to the discussion paper provided stakeholder comments on gearing.

209. All five submissions supported maintaining the use of a benchmark gearing level of 55 per cent.[65,66,67,68,69]

210. The CRG submitted that it understood that:[70]

- A gearing level of 55 per cent is broadly similar for regulated energy networks and similar businesses, and that the capital structure of energy networks is relatively stable.
- At least one regulated pipeline has a gearing level of 70 per cent and this may be representative of standard financing for gas pipelines.

211. The CRG considered that it would be useful to check the actual gearing levels of the firms that the ERA regulates and consider any potential higher gearing levels.[71]

212. GGT noted that further work on appropriate comparators for regulated Australian gas pipelines was required, but this work should be deferred until the next rate of return review.[72]

213. Stakeholder submissions provided mixed views on the treatment of hybrid securities:

- AGIG considered that hybrid securities should be excluded from gearing, as part of consistency across the estimation of the WACC. AGIG referred to detailed discussions by Energy Networks Association with the AER.[73]

65 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 34.
66 ATCO, *Submission to Discussion Paper*, February 2022, p. 14.
67 CRG, *Submission to Discussion Paper*, February 2022, p. 45.
68 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 12.
69 South32, *Submission to Discussion Paper*, February 2022, p. 2.
70 CRG, *Submission to Discussion Paper*, February 2022, p. 45.
71 CRG, *Submission Discussion Paper*, February 2022, p. 45.
72 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 12.
73 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 34.

- ATCO supported, in principle, the adjustment of debt and equity for hybrid securities, noting that:[74]
  - The ERA needed to provide more information on the adjustment approach.
  - The ERA must carefully review the instruments identified and ensure that these hybrid securities instruments met the criteria for hybrid debt or equity instruments, and the categorisations were consistently applied to gearing used in the WACC calculations.
- The CRG noted that reclassification of all hybrid securities as equity rather than a component of the security is an extreme position. A 50/50 allocation seemed to be a more accurate disaggregation in the absence of other information.[75]
- The CRG considered that the ERA should monitor the AER approach on recognising hybrid securities and present some examples of how the two alternatives could affect gearing and the rate of return.[76]
- GGT did not support the adjustment of debt and equity values used in determining gearing to recognise hybrid securities. GGT considered that he issuance of hybrid securities is typically limited to larger borrowers and these markets may not always be "open" for new issuance. GGT considered that there was no simple method whereby the value of hybrid securities could be allocated between debt and equity.[77]
- South32 noted that where hybrid securities are more "equity like" or "debt like" they should be treated as such. South32 considered that ERA needed to determine guidelines or protocols for hybrid securities instruments.[78]

8.4 2022 draft approach

214. The ERA considers that the gearing will 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.

215. The ERA's analysis supports a benchmark gearing level of 55 per cent debt.

216. A gearing level of 55 per cent will be fixed until the next review of the gas instrument.

74 ATCO, *Submission to Discussion Paper*, February 2022, p. 14.

75 CRG, *Submission to Discussion Paper*, February 2022, p. 46.

76 CRG, *Submission to Discussion Paper*, February 2022, p. 46.

77 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 13.

78 South32, *Submission to Discussion Paper*, February 2022, p. 2.

8.5 Reasoning

8.5.1 Theoretical and practical considerations

217. 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.

218. 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.[79]

219. 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.

220. The use of the market value of equity is consistent with the Henry's approach to estimating equity beta.[80] 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.

221. Partington and Satchell considered that market values should be used when estimating gearing where possible.[81]

222. 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.

223. 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 firm's balance sheets is comparable.

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79 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.

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

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

8.5.2 Other regulators' decisions

224. 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[82]	2018	Gas and electricity	60
ERA[83]	2018	Gas	55
ESC[84]	2021	Water	60
ESCOSA[85]	2016	Water	60
IPART[86]	2020	Water	60
OTTER[87]	2022	Water	60

Source: Compiled by the ERA

225. 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.

226. Other regulators, such as the AER, OTTER and QCA, have used a longer term (10-year period) to estimate gearing levels.[88,89,90]

227. 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.[91] For example, the AER's 2021 annual rate of return update showed that gearing levels based on market values were around 53 per cent over a five-year average and 55 per cent over a 10-year average.[92]

228. As part of its 2022 rate of return guidelines review, the AER considered that it would place primary reliance on market value estimates of gearing and use its existing observation periods.[93]

82 AER, *Rate of Return Instrument*, December 2018, p. 3.

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

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

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

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

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

88 AER, *Rate of return instrument: Explanatory Statement*, December 2018, p. 65.

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

90 QCA, *Rate of return review: Final report*, November 2021, p. 25.

91 AER, *Overall rate of return, equity and debt omnibus: Final working paper*, December 2021, p. 20.

92 AER, *Rate of Return Annual Update*, December 2021, p. 7.

93 AER, *Rate of Return: Information paper and call for submissions*, December 2021, p. 15.

8.5.3 The ERA's estimation of the benchmark gearing

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

8.5.3.1 Benchmark gearing

230. 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.

231. The ERA notes the CRG's comment on checking the actual gearing of all the firms regulated by the ERA and determining the reasons for higher gearing level of 70 per cent from one regulated pipeline.[94] CRG did not provide further information on this regulated pipeline but noted that it might represent standard financing for gas pipelines.

232. 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.

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

234. 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.

235. 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.

8.5.3.2 Treatment of hybrid securities

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

237. 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.[95]

238. The AER observed an increased use of hybrid securities by regulated businesses in 2020 and 2021. These hybrid issuances included:[96]

- 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.

94 CRG *Submission to Discussion Paper*, February 2022, p. 45.

95 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 66.

96 AER, *Overall Rate of Return: Draft Working Paper*, July 2021, p. 35.

- 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.

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

240. The ERA notes stakeholders expressed mixed views on hybrid securities. Of the five submissions commenting on this issue, responses ranged from:

- supporting adjustment of debt and equity for hybrid securities (ATCO)
- not supporting the adjustment (GGT)
- excluding hybrid securities from gearing estimates (AGIG).

241. In its submission on the discussion paper, AGIG referred to detailed discussions of the treatment of hybrid securities between the AER and Energy Networks Australia.[97] Similarly, the CRG considered that the ERA should monitor the AER approach on recognising hybrid securities.[98]

242. In its 2018 rate of return instrument development the AER also had some recognition of hybrid securities:[99]

- Envestra and Spark Infrastructure had shareholder loan notes that were included as debt for accounting purposes but had characteristics similar to equity. The AER did not include these hybrid securities in its gearing calculation as they were not sufficiently similar to debt.
- AusNet Services had two hybrid security issues in the form of non-convertible subordinated notes. The AER did not remove these securities as it was unlikely to be material when estimating gearing.

243. In the development of its gearing for its 2018 rate of return instrument, the AER removed loan notes from its measures of debt when estimating gearing ratios if those notes had the following equity characteristics:[100]

- They were stapled to each share, with no separate existence without the share (that is, they cannot be traded independently).
- They were subordinate to all other creditors.
- Returns on the notes were not guaranteed and only payable to the extent to which there is available cash.

244. Given the recent increase in hybrid debt issuance, the AER has also been considering the effect of these hybrid securities on debt.[101]

97 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 34.

98 CRG, *Submission to Discussion Paper*, February 2022, p. 46.

99 AER, *Rate of Return Instrument: Explanatory Statement*, December 2018, p. 71.

100 AER, *Rate of Return Instrument: Explanatory Statement*, December 2018, p. 71.

101 AER, *Overall Rate of Return: Draft Working Paper*, July 2021, pp. 34 – 38.

245. The AER has been investigating the characteristics of the recently issued hybrid securities.[102]

246. In its review of the issue the AER considered that the main difficulty with including hybrid securities into gearing was the apportionment between debt and equity.[103] The AER was further investigating the treatment of hybrid securities when estimating gearing and what method should be used for allocating between debt and equity. If a suitable method was not available, the AER indicated that it might exclude hybrid securities from the gearing calculation or apply a simple 50/50 allocation between debt and equity.[104]

247. 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 advises that these debts are referred to as hybrids in AusNet publications because ratings agencies assign them a favourable treatment.[105]

248. 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.

249. None of the submissions received by the ERA to the discussion paper have provided details on a suitable method for allocating hybrid securities between debt and equity or explained an alternative approach of adjusting debt and equity values for hybrid securities. Though the CRG noted that a 50/50 allocation seemed to be a more accurate disaggregation in the absence of other information.[106]

250. 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.[107]

251. 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.[108] This demonstrates the difficulty of properly understanding hybrid securities.

252. 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.

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102 AER, *Overall Rate of Return: Draft Working Paper*, July 2021, p. 35.

103 AER, *Overall Rate of Return: Draft Working Paper*, July 2021, p. 36.

104 AER, *Overall Rate of Return: Draft Working Paper*, July 2021, p. 37.

105 Energy Networks Australia, *Estimating the Cost of Debt: Response to AER's pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021, p. 24.

106 CRG, *Submission to Discussion Paper*, February 2022, p. 46.

107 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 66.

108 Energy Networks Australia, *Estimating the Cost of Debt: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Debt Omnibus Working Paper*, September 2021, p. 24.

- Applied a 50/50 allocation of the two hybrid securities between debt and equity.

253. 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.

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

255. 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.

256. 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.

257. The ERA will continue to monitor the AER's review of hybrid securities.

8.5.3.3 Gearing estimation method

258. The ERA's general gearing method involves observing gearing over the last five-year period.[109] The ERA does not forecast direction 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.

259. 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. This is consistent with the averaging period used for other parameters. Using inconsistent measures of gearing for de-levering and re-levering can result in under or overestimated equity betas in the Henry approach.
- 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.[110] In addition, an efficient network business would have some cash as part of its optimal asset mix.

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

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

- Debt is adjusted to incorporate a firm's investments in associates and its associated debt, which may not be reported on the firm's balance sheet. Debt from associates is added to parent debt in line with proportional ownership. For example, Spark Infrastructure is adjusted for its investments in South Australia Power Networks, Victoria Power Networks and TransGrid.
- Hybrid securities which have equity characteristics are removed from debt.

8.5.3.4 Gearing estimates

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

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

Table 5: ERA market value gearing 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	55	53
5-year average	**47**	**56**	**N/A**	**57**	**53**
10-year average	**47**	**57**	**64**	**57**	**55**

Source: Annual reports, Bloomberg, ERA Analysis.

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

263. The ERA notes that three of the sample firms have been delisted, including the delisting of AusNet and Spark Infrastructure in 2022. However, the ERA considers that past market information still provides a useful reference to understand a gearing measure of the sample energy firms.

264. 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.

265. The AER's recent analysis has also shown that gearing levels based on market values are 53 per cent over a five-year average or 54 per cent over a 10-year average.[111]

266. The estimated benchmark gearing of 55 per cent is lower than the 60 per cent that has been used by some Australian regulators for over a decade.

267. The ERA notes the GGT's submission on the need to review the list of benchmark comparators of regulated energy networks and its view that this work should be deferred until the next rate of return review. The ERA considers that gearing levels are relatively stable over time, particularly when considering rounding, and that the existing benchmark sample provides information to inform a decision on a benchmark gearing level.

268. Based on the above information, for the 2022 draft gas instrument the ERA considers a gearing level of 55 per cent is warranted when rounding to the closest five percentage points.

[111] AER, *Rate of Return Annual Update*, December 2021, p. 7.

9. Return on debt

269. 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.

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

9.1 Method for estimating the return on debt

9.1.1 2018 position

271. The 2018 gas instrument implemented a hybrid trailing average approach for its debt approach. Under the hybrid trailing average approach:[112]

- 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.

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

273. 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.[113]

274. 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.

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

276. 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).[114]

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

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

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

277. 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.[115]

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

9.1.2 Working views in the discussion paper

279. The ERA's working view in the discussion paper was to continue the hybrid trailing average approach to estimate the return on debt.

280. The ERA considered that the above approach to estimating the return on debt would provide the best estimate of the return on debt for gas network service providers for the regulatory period and best achieves the national gas objective and the revenue and pricing principles in the long-term interests of consumers.

9.1.3 Consultation

281. Five of the submissions to the discussion paper commented on the return on debt.

282. All five submissions supported the ERA's hybrid trailing average approach for its debt approach for the 2022 gas instrument.[116,117,118,119,120]

283. AGIG considered that this was an approach which it could replicate adequately to match regulated revenue.[121]

284. The CRG considered that the hybrid trailing average approach was 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.[122]

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

116 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 33.

117 ATCO, *Submission to Discussion Paper*, February 2022, p. 15.

118 CRG, *Submission to Discussion Paper*, February 2022, p. 48.

119 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 14.

120 South32, *Submission to Discussion Paper*, February 2022, p. 2.

121 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 33.

122 CRG, *Submission to Discussion Paper*, February 2022, p. 48.

9.1.4 2022 draft approach

285. 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

286. 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.

287. 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.

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

289. 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.

290. 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. The nomination of the 20-day period is discussed in Chapter 7.

291. 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 9.6.3.4 – 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.

292. The nomination of averaging periods for the interest rate swap rate and debt risk premium is discussed in Chapter 7.4.2.

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

9.1.4.1 Initial revenue path

294. 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).

9.1.4.2 Annual update of the return on debt

295. The ERA will revise the return on debt each year to incorporate an annual update of the estimate of the debt risk premium.

296. 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.

9.1.4.3 Implementing the annual update

297. 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.

298. 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.

299. 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.

300. 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.

301. 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).

302. 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:

$$\Delta RoD_t = \frac{D}{(D+E)}\left(DRP_t \times RAB_{Op,t} - DRP_1 \times RAB_{Op,1}\right)$$

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

DRP_1 is the initial debt risk premium estimated at the start of the regulatory period

$RAB_{Op,1}$ is the opening regulated asset base at the start of the regulatory period

DRP_t is the debt risk premium estimated at the start of period t

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

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

303. Under this formula, all return on debt amounts remain unchanged from those provided in the initial revenue path in the final access arrangement decision, except for the annual allowance ΔRoD_t, which reflects the change in the debt risk premium in the regulatory years two to five.

304. 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.

305. 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. This partial update is the approach that best meets the requirements of the National Gas Law, the national gas objective, the revenue and pricing principles and the National Gas Rules, since it takes both efficiency and the desire of users for stability in gas pipeline tariffs into account.

9.1.5 Reasoning

306. The ERA has considered further its return on debt approach, informed by the submissions received and expert reports.

307. The ERA has considered 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.

308. 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.

309. 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.

310. 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.

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

9.1.5.1 On-the-day approach

312. 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.

313. 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.

314. 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.

315. 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.

9.1.5.2 Full trailing average approach

316. 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.

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

- It is effective in addressing refinancing risk. This assumes that the weights for the trailing average are reasonable estimates for what the benchmark firm employs and the assumed 10-year term of debt actually applies.
- It better reflects how regulated firms refinance their debt in practice.
- It reduces volatility of the cost of debt and the resulting volatility for regulated services.
- It can take account of extreme events that affect both the risk free rate and the debt risk premium.
- It recognises that most capital is sunk.
- It achieves the NPV=0 principle.
- It minimises price volatility at the time of an access arrangement.

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

- 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.
- 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.

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

9.1.5.3 Hybrid trailing average approach

320. 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 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.

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

- The use of the current risk free rate for the return on debt matching the regulatory period is important for ensuring that the NPV=0 principle is met.
- It reduces the ability of firms to exploit the slope of the yield curve. The use of a 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 risk free rate ensures that a firm would not benefit from a higher margin allowed in a 10-year rate while at the same time entering into five-year debt contracts.
- It reduces refinancing risk. Refinancing risk provides justification for adopting some form of trailing average method. Refinancing risk can be further reduced through allowing costs for hedging.
- 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 regulatory period. Interest rate risk can be further managed with the allowance for hedging costs.
- Compared to the on-the-day approach it better reflects how regulated firms refinance their debt in practice.
- It recognises that most capital is sunk.
- It minimises price volatility within an access arrangement period.

322. The weaknesses of the hybrid trailing average approach are:

- It is not applicable to an unregulated entity in a competitive environment.
- It introduces complexity through annual updating.
- It imposes additional hedging costs on top of a benchmark efficient debt strategy.

323. From 2015, the ERA has implemented the hybrid trailing average approach for all of Western Australia's regulated gas pipelines 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.[123] Since then, the ERA has used the hybrid trailing average approach to determine the return on debt for regulated energy networks in Western Australia.[124]

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

[124] 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.

9.1.5.4 Maintaining the hybrid trailing average approach

324. Dr Martin Lally provided new advice on return on debt approaches.[125] 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.[126]
- 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.[127]
- 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.[128]

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

326. The ERA considers that this is an efficient and implementable debt strategy for a long-term asset. 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.

327. 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.[129]

328. 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.

329. 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.

330. Maintaining the current hybrid trailing average approach would promote regulatory certainty.

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

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

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

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

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

331. The ERA considers that an annual allowance of debt-raising costs and debt-hedging costs should be included for the return on debt estimation, recognising the administrative costs and other charges incurred by businesses when obtaining and hedging debt financing.

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

333. The individual debt components are further discussed below.

9.2 Debt risk free rate

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

335. 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.

336. This chapter outlines the ERA's reasoning for its current position on determining the risk free rate for the return on debt outlined in the 2022 draft gas instrument.

9.2.1 2018 position

337. Under the 2018 gas instrument the ERA used the prevailing five-year interest rate swap for the return on debt.[130]

338. 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.

339. The 2018 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.[131]
- 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.[132]

9.2.2 Working views in the discussion paper

340. The ERA's working view in the discussion paper was to maintain the use of the five-year interest rate swap rate to estimate the risk free rate for the return on debt.

130 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 20

131 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 104.

132 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 100.

9.2.3 Consultation

341. Two of the submissions to the discussion paper commented on the risk free rate for the return on debt.

342. ATCO supported the risk free rate for debt being the five-year interest rate swap rate as the proxy to estimate the risk free rate for the return on debt. The use of the five-year interest rate swap rate is consistent with the efficient and implementable hybrid trailing average debt strategy.[133]

343. ATCO also considered, that the risk free rate for debt and equity are independent and need not be the same. For debt, a five-year term is consistent with efficient debt strategy. For equity, a 10-year term is consistent with setting a rate of return expected by equity investors.[134]

344. 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.[135]

9.2.4 2022 draft approach

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

346. 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.

347. 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.

348. The nomination of the averaging period for the interest rate swap rate is outlined in Chapter 7.4.1.

9.2.5 Reasoning

349. 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.

350. 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.

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

352. The rationale for using a swap rate is that it is difficult to hedge government bonds.

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133 ATCO, *Submission to Discussion Paper*, February 2022, p. 11.

134 ATCO, *Submission to Discussion Paper*, February 2022, p. 11.

135 CRG, *Submission to Discussion Paper*, February 2022, p. 9.

353. For the purposes 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 simplifies the calculation of the debt risk premium.

354. 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.

355. 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.

356. The ERA has used a five-year interest rate swap rate for its energy network regulatory determinations.[136,137]

357. 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.

358. The ERA considers that maintaining the use of the interest rate swap rate for the risk free rate for the return on debt best delivers an efficient rate of return in the long-term interests of consumers.

359. On the basis of these considerations, for the purposes of the 2022 draft gas instrument, the ERA will use the prevailing five-year interest rate swaps for the risk free rate in the return on debt.

360. 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.

361. 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.

362. For illustrative purposes, the five-year interest rate swap was 3.12 per cent for the 20 trading days to 29 April 2022.

9.3 Term of debt

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

136 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 20.

137 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.

364. This chapter outlines the ERA's reasoning for its current position on the term of debt outlined in the 2022 draft gas instrument.

9.3.1 2018 position

365. 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 debt with 10 per cent refinanced each year.

9.3.2 Working views in the discussion paper

366. The ERA's working view in the discussion paper was to maintain the benchmark efficient debt strategy as a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year.

9.3.3 Consultation

367. Five of the submissions to the discussion paper commented on the return on debt.

368. All five submissions supported the ERA's hybrid trailing average approach for its debt approach for the 2022 gas instrument.[138,139,140,141,142] This approach included the benchmark efficient debt strategy as a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year.

369. The CRG discussed the AER's energy network debt index and the AER's findings on the term of debt. The CRG considered that the ERA should investigate: the AER's index and its findings on debt costs, and whether the index could be used as a cross check to help assure the robustness of the ERA's estimates of the return on debt.[143]

9.3.4 2022 draft approach

370. For the purposes of the 2022 draft gas instrument, the ERA will apply a benchmark efficient debt strategy as a portfolio of 10-year fixed-rate debt with 10 per cent refinanced each year.

9.3.5 Reasoning

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

138 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 33.

139 ATCO, *Submission to Discussion Paper*, February 2022, p. 5.

140 CRG, *Submission to Discussion Paper*, February 2022, p. 48.

141 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 14.

142 South32, *Submission to Discussion Paper*, February 2022, p. 2.

143 CRG, *Submission to Discussion Paper*, February 2022, p. 48.

Table 6: Term of debt in Australian regulatory decisions

Regulator	Year	Term of debt (year)
ESCOSA[144]	2016	10
IPART[145]	2018	10
ERA[146]	2018	10
ESC[147]	2020	10
AER[148]	2021	10
QCA[149]	2021	10
OTTER[150]	2022	10

Source: ERA analysis

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

373. 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.

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

375. 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.[151]
- That the average term of instruments in the EICSI was influenced by a few service providers that raise 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 instrument in the EICSI increases from 7.5 year to 8.5 years.[152]

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

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

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

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

148 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final working paper*, December 2021, p. 87.

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

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

151 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final working paper*, December 2021, p. 78.

152 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final working paper*, December 2021, p. 78.

376. The AER has noted that it intended to consider the issue of term of debt further in future consultation.[153]

377. The AER's preliminary position in its information paper for its rate of return review was that the weighted average term to maturity of issuance (WATMI) could be useful in determining 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 8 years. The AER considered further analysis on the actual drawdown of bank debt was required to use WATMI to make a more accurate assessment to information any change to the benchmark term.[154]

378. The ERA is aware that Energy Networks Australia (ENA) has also sought the same actual debt information from the same energy networks and, with the assistance of CEG, analysed the data.[155,156] ENA'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.[157]
- 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.[158]
- The benchmark debt strategy was consistent with a broad range of network service provider debt strategies.[159]
- 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.[160]
- That residual outperformance of debt was neither material nor persistent.[161]

379. 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.

153 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final working paper*, December 2021, pp. 79-80.

154 AER, *Rate of Return – Information Paper and Call for Submissions*, December 2021, p. 17.

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

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

157 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.

158 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.

159 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.

160 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.

161 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.

- 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.

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

381. 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.

382. The ERA also notes the CRG's comments on the use of the AER's energy network debt index as cross check on the return on debt estimates. 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 ERA considers that the EICSI is useful to cross check on the term of debt.

383. Based on these considerations, for the purposes of the 2022 draft 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.

9.4 Benchmark credit rating

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

385. 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.

386. 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.

387. 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.

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

389. This chapter outlines the ERA's reasoning for its current position on the benchmark credit rating outlined in the 2022 draft gas instrument.

9.4.1 2018 position

390. The 2018 gas instrument used a benchmark credit rating of BBB+, which was fixed over the period of the instrument.[162]

391. 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.[163]

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

9.4.2 Working views in the discussion paper

393. In the discussion paper the ERA reviewed current information on the benchmark credit rating.

394. The ERA's working view in the discussion paper was to maintain the benchmark credit rating of BBB+.

9.4.3 Consultation

395. Five of the submissions to the discussion paper commented on the benchmark credit rating.

396. Three submissions supported the use of a BBB+ benchmark credit rating.[164,165,166]

397. The CRG, GGT and South 32 raised the issue of foreign parental ownership:

- GGT noted that the ERA retained its definition of a benchmark entity, which was a pure play network service provider operating within Australia without parental ownership. However, GGT submitted that the elevated credit ratings in the ERA's sample were, in part, attributable to the financial strength and support of a parent entity.[167]
- The CRG considered that a credit rating of BBB+ had strong support. However, the CRG noted that where foreign parental ownership provided a higher credit rating, the cost of debt would likely be lower. The CRG requested that the ERA investigate why the benchmark precluded the recognition of foreign parental ownership.[168]

162 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 22.

163 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 22.

164 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 33.

165 ATCO, *Submission to Discussion Paper*, February 2022, p. 15.

166 Consumer Reference Group, *Submission to Discussion Paper*, February 2022, p. 49.

167 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 15.

168 CRG, *Submission to Discussion Paper*, February 2022, p. 10.

- South32 considered that it would be inefficient to allow foreign-owned entities to leverage the difference in their own credit rating with the rating assumed by the ERA. However, at the same time South32 recognised that this mechanism should not discourage ownership by smaller Australian companies who would be at a disadvantage.[169]

398. South 32 submitted that, considering the increased amount of foreign ownership, it may be more appropriate to consider the rating of some similar companies in other countries of similar market structure to Australia.[170]

399. GGT did not support a benchmark credit rating of BBB+ and submitted that if a credit rating was required it should be BBB.[171] GGT submitted that:

- Two of the entities in the GGT joint venture are APA Group entities. The rated issuer within the APA Group of companies was rated BBB.
- For GGT to achieve a credit rating of BBB+, its gearing would have to be lower than 55 per cent. GGT submitted that the benchmark credit rating and the benchmark gearing appeared to be inconsistent.
- Downgrading the benchmark credit rating by one "notch" to remove parental ownership would produce a credit rating of BBB.

9.4.4 2022 draft approach

400. The ERA considers that the benchmark credit rating 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.

401. The ERA's analysis supports a benchmark credit rating of BBB+.

402. A credit rating of BBB+ will be fixed until the next review of the gas instrument.

9.4.5 Reasoning

9.4.5.1 Benchmark credit rating estimation

403. 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.

404. 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.

169 South32, *Submission to Discussion Paper*, February 2022, p. 2.

170 South32, *Submission to Discussion Paper*, February 2022, p. 2.

171 Goldfields Gas Transmission Pty Ltd, *Submission Discussion Paper*, February 2022, pp. 15-16.

- Second, the company's credit rating must be published by an international rating 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.

405. The ERA's 2018 gas instrument benchmark sample included the DUET Group, Spark Infrastructure, AusNet Services and the APA Group.

406. The ERA notes that the list of Australian energy networks is reducing, with DUET not being rated since 2012.

407. 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	2017	2018	2019	2020	2021
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

408. 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.[172]
- 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.[173,174]

409. 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.

410. Other regulators' decisions are referred to as a cross check. For example, the AER's 2021 annual rate of return update analysed the credit ratings of energy networks. It shows that the median credit rating in recent years remains almost unchanged at BBB+.[175]

172 Moody's Investors Service, *Rating Action: Moody's downgrades Spark Infrastructure Trust to Baa2; stable outlook*, April 2021.

173 S&P Global Ratings, *Research Update: AusNet services Ltd. Downgraded to 'BBB+' on Ownership Change; Outlook Stable*, February 2022.

174 Moody's Investors Service, *Rating Action: Moody's downgrades AusNet's rating to Baa1; stable outlook*, February 2022.

175 AER, *Rate of Return Annual Update*, December 2021, p. 22.

411. On the basis of the above information, the ERA considers a benchmark credit rating of BBB+ to be appropriate for the 2022 gas instrument.

9.4.5.2 Parental ownership

412. 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 of a regulated entity should not be affected by parental ownership. GGT submitted that downgrading the benchmark credit rating by one notch would remove the effect of parental ownership and produce a credit rating of BBB.[176]
- South 32 also submitted that it would be inefficient to allow foreign-owned entities to leverage the difference in their own credit rating with the rating assumed by the ERA. However, at the same time South32 recognised that this mechanism should not discourage ownership by smaller Australian companies who would be at a disadvantage.[177]
- The CRG supported the use of benchmark credit rating of BBB+. However, the CRG noted that where foreign parental ownership provided a higher credit rating, the cost of debt would likely be lower.[178]

413. It is common regulatory practice to use a benchmark efficient entity to inform the WACC parameters set for a regulated entity.

414. 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.

415. "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.

416. 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.

417. As noted by South32 allowing for parental ownership may discourage energy network ownership by smaller Australian companies which would be disadvantaged. This may also result, in inefficient investment that has the returns for these companies but do not reflect the risk, and costs, of these network assets.

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176 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, pp. 15-16.

177 South32, *Submission to Discussion Paper*, February 2022, p. 2.

178 CRG, *Submission to Discussion Paper*, February 2022, p. 10.

418. 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.

9.4.5.3 Actual and benchmark credit rating

419. GGT considered that it could not aspire to the benchmark BBB+ credit rating without lowering its gearing below 55 per cent. The GGT submitted that the benchmark credit rating and gearing were inconsistent.[179]

420. The ERA considers that the efficient benchmark does not need to reflect the actual financial characteristics of a service provider. Instead, the benchmark efficient entity should reflect attainable and efficient means of financing to deliver the reference services. This provides an incentive for the firm to move towards efficient benchmark financing through reducing costs and/or risk.

421. If regulated allowances tracked the actual costs of the firm this would not incentivise an inefficiently financed firm to be efficient. Even if the firm is efficiently financed, awarding actual costs would leave the firm with no profit incentive to further reduce costs.

422. An implication of adopting the benchmark firm is that the actual decisions of a service provider may differ (and often will 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.

423. The ERA considers that it is not appropriate to compensate a regulated service provider for its actual financial structure.

9.4.5.4 Other jurisdictions' comparators

424. South 32 submitted that the ERA may wish to consider the benchmark credit rating of comparators in other similar jurisdictions instead of just Australia.

425. The ERA considers that the extent to which foreign markets are considered should be guided by the principle that the risk of the asset being observed should stem from the economy in which the benchmark efficient entity is situated. Observations on debt will be limited to the credit risk of debt instruments where the country of risk is classified as Australia.

426. For consistency, 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 cost of debt each year. The country of risk criterion ensures that yields and credit spreads estimated on the bonds issued are reflective of credit risks primarily linked to economic and financial market conditions in Australia.

427. The ERA considers that the benchmark credit rating has been stable over time and there has been sufficient domestic information to inform the benchmark credit rating.

[179] Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, pp.15-16.

9.5 Debt risk premium

428. 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.

429. This chapter outlines the ERA's reasoning for its current position on determining the debt risk premium outlined in the 2022 draft gas instrument.

9.5.1 2018 position

430. The 2018 gas instrument applied the revised bond yield approach to determine the debt risk premium.[180]

431. 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.[181]

432. To determine the debt risk premium used to calculate the gas rate of return, the 2018 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.[182]

433. The 2018 gas instrument provided that an allowance for debt risk premium estimation costs will be reviewed in the ERA's assessment of efficient operating expenditure for a regulated business's access arrangement and does not form part of the rate of return.[183]

9.6 Working views in the discussion paper

434. The ERA's working view in the discussion paper was to maintain its use of the revised bond yield approach to estimate the debt risk premium.

435. The ERA considered that this debt risk premium estimation approach best delivers an efficient rate of return in the long-term interests of consumers.

9.6.1 Consultation

436. Five submissions to the discussion paper provided comments on the debt risk premium.

180 ERA, *Final Gas Rate of Return Guidelines (2018)*, December 2018, p. 23.

181 ERA, *Final Gas Rate of Return Guidelines (2018)*, December 2018, p. 23.

182 ERA, *Final Gas Rate of Return Guidelines (2018)*, December 2018, p. 23.

183 ERA, *Final Gas Rate of Return Guidelines (2018)*, December 2018, p. 23.

437. All five submissions supported the ERA's revised bond yield approach to estimate the debt risk premium for the 2022 gas instrument:[184,185,186,187,188]

- AGIG submitted that the revised bond yield approach is an approach that can be replicated adequately.[189]
- The CRG recognised the advantages of the ERA's approach relative to the AER's current approach.[190]

9.6.2 2022 draft approach

438. The revised bond yield approach will be used to determine the debt risk premium for the 2022 draft gas instrument.

439. 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.

440. 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.

441. These steps determine the debt risk premium at a point in time, being the date of calculation.

442. 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.

184 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 33.
185 ATCO, *Submission to Discussion Paper*, February 2022, p. 15.
186 Consumer Reference Group, *Submission to Discussion Paper*, February 2022, p. 45.
187 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 17.
188 South32, *Submission to Discussion Paper*, February 2022, p. 2.
189 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 33.
190 CRG, *Submission to Discussion Paper*, February 2022, p. 51.

9.6.2.1 Determining the benchmark sample

443. 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.

444. 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).[191]
- The benchmark sample will include both fixed bonds and floating bonds.[192,193]
- 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.

9.6.2.2 Collecting data and converting bond yields to Australian dollar equivalent yields

445. 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 isolate the credit spread, giving the spread to swap in the denominated currency.

446. The ERA will convert this denominated currency credit to Australian dollar terms by accounting for hedging costs.

9.6.2.3 Estimating yield curves

447. 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.

9.6.2.4 Estimating the cost of debt

448. The ERA will average the results of these three methods to arrive at a market estimate of the 10-year return on debt.

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191 Country of risk is based on Bloomberg's method using four factors listed in order of importance: management location, country of primary listing, country of revenue and reporting currency of issuer. These criteria allow for the largest sample of bonds that reflect an Australian risk premium.

192 Fixed bond is a long-term bond that pays a fixed rate of interest (a coupon rate) over its life.

193 Floating bond is a bond whose interest payment fluctuates in step with the market interest rates. Price of floating rate bonds remains relatively stable because neither a capital gain nor capital loss occurs as market interest rates go up or down.

9.6.2.5 Calculating the debt risk premium

449. The estimate of the debt risk premium for each year will be a simple 10-year trailing average.

450. The ERA began calculating annual debt risk premia in April 2015 and used these premia as inputs when constructing a 10-year trailing average.

451. 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.

452. 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).

453. 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.

454. 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.

9.6.3 Reasoning

9.6.3.1 Theoretical considerations

455. The debt risk premium relies on two inputs: the benchmark credit rating and the term of debt.

Benchmark credit rating

456. 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.

457. 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.[194]

458. 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.

459. 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 rating 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.

460. 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.

461. 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

462. 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.

463. A bond is a loan made by an investor to a borrower for a set period of time 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”.

464. A bond's yield is the return an investor expects to receive each year over its term to maturity.

465. The yield curve – also called the term structure of interest rates – shows the yield on bonds over different terms to maturity.

466. 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.

[194] By setting the price of the bond equal to the promised cash flows of the bond and solving for the discount rate.

467. Therefore, any method used to estimate the debt risk premium must define the term of debt to be issued.

468. Consistent with the benchmark debt strategy, the term at issuance for a benchmark efficient entity is approximately 10 years.

9.6.3.2 Methods adopted by other regulators for estimating the debt risk premium

469. Australian and overseas economic regulators have adopted various approaches for determining the cost of debt.

470. 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.

471. 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.[195] 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.[196]

472. Ofgem estimates the cost of debt directly from a sample of corporate bonds without separately identifying the risk free rate or debt risk premium.[197]

9.6.3.3 The revised bond yield approach

473. The ERA has used the revised bond yield approach across its regulatory determinations and all its annual tariff variations.[198,199,200]

474. 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.

475. 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.[201]

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195 New Zealand Commerce Commission, *Gas Distribution Services Input Methodologies Amendments Determination 2022*, February 2022, p. 68.

196 New Zealand Commerce Commission, *Gas Distribution Services Input Methodologies Amendments Determination 2022*, February 2022, p. 70.

197 Ofgem, *Cost of Debt Indexation Model AIP 2020*, 27 November 2020.

198 ERA, *Final Rate of Return Guidelines*, December 2018, p. 23.

199 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.

200 ERA, *Final Determination 2018 and 2019 Weighted Average Cost of Capital for the Freight and Urban Networks and Pilbara Railways*, August 2019, p. 25.

201 Technical detail and tools to run the ERA's revised bond yield approach can be found on the ERA's website.

476. 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.
- 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.

477. The ERA considers the debt risk premium process is robust and replicable.

478. The ERA considers that this debt risk premium estimation approach best delivers an efficient rate of return in the long-term interests of consumers.

479. The ERA will use of the revised bond yield approach to estimate the debt risk premium for the 2022 gas instrument.

480. Further technical detail is provided below. The ERA provides debt risk premium process documents and accompanying tools consistent with the revised bond yield approach.[202]

The benchmark sample

481. 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.

482. 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.

483. Many Australian corporate bonds are denominated in foreign currencies. Furthermore, overseas markets have assumed greater importance for the longer end of the yield curve.

484. 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.

485. 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.

[202] Technical detail and tools to run the ERA's revised bond yield approach can be found on the ERA's website.

486. 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.

487. Further, it is standard practice to exclude firms operating in the financial sector, because these firms have a different capital structure.[203]

488. 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

489. 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.

490. 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.

491. 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

492. 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.

[203] The ERA notes that the RBA estimates exclude financial sector bonds.

Data availability

493. 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

494. 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.

495. The ERA uses these three curve estimation techniques to estimate a return on debt with a tenor of 10 years.

496. 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.

Gaussian Kernel Method

497. The Gaussian Kernel method is consistent with the approach used by the RBA.[204]

498. 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.

499. 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.[205] 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.

500. 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.

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204 RBA, *New Measures of Australian Corporate Credit Spreads*, Bulletin, December quarter 2013.

205 RBA, *New Measures of Australian Corporate Credit Spreads*, Bulletin, December quarter 2013, p. 20.

501. 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.

502. 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.

503. 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

504. 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

505. 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 in the world.[206]

506. 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.[207]

507. 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.

508. 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.

509. 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

510. 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.

511. The parametric form of the Nelson-Siegel-Svensson curve used by the ERA is that specified in Svensson's 1994 paper.[208] The notation for this parametric form is shown in equation 11.

[206] 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.

[207] de Pooter, M., Examining the Nelson-Siegel Class of Term Structure Models, 2007.

[208] 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.

$$\hat{y}(\tau) = \beta_{0t} + \beta_{1t}\frac{1-e^{-\tau/\lambda_1}}{\tau/\lambda_1} + \beta_{2t}\left[\frac{1-e^{-\tau/\lambda_1}}{\tau/\lambda_1} - e^{-\tau/\lambda_1}\right] + \beta_{3t}\left[\frac{1-e^{-\tau/\lambda_2}}{\tau/\lambda_2} - e^{-\tau/\lambda_2}\right]$$

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.

512. The Nelson-Siegel-Svensson method is estimated in the same way as the Nelson-Siegel method, except it uses a different parametric form.

Contingencies

513. The debt risk premium process includes three contingency approaches detailed below (see Table 9).

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 Gaussian estimate**
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.[209] 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.

[209] RBA Table F3: Aggregate Measures of Australian Corporate Bond Spreads and Yields – Non-financial Corporate Bonds.

514. The ERA has reflected the following considerations of each contingency in the detailed debt risk premium technical process documents.[210]

Contingency A – Bond Size

515. The ERA considered other market yield curve providers' practice to arrive at this minimum bond requirement. Bloomberg requires at least 15 bonds,[211] while Thomson Reuters requires at least 5 bonds for the yield curve to be constructed.[212]

516. The ERA notes that Bloomberg's bond count requirements are:[213]

- 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.

517. The ERA supports a minimum number of bonds in the sample of at least 15 across the term structures.

518. 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.

519. 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.

520. 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.

521. The debt risk premium will then be calculated by removing the risk free rate.

Contingency B – Estimation Divergence

522. In the event that estimators diverge, the ERA recognises the anomaly may rest in either of the three estimation techniques (Gaussian Kernel, Nelson-Siegel and Nelson-Siegel Svensson).

523. 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.

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210 The detailed process for estimating the debt risk premium can be found on the ERA's website.

211 ACCC, Regulatory Economics Unit, *Return on debt estimation: a review of the alternative third party data series*, August 2014, p. 18.

212 ACCC, Regulatory Economics Unit, *Thomson Reuters Credit Curve Methodology Note for the AER*, April 2017, p. 5.

213 ACCC, Regulatory Economics Unit, *Return on debt estimation: a review of the alternative third party data series*, August 2014, p. 18.

524. 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.

525. The debt risk premium will then be calculated by removing the risk free rate.

Contingency C – Bloomberg data unavailable

526. In the event that Bloomberg data is unavailable, the ERA will use the RBA data to calculate the debt risk premium.

527. The ERA will use the AER's method to calculate the cost of debt based on market data sourced from RBA.

528. 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.

529. The debt risk premium will then be calculated by removing the risk free rate.

9.6.3.4 Estimating the 10-year trailing average debt risk premium

530. 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.

531. 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.

532. 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.

533. 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.

534. 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.

535. 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.

536. 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.

537. The ERA considers that this debt risk premium estimation approach best delivers an efficient rate of return in the long-term interests of consumers.

10. Return on equity

538. 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.

539. 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.

540. Estimating a forward-looking return on equity – sufficient to enable regulated firms to recoup their prevailing equity financing costs – requires the use of models.

541. The model most used by Australian regulators for quantifying the return on equity has been the Sharpe-Lintner Capital Asset Pricing Model (CAPM).

542. This chapter outlines the ERA's reasoning for its current position on determining estimating the return on equity.

10.1 Return on equity model

10.1.1 2018 position

543. The 2018 gas instrument adopted the Sharpe-Lintner CAPM to estimate the return on equity.[214]

544. Under the 2018 gas instrument, 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.

545. To estimate the return on equity the ERA would separately estimate:

- the risk free rate
- the market risk premium
- the equity beta.

[214] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 27.

546. The ERA's 2018 gas instrument adopted a return on equity calculated on 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.[215]

10.1.2 Working views in the discussion paper

547. The ERA's working view on the return on equity model in the discussion paper was to maintain the use of the Sharpe-Lintner CAPM, and to maintain a five-year term for equity.

10.1.3 Consultation

548. Six of the submissions to the discussion paper provided stakeholder comments on the equity rate of return framework.

549. Stakeholder submissions discussed two matters related to the return on equity:

- the use of CAPM
- the term for the return on equity.

10.1.3.1 CAPM

550. AGIG queried whether the rate of return instrument would meet the requirements of the national gas objective at each access arrangement if the return on equity parameters were fixed for the term of the instrument.[216]

551. ATCO supported the continued use of the Sharpe-Lintner CAPM because it is consistent with the method historically adopted by the ERA and so promotes regulatory certainty and stability. However, ATCO noted that the CAPM is a model that relies on assumptions and statistical estimates of parameters used in the model. Therefore, ATCO considered that the result of applying the model must be assessed for reasonableness in light of current market conditions and the relevance of the result to regulatory determinations within the effective period of the instrument.[217]

552. The CRG recognised that:[218]

- There are not readily observable proxies for the expected return on equity and that as a result, the expected return on equity has to be estimated with the help of models.
- The main model used by Australian regulators, including the ERA, to estimate the cost of equity is the widely accepted Sharpe-Lintner CAPM.

553. The CRG submitted that while the CAPM is a default method for establishing an allowed rate of return, the ERA should consider the extent to which the regulatory affect the assumptions of the model.[219]

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215 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 34-35.

216 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 5-7.

217 ATCO, *Submission to Discussion Paper*, February 2022, p. 17.

218 CRG, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 3-4.

219 CRG, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 4-5.

554. ENA referred to analysis of the approaches taken by international regulators conducted by CEPA and the Brattle Group for the AER, proposing that the ERA should put more focus on forward-looking models for the return on equity.[220]

10.1.3.2 Term for equity

555. All stakeholder submissions on the discussion paper commented on the term for equity.

556. There were mixed views submitted on the term for equity with consumers supporting retaining a five-year term for equity, while energy networks supported a 10-year term.

557. The CRG and South32 supported the five-year term for equity:

- The CRG agreed with the ERA's five-year term-matching approach. The CRG considered that a five-year term is the most appropriate for achieving the national gas objective and satisfies the NPV=0 principle. The CRG also noted that using longer horizons would typically result in higher expected profits and prices as longer-term rates are generally higher than short-term rates.[221]
- South32 submitted that five-year terms represent a good trade-off between the long-term nature of the assets and current market rates. The five-year term also aligns with the regulatory period.[222]

558. Energy networks proposed a move to a 10-year term for equity, submitting that applying the five-year term will not result in the best estimate of the return on equity because:[223,224,225,226, 227]

- It does not satisfy the NPV=0 principle. Providing a lower rate than expected by investors will produce a negative NPV.
- It is not supported by mainstream financial theory and may be inconsistent with the assumptions underlying the CAPM.
- It is based on Dr Lally's proof, which requires modelling assumptions that are either incorrect or unrealistic, such as the certainty of regulated asset base recovery at the end of the regulatory period. The regulated asset base is not paid out at the end of the regulatory period.
- Dr Lally's proof assumes that equity investors receive all cash returns in the regulatory period, whereas in reality equity investors receive a substantial component of returns as non-cash returns (regulated asset base escalation) that are recovered over time.
- The regulatory period is not analogous to a floating rate bond.
- It is not supported by market practice and what investors appear to do in the valuation of assets and consideration of cashflows.
- It is not well supported by regulatory practice.

220 ENA, *Submission to Discussion Paper*, February 2022, p. 1.

221 CRG, *Submission to Discussion Paper*, February 2022, p. 43.

222 South32, *Submission to Discussion Paper*, February 2022, p. 3.

223 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 11-15.

224 ATCO, *Submission to Discussion Paper*, February 2022, pp. 5-11.

225 Energy Networks Australia, *Submission to Discussion Paper*, February 2022, pp. 2-3.

226 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, pp. 4-10.

227 Frontier Economics, *Considerations for the regulatory rate of return allowance,* December 2021, pp. 7-26.

- It is inconsistent with the prevailing uncertainty that will exist in the energy sector for the foreseeable future.

10.1.4 2022 draft approach

559. The ERA will use the Sharpe-Lintner CAPM for estimating the return on equity and will determine a single point estimate.

560. To estimate the return on equity the ERA will separately estimate:
- the risk free rate
- the market risk premium
- the equity beta.

561. The ERA will use a term for equity of 10 years.

10.1.5 Reasoning

10.1.5.1 CAPM

562. The Sharpe-Lintner CAPM remains the principal model for estimating the return on equity used by economic regulators in Australia.

563. 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.[228,229]

564. 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.

565. 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 for the regulatory period and is in the long-term interests of consumers, because it will likely promote efficient investment in, and use of, gas networks services.

566. To estimate the return on equity the ERA will separately estimate:
- the risk free rate
- the market risk premium
- the equity beta.

567. 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 for the long-term interest of consumers.

228 QCA, *Final Report: Rate of return review*, November 2021, pp. 53-54.

229 AER, *CAPM and alternative return on equity models, Final working paper*, December 2020, p. 24.

10.1.5.2 Term for equity

568. When determining a cost of equity it is necessary to consider the term of the estimate of the cost of equity.

569. 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.[230] Accordingly, as the regulatory period for the ERA's gas pipeline decisions is five years, under the 2018 gas instrument the term of estimates for the rate of return was generally five years.[231,232]

570. 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.[233]

571. 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.

572. 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.

573. The ERA has given further consideration to the term for equity in light of:

- The new regulatory work on the term for the return on equity.
- Submissions received in response to the ERA's discussion paper.
- The AER's concurrent evidence sessions.
- New advice from Dr Lally commissioned by the ERA in response to submissions received.

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.[234] The AER had previously been using a 10-year term for expected inflation.

575. 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.[235]

230 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 29.

231 ERA, *Final Rate of Return Guidelines (2018)*, December 2018, p. 12.

232 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.

233 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 30-34.

234 AER, *Final Position: Regulatory Treatment of Inflation,* December 2020, p. 35.

235 AER, *Final Position: Regulatory Treatment of Inflation,* December 2020, p. 23.

576. The AER engaged Dr Martin Lally as part of its review of the appropriate term for the rate of return.[236] 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.[237]
- 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.[238]
- 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.[239]

577. In December 2021, the AER published an information paper that expressed an open position for the term for equity as part of its concurrent evidence sessions in 2022.[240] In the paper, the AER:

- Adopted a preferred position that the terms for the return on equity, return on debt and expected inflation should be independently assessed. However, the AER noted that common principles underpin the choice of term in each case (in particular the NPV=0 principle) which may lead to the same term being applied.[241]
- Outlined that there are typically two choices for the term for the rate of return:
  - Match to the length of the regulatory periods (typically five years)
  - Match to the underlying asset lives (typically 10 years, reflecting long asset lives).

578. In November 2021 the QCA finalised its rate of return review. In this review the QCA considered that is was reasonable to use a long-term of 10 years for the return on equity. The QCA 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.[242]

579. The QCA noted that it had changed from its previous term-matching approach:[243]

> 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.

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

237 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 21.

238 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, pp. 3-4.

239 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 52.

240 AER, *Rate of Return Information Paper and Call for Submissions,* December 2021, pp. 16-17.

241 See also AER, *Rate of Return – Term of the Rate of Return & Rate of Return and Cashflows in a Low Interest Rate Environment – Final Working Paper,* September 2021, pp. 43-44.

242 Queensland Competition Authority, *Final report – Rate of return review,* November 2021, pp. 83-84.

243 Queensland Competition Authority, *Final report – Rate of return review,* November 2021, p. 83.

Concurrent evidence sessions

580. One of the AER's concurrent evidence sessions specifically considered the term for equity.[244]

581. There was a consensus view among the experts that NPV=0 was the correct principle for determining the term for equity.

582. 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.[245]
- 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.

583. 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 reduce the market risk premium.

Advice commissioned from Dr Lally

584. In their submissions, energy networks were critical of Dr Lally's approach and advice on the term for equity. Energy networks submitted that:[246,247,248,249, 250]

- 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.

244 AER, *Rate of Return Instrument Concurrent Evidence Session 2 of 4*, February 2022.

245 Dr Lally, M., *Notes for the Expert Sessions 10 February 2022: Term of the Rate of Return*, February 2022.

246 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 11-15.

247 ATCO, *Submission to Discussion Paper*, February 2022, pp. 5-11.

248 Energy Networks Australia, *Submission to Discussion Paper*, February 2022, pp. 2-3.

249 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, pp. 4-10.

250 Frontier Economics, *Considerations for the regulatory rate of return allowance,* December 2021, pp. 7-26.

585. The ERA commissioned Dr Lally to review the appropriate term for the allowed cost of equity and review submissions received by the ERA.[251]

586. 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. [252]

587. Dr Lally considered that:[253]

- None of the critiques received have contradicted his mathematical proof that term-matching satisfies the NPV=0 principle.
- No alternative proof was presented for a 10-year term for equity.

10-year term for equity

588. The ERA has further considered the term for equity for the 2022 draft gas instrument.

589. The ERA has considered the opposing stakeholder views and new information on the term for equity.

590. The ERA considers that the term for equity depends on what rate a regulator is setting:

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

591. 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.

592. 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.

593. 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 regulatory asset base (RAB).

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251 Dr Lally, M., *The Appropriate Term for the Cost of Equity*, April 2022.

252 Dr Lally, M., *The Appropriate Term for the Cost of Equity*, pp. 4-16.

253 Dr Lally, M., *The Appropriate Term for the Cost of Equity*, April 2022, pp. 16-31.

- 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.
- Dr Lally 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.

594. 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 QCA 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".[254]
- 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 (and equity more generally as an infinitely lived asset) 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.
- 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.

[254] Queensland Competition Authority, *Rate of return review: Final report*, November 2022, p. 83

- The allowed return on equity is not provided as a series of cashflows during the 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.
  - 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 deliver equity investors with residual returns which are lower than the real return on equity. Non-cash returns are received in the form of an escalation of the RAB. Equity investors then recover the increased RAB over multiple regulatory periods.
  - 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.

595. Consistent with standard finance practice the term of the discount rate is equal to the period of the cashflows being considered. Therefore, if investors do consider cashflows over the long-term (or even beyond the regulatory period) they will discount those cashflows with a long-term discount rate.

- If regulated revenues are set with reference to a 10-year term for equity and equity investors discount cashflows with a 10-year term this ensures that NPV=0 is maintained.
- However, if regulated revenues are set with reference to a five-year term of equity and equity investors require a 10-year term, this will produce negative NPV outcomes.

596. The ERA has reviewed submissions regarding investor expectations from groups such as the Global Infrastructure Investor Association (GIIA) and Network Shareholders Group (NSG).

- GIAA 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".[255]
- 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.[256]

[255] Global Infrastructure Investor Association, *Response to AER Final Omnibus Paper*, March 2022, pp. 2-3.

[256] Network Shareholders Group, *Response to the AER Rate of Return Information Paper and Omnibus Final Working Paper*, March 2022, p. 3.

- 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.[257]

597. The ERA notes that other Australian and international regulators have set a long-term rate when setting the return on equity. These regulators have sought to match common market approaches for long-lived assets.

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

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

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

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

601. The ERA considers that should 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.

[257] Network Shareholders Group, *Response to the AER Rate of Return Information Paper and Omnibus Final Working Paper*, March 2022, p. 7.

602. On the basis of the above information, the ERA is minded to adopt a 10-year term for equity. The ERA welcomes stakeholder feedback on the matter of the term for equity, including on Dr Lally's position. The ERA will consider this feedback when finalising its position on the term for equity for the 2022 final gas instrument.

603. For the purposes of the 2022 draft gas instrument, the ERA applies a 10-year term for the return on equity.

604. 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. This is a position that is supported by experts. The ERA considers that the terms for debt and inflation are separate issues and these are discussed in the respective chapters of this draft determination.

- The ERA considers that regulated assets have long lives 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.
- 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.
- The ERA considers that the term of expected inflation should be five years, consistent with the length of the access arrangement. This allows the 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). Not aligning the inflation term to the regulatory cycle would create a present value error.

10.2 Equity risk free rate

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

606. 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.

607. 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.

608. This chapter outlines the ERA's reasoning for its current position on estimating the risk free rate for the return on equity outlined in the 2022 draft gas instrument.

10.2.1 2018 position

609. Under the 2018 gas instrument, the ERA used five-year Commonwealth Government Security bonds to estimate the risk free rate.

610. The 2018 gas instrument specified that for the risk free rate for the return on equity:

- Consistent with the term of the return on equity, the ERA would use five-year terms to estimate the risk free rate.[258]
- The ERA would set the risk free rate at the start of a regulatory access arrangement period and the estimate would be fixed for the length of the regulatory access arrangement period.[259]
- Commonwealth Government Security bonds would be used as the proxy for risk free assets. The ERA would use the observed yields from these Commonwealth Government Securities to estimate the risk free rate. Due to it being uncommon to observe a Commonwealth Government Security bond with a remaining term to maturity exactly matching the term of the regulatory period, the ERA would use a linear interpolation of the observed yields of Commonwealth Government Security bonds to estimate the risk free rate.[260, 261]

10.2.2 Working views in the discussion paper

611. The ERA's working view in the discussion paper was to maintain its approach to the risk free rate for the return on equity.

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258 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, p. 104.

259 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement,* December 2018, p. 100.

260 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement,* December 2018, p. 101.

261 In the linear interpolation approach, two bonds are selected with terms to maturity that fall on either side of the date on which the term of the regulatory period ends. The dates on these bonds are referred to as the 'straddle' dates. Linear interpolation estimates the yields on the regulatory period term by assuming a linear increase in yields between the straddle dates on the two bonds observed.

10.2.3 Consultation

612. Five of the submissions to the discussion paper provided stakeholder comments on the risk free rate.[262, 263, 264, 265, 266]

613. All submissions generally agreed with the use of Commonwealth Government Securities. GGT noted that Commonwealth Australian Government securities are essentially free from default risk, are denominated in the same currency as regulated cashflows and are extensively traded.[267]

614. The ERA notes that stakeholder submissions also discussed the term of the risk free rate for equity. These stakeholder comments have been discussed earlier in the Chapter 10.1.

615. ATCO submitted that the ERA could consider putting a floor of zero on the real risk free rate.[268]

10.2.4 2022 draft approach

616. The ERA will use a 10-year Commonwealth Government bond for the risk free rate for the return on equity.

617. 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.

618. 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.

619. The averaging period for the risk free rate will be set according to Chapter 7.4.

10.2.5 Reasoning

620. 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.
- Whether or not to adopt a floor on the real risk free rate, as suggested by a stakeholder submission.

262 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 16.
263 ATCO, *Submission to Discussion Paper*, February 2022, p. 17.
264 CRG, *Submission to Discussion Paper*, February 2022, p. 53.
265 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 19.
266 South32, *Submission to Discussion Paper*, February 2022, p. 3.
267 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 19.
268 ATCO, *Submission to Discussion Paper*, February 2022, p. 17.

621. 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 10.1.5.2.

622. 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.

623. 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:

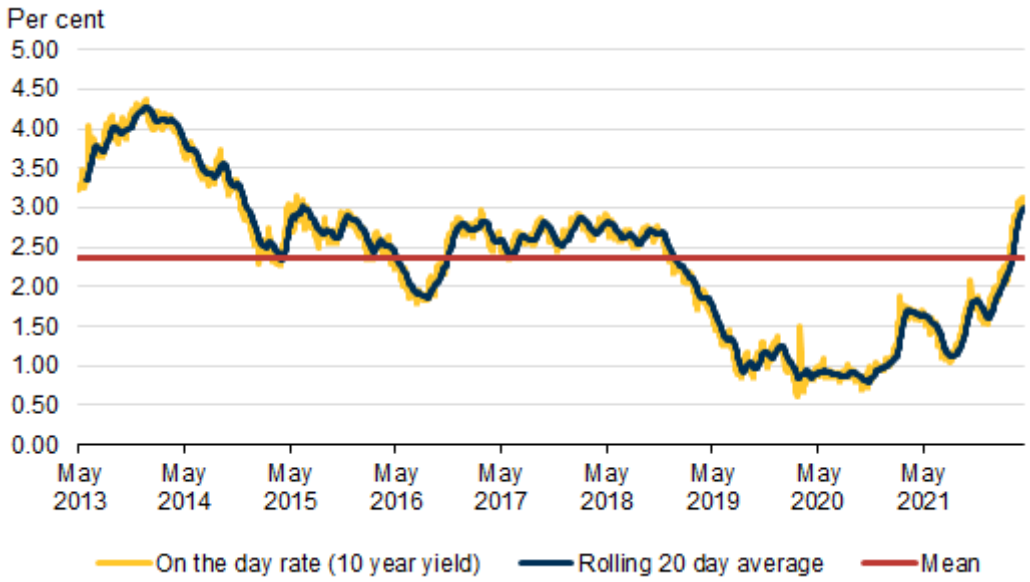
- essentially free from default risk
- relatively liquid
- transparently and regularly reported.

624. Commonwealth Government bonds are also commonly used by other Australian regulators and market practitioners to determine the risk free rate.

625. Submissions from stakeholders generally agreed with the use of a Commonwealth Government Security as the risk free asset.

626. The ERA notes that Commonwealth Government Security yields have shown some volatility and have recently risen, as shown in Figure 1.

Figure 1 10-year Commonwealth Government Securities yields



Source: ERA analysis, based on Reserve Bank of Australia F2 statistical tables.

627. The near-term risk free rate has been volatile and uncertain as the economy recovers from the COVID-19 pandemic, and there is increasing uncertainty around central bank monetary policy.

628. Inflation expectations in the market have recently increased, but there is ongoing uncertainty as to whether this will be transitory or more permanent. Other shocks such as the conflict in the Ukraine have added to the uncertainty of the inflationary environment.

629. 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.[269] On 7 June 2022 the ERA decided to increase the cash rate target by 50 basis points to 0.85 per cent. The RBA Board noted that it was the appropriate time to withdraw the monetary support put in place during the pandemic, with a resilient economy and higher inflation justifying the normalisation of monetary conditions.[270]

630. This raises the possibility of a volatile risk free rate during the period in which the 2022 gas instrument is in effect.

631. 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 and moderate the influence of idiosyncratic yields.

632. ATCO submitted that the ERA should place a floor on the real risk free rate. When applying a nominal CAPM, the risk free rate should reflect prevailing conditions expected over the five year regulatory period. This would extend to the possibility of negative real risk-free rate. The ERA considers that there is insufficient theoretical support for placing a floor on the real risk-free rate and therefore has not adopted the application of such a floor.

633. On the basis of the above information, for the 2022 draft gas instrument the ERA applies a 10-year Commonwealth Government bond for the risk free rate for the return on equity.

634. For illustrative purposes, the 10-year Commonwealth Government bond was 3.01 per cent for the 20 trading days to 29 April 2022.

[269] RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 3 May 2022.

[270] RBA, *Media Release - Statement by Philip Lowe, Governor: Monetary Policy Decision*, 7 June 2022.

10.3 Market risk premium

635. The market risk premium is a parameter of the Sharpe-Lintner CAPM.

636. 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.

637. 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.[271] This is a forward-looking concept.

638. 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.

639. This chapter outlines the ERA's reasoning for its current position on determining the market risk premium outlined in the 2022 draft gas instrument.

10.3.1 2018 position

640. The 2018 gas instrument applied a market risk premium of 6.0 per cent, which was fixed over the period of the instrument.[272]

641. The 2018 gas instrument set out the ERA's approach to estimating the market risk premium. The ERA determined an estimate of the market risk premium using the historic market risk premium, the dividend growth model (DGM) and conditioning variables.[273]

642. The historic market risk premium is the average realised annual return that stocks have earned in excess of the government bond rate. The ERA considered that investors were likely to consider historical information on equity risk premiums to form their expected market risk premium.

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271 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.

272 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 32.

273 ERA, *Final Rate of Return Guidelines (2018),* December 2018, pp. 30-32.

643. The approach to estimating the historic market risk premium in the 2018 gas instrument followed the approach established by Ibbotson. The approach set out in the 2018 gas instrument is as follows:[274]

- Arithmetic and geometric averages of the historic market premium observations are calculated using the Brailsford, Handley and Maheswaran (BHM) and NERA Economic Consultancy datasets.
- Five overlapping time periods (1883-2017, 1937-2017, 1958-2017, 1980-2017 and 1988-2017) are used for averaging periods, to reflect different economic conditions.
- A simple average of the lowest arithmetic and highest geometric means of the produced historic market risk premium matrix is then used to estimate the historic market risk premium.

644. The DGM examines the forecast future dividends for a market portfolio and estimates the return on equity that makes these dividends consistent with the market valuation of that portfolio. The ERA applied the two-stage DGM to estimate the market risk premium.[275]

645. The ERA used conditioning variables to determine a final point estimate. Conditioning variables are readily available market data that allow the ERA to take into account current market conditions. The ERA used conditioning variables including:[276]

- default spreads
- the five-year interest rate swap spread
- dividend yields
- stock market volatility index.

646. When assessing current market conditions, the ERA considered how the current value of each conditioning variable compared to its historic average.

647. Under this approach the ERA:

- Placed more reliance on the historic market risk premium, relative to the DGM.
- Placed less reliance on the DGM, relative to the historic market premium.
- Determined a final point estimate of the market risk premium by using regulatory judgement, including considering conditioning variables. The final point estimate of the market risk premium was rounded to one decimal place.

10.3.2 Working views in the discussion paper

648. The ERA's working view in the discussion paper was to maintain the approach taken for the 2018 gas instrument, but to consider the following changes and topics.

649. The ERA proposed a simplification of the approach in the 2018 gas instrument in the following manner:

- Only considering market risk premia post-1958 given the data quality issues and representativeness of returns of the 1883-1958 period.

274 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 30.

275 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 30.

276 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 31.

- Including an additional subperiod (2000 onwards).
- Solely relying on the BHM dataset.
- A final historic market risk premium estimate where the average of arithmetic and geometric means of all subperiods is taken, where those global means are averaged to provide the point estimate.

650. The ERA's working view was that the market risk premium was to remain fixed over the period of the gas instrument.

651. The ERA sought stakeholder views on whether there was a relationship between the market risk premium and the risk free rate (magnitude and direction).

10.3.3 Consultation

10.3.3.1 Discussion paper

652. The ERA received six submissions in response to the discussion paper. All of these submissions discussed the market risk premium.

653. Stakeholder submissions discussed multiple market risk premium matters including:

- historic market risk premium
- DGMs
- conditioning variables
- the relationship between the market risk premium and risk free rate
- a fixed or variable market risk premium.

654. Each market risk premium matter is discussed below.

Historic market risk premium

655. Stakeholders were generally supportive of the ERA's proposed simplification of the historic market risk premium approach in the 2018 gas instrument.

656. With regard to removing historic data pre-1958 and the use of sampling periods post-1958 most stakeholders were supportive.[277, 278, 279, 280, 281]

- The CRG agreed with the ERA's working position that data from 1883-1958 is potentially problematic given measurement issues and differences in the economy, financial markets and institutions to current conditions.[282]
- GGT did not support the multiple sampling periods post-1958 and instead cautiously supported the use of data for a single long period post-1958 for market risk premium estimation. GGT submitted that a sample period of shorter durations would reduce the statistical precision of the estimate.[283,]

657. Stakeholders expressed diverging views on the inclusion of a new sampling period from 2000 to current:

- South32 supported the inclusion of the new sampling period from 2000.[284]
- AGIG and ATCO both submitted that the new period from 2000 could replace the period from 1988, as there would then be three periods each roughly 20 years shorter than its predecessor.[285,286]
- The CRG queried why the introduction of the Goods and Services Tax would impact the market risk premium. The CRG wanted further information on the introduction of the period.[287,]
- GGT did not support the new period and submitted it was too short to be statistically precise.[288]

658. The majority of stakeholders expressed support for only considering the BHM dataset when calculating the market risk premium.[289,290, 291, 292] However, AGIG supported the NERA dataset and stated that experts in the field had chosen that data set.[293]

[277] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 16.
[278] ATCO, *Submission to Discussion Paper*, February 2022, p. 18.
[279] CRG, *Submission to Discussion Paper*, February 2022, p. 13.
[280] GGT, *Submission to Discussion Paper*, February 2022, p. 20.
[281] South32, *Submission to Discussion Paper*, February 2022, p. 3.
[282] CRG, *Submission to Discussion Paper*, February 2022, p. 54.
[283] GGT, *Submission to Discussion Paper*, February 2022, p. 20.
[284] South32, *Submission to Discussion Paper*, February 2022, p. 3.
[285] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 17.
[286] ATCO, *Submission to Discussion Paper*, February 2022, p. 18.
[287] CRG, *Submission to Discussion Paper*, February 2022, pp. 20-21.
[288] GGT, *Submission to Discussion Paper*, February 2022, p. 21.
[289] ATCO, *Submission to Discussion Paper*, February 2022, p. 19.
[290] CRG, *Submission to Discussion Paper*, February 2022, p. 14.
[291] GGT, *Submission to Discussion Paper*, February 2022, p. 22.
[292] South32, *Submission to Discussion Paper*, February 2022, p. 3.
[293] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 17.

659. Stakeholders expressed diverging views on how to use the arithmetic and geometric means when calculating the historic market risk premium.[294]

- The CRG and South32 supported the ERA's working view of using both arithmetic and geometric means.[295, 296] The CRG considered that the ERA needed to provide a conceptual reason for which averaging method (arithmetic or geometric) was appropriate.[297]
- All gas network service providers strongly supported the sole use of the arithmetic mean. These stakeholders submitted that the use of the arithmetic mean was consistent with standard financial theory and previous advice from Dr Lally.[298, 299, 300, 301]

660. GGT also submitted that negative historic market risk premium observations be removed as they cannot be *ex-ante* expectations.[302]

Dividend growth models

661. Stakeholders expressed diverging views on the use and estimation of the DGM in the estimation of the market risk premium.

662. Gas network service providers supported the greater use of the DGM as it is a forward-looking model, with most suggesting that the calibrated DGM be adopted:[303, 304,305]

- AGIG suggested that the long-term growth assumption necessary for the DGM could be solved through using the ENA's calibrated DGM.[306]

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294 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:

$$Geometric\ Mean\ for\ \%\ return = \sqrt[n]{(1 + x_1\%) \cdot (1 + x_2\%) \cdots (1 + x_n\%)} - 1$$

295 CRG, *Submission to Discussion Paper*, February 2022, pp. 20-21.

296 South32, *Submission to Discussion Paper*, February 2022, p. 3.

297 CRG, *Submission to Discussion Paper*, February 2022, p. 57.

298 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 17.

299 ATCO, *Submission to Discussion Paper*, February 2022, pp. 19-20.

300 ENA, *Submission to Discussion Paper*, February 2022, pp. 4-5.

301 GGT, *Submission to Discussion Paper*, February 2022, p. 28-33.

302 GGT, *Submission to Discussion Paper*, February 2022, pp. 33-34.

303 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 21-22.

304 ATCO, *Submission to Discussion Paper*, February 2022, pp. 24-26.

305 ENA, *Submission to Discussion Paper*, February 2022, p. 2.

306 Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 21.

- ATCO supported giving explicit and material weight to the DGM method, stating that the DGM is agnostic about the relationship between the risk free rate and the market risk premium. ATCO suggested that the DGM to be used could be the ERA's current two-stage model, or the ENA's calibrated DGM.[307]
- ENA submitted that its calibrated DGM developed by Frontier Economics addresses the ERA's historic concerns with the DGM and could be used to provide a forward looking estimate of the market risk premium.[308]

663. While the CRG acknowledged that the DGM was a forward-looking model, it was concerned with its implementation and considered that it should only be used to inform the direction of any changes to the market risk premium.[309]

664. South32 supported the ERA's working view on the market risk premium which placed less reliance on the DGM.[310]

Conditioning variables

665. Stakeholders expressed diverging views on the use of conditioning variables in the estimation of the market risk premium.

666. The CRG considered that a historic market risk premium with more weight given to recent years along with the application of conditioning variables provides the most appropriate approach for estimating the relevant forward-looking market risk premium.[311]

667. AGIG and GGT questioned the use of conditioning variables.[312,313] AGIG questioned how conditioning variables would be used by the ERA, especially given how regulatory judgment could be exercised in the context of a binding instrument.[314] GGT submitted that conditioning variables provide no further information to that already embedded in the returns data.[315]

The relationship between the risk free rate and the market risk premium

668. There were mixed views expressed by stakeholders on the relationship between the *ex-ante* market risk premium and the *ex-ante* risk free rate.

[307] ATCO, *Submission to Discussion Paper*, February 2022, pp. 24-26.

[308] ENA, *Submission to Discussion Paper*, February 2022, p. 2.

[309] CRG, *Submission to Discussion Paper*, February 2022, p. 58.

[310] South32, *Submission to Discussion Paper*, February 2022, p. 2.

[311] CRG, *Submission to Discussion Paper*, February 2022, p. 26.

[312] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 18.

[313] GGT, *Submission to Discussion Paper*, February 2022, p. 27.

[314] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 18.

[315] GGT, *Submission to Discussion Paper*, February 2022, p. 27.

669. Some gas network service providers submitted that there was a relationship between the market risk premium and the risk free rate.[316,317]

- AGIG submitted that the ERA did not put sufficient weight on the CEPA report commissioned by the AER regarding the relationship between the risk free rate and the market risk premium.[318] AGIG suggested that ENA's calibrated DGM could be used to recognise relationships given the calculated correlation between the calibrated DGM's market risk premiums and the risk free rate.[319]
- ATCO disagreed with the assumption that the market risk premium is fixed, preferring their interpretation of the evidence provided in the CEPA report commissioned by the AER.[320] ATCO submitted the "flight to safety" theory for a negative relationship, where lower yields on risk free assets are associated with increased yields on risky assets.[321] ATCO also supported the "business cycle" theory that relates market risk premiums to business conditions in a counter-cyclical manner, where expected returns are lower when economic conditions are strong and vice versa.[322]

670. The CRG and South32 supported the ERA's working view that there was no clear relationship between the *ex-ante* market risk premium and the *ex-ante* risk free rate. The CRG considered that there was no clear usable relationship.[323,324]

671. GGT also supported the ERA's working view, where GGT submitted that at this moment in time there is no theory or strong empirical evidence that supports a relationship between the risk free rate and *ex-ante* market risk premium in Australia.[325]

A fixed or variable market risk premium

672. Stakeholders expressed diverging views on setting a variable market risk premium calculated at the commencement of each access arrangement.

673. AGIG submitted that the market risk premium should be updated, rather than fixed, over the term of the gas instrument.[326] AGIG suggested two approaches for this updating procedure.

- The first suggestion was to determine the market risk premium range in the instrument, and at each access arrangement determination estimate the historic market risk premium and DGM as per the instrument and adopt the same point (percentile value) on the range as the final market risk premium estimate.[327]

[316] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 22-25.
[317] ATCO, *Submission to Discussion Paper*, February 2022, pp. 20-23.
[318] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 23.
[319] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 24.
[320] ATCO, *Submission to Discussion Paper*, February 2022, pp. 20-21.
[321] ATCO, *Submission to Discussion Paper*, February 2022, p. 22.
[322] ATCO, *Submission to Discussion Paper*, February 2022, pp. 22-23.
[323] South32, *Submission to Discussion Paper*, February 2022, p. 3.
[324] CRG, *Submission to Discussion Paper*, February 2022, p. 58.
[325] GGT, *Submission to Discussion Paper*, February 2022, p. 35.
[326] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 25.
[327] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 25.

- The second suggestion was to estimate the market risk premium and relationship for a time varying market risk premium in the instrument, where at each access arrangement determination the market risk premium would be adjusted according to that rule.[328]

674. ATCO submitted that the market risk premium should not be fixed for the term of the instrument, but it should be updated at each access arrangement determination.[329]

675. The CRG considered that the ERA's objective is to obtain the best estimate of the market risk premium that should apply over the forthcoming period. The CRG also supported the ERA's working position of fixing the market risk premium.[330]

676. South32 supported the ERA's working view to keep the market risk premium fixed.[331]

10.3.3.2 Focused consultation

677. Following the ERA's review of submissions on the discussion paper and the concurrent expert sessions, the ERA considered that there was further value that could be gained through focused consultation before the publication of the 2022 draft gas instrument.

678. The ERA identified the market risk premium as a topic for which it considered additional consultation will assist the ERA to make decisions that contribute to the achievement of the national gas objective.

679. The ERA published a discussion paper outlining specific questions on the market risk premium.[332] An online session was also conducted with interested stakeholders. The ERA received written stakeholder in May 2022. The CRG also provided a supplementary submission in response to stakeholder submissions.

680. The ERA received five submissions regarding the market risk premium as part of its focused consultation.

681. Stakeholder submissions discussed multiple market risk premium matters including:

- historic market risk premium
- calibrated DGM
- determining the market risk premium
- a fixed or variable market risk premium.

682. Each market risk premium matter is discussed below.

[328] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 25-26.

[329] ATCO, *Submission to Discussion Paper*, February 2022, pp. 23-24,28.

[330] CRG, *Submission to Discussion Paper*, February 2022, p. 58.

[331] South32, *Submission to Discussion Paper*, February 2022, p. 3.

[332] ERA, *Focused consultation for the 2022 gas rate of return instrument review* – Discussion paper, April 2022.

Historic market risk premium

683. Stakeholders expressed diverging views on the use of the arithmetic and geometric means when estimating the historic market risk premium.

684. The CRG discussed the use of arithmetic and geometric means, supporting the usage of geometric means. The CRG made the following points regarding historical means:

- Returns are not identically and independently distributed (iid). The CRG considered there was evidence of negative serial correlation and this justifies the use of geometric returns. The CRG also submitted that Dr Lally's preference for arithmetic returns was based on the assumption of iid, which the CRG does not believe to be true.[333]
- If the most representative time horizon is not annual, then an average annual rate would not be appropriate.[334]
- The arithmetic average of annual returns will overestimate expected returns if the holding period is more than one year. There is a convergence of the arithmetic mean to the geometric mean where increases in the holding period will decrease mean returns asymptotically to the geometric mean.[335]
- The relevant compounding is about investors and whether they experience and expect compounding due to their choice of investment horizons and practices.[336]
- The regulatory process does not preclude compounding of returns by investors.[337]
- The geometric return approximation decomposes the arithmetic mean into the geometric mean plus a variance term. The CRG argued that regulatory protection lowers volatility such that historical returns are closer to the geometric mean. Additionally, if returns are long term in the presence of return predictability, then this would have the effect of lowering long horizon variances.[338,339]

685. All gas network service providers reiterated their support for the arithmetic mean as the only mean to be used in calculating the historic market risk premium.[340,341,342]

- AGIG commissioned a memorandum from CEG which analysed the serial correlation of historical market returns, concluding that it was not a serious concern.[343] The CEG report also suggested an alternative method of calculating the geometric mean.[344]

[333] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 24.

[334] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 24.

[335] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, pp. 12-13.

[336] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 24-25.

[337] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 25.

[338] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 26-27.

[339] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, p. 13.

[340] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.

[341] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 12-13.

[342] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 17.

[343] *CEG Memorandum for Australian Gas Infrastructure Group*, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 1.

[344] *CEG Memorandum for Australian Gas Infrastructure Group*, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.

686. In response to the CEG report, the CRG submitted that the finding of limited serial correlation in total returns based on annual observations is not relevant if the holding period for investors is considerably longer than one year. Since with a longer holding period, the annual results are not realised in practice.[345]

687. The CRG also submitted that the ERA did not make adjustments for survivorship bias for the historical market return, which implied that it was upwardly biased.[346]

688. GGT re-iterated its position for the calculation of historic market risk premiums that negative observations should be excluded as this is inconsistent with the *ex-ante* expectations and equilibrium model of the CAPM.[347]

689. The CRG noted that it is true that the *ex-ante* market risk premium must be positive in order to provided incentives for equity investment. However, this does not justify the removal of negative realised excess returns because investors also expect there to be variability in returns over time. Furthermore, the use of the long term historically based market risk premium effectively precludes the adoption of a negative market risk premium.[348]

Calibrated dividend growth model

690. The ERA's focused consultation online session included a presentation from Frontier Economics on the use of the calibrated DGM.

691. Stakeholders expressed mixed views on the use of the calibrated DGM.

692. All gas network service providers supported the use of a DGM for the market risk premium, particularly ENA's calibrated DGM by Frontier Economics. These stakeholders submitted that the calibrated DGM addressed the ERA's concerns with the DGM and therefore considered that the DGM should receive equal weighting to the historic market risk premium.[349, 350, 351]

- AGIG raised the issue that as the risk free rate was determined by an averaging process, it could potentially be mismatched against the DGM estimate. AGIG proposed a compromise solution of a two-month to three-month DGM estimate paired with the spot rate.[352]
- ATCO considered that it was essential to incorporate a DGM model into the market risk premium estimate and considered that the calibrated DGM had advantages in removing the subjectivity in the dividend growth rate parameter.[353] ATCO submitted that the ERA could choose a calibrated estimate from the last three to six months to set the DGM estimate.[354]

[345] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, p. 12.
[346] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 20.
[347] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 20.
[348] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, p. 16.
[349] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.
[350] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 10-11.
[351] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 18-19.
[352] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 7.
[353] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 10.
[354] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 10.

- GGT submitted that the scope for subjectively influencing the choice of model parameters is reduced with the calibrated DGM.[355]

693. The CRG did not support the use of the calibrated DGM in setting market risk premiums directly, but considered that it could be used in a directional manner.[356]

- The CRG submitted that the calibration to a historic market risk premium makes the calibrated DGM less useful as a forward looking model.[357]
- The CRG also submitted that the calibrated DGM could be sensitive to the data, along with the observation that the calibrated market risk premium is rising in the later half of the sample.[358]
- The CRG was unclear what the calibrated DGM meant for notions of market efficiency and the likelihood that dividend growth varies over time.[359]

Determining the market risk premium

694. Stakeholders expressed diverging views on how to combine inputs to best estimate the market risk premium.

695. All gas network service providers supported an approach that provided greater weight to the DGM, particularly the calibrated DGM. Most suggested that equal weight should be provided to the historic market risk premium estimate and the DGM estimate:[360,361,362]

- AGIG considered that the ERA's 2013 rate of return process is an example where weights could be provided and fixed in the instrument, with estimates updated at each access arrangement determination.[363]
- AGIG submitted that, as a starting position, equal weights should be provided to the historic market risk premium and the DGM estimate. AGIG also submitted that the choice of weights would require discretion and it will be important to explain such judgement.[364]
- AGIG also submitted that a near-fixed market risk premium based on the unconditional mean of the historic market risk premium was inappropriate. AGIG referred to evidence from the AER's expert session that discussed how conditional market risk premiums could play a role in the expected market risk premium.[365]

[355] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 19.
[356] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 19.
[357] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 19.
[358] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 17.
[359] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 19.
[360] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 6.
[361] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 12.
[362] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 22.
[363] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.
[364] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 6.
[365] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 5-6.

- AGIG referred to its past submission and suggested that a market risk premium estimate could incorporate time variation of returns through a weighted average of historical and forward looking information, or through using a set relationship between the market risk premium and the risk free rate.[366]
- AGIG also referred to a Synergies report for Queensland Treasury Corporation (QTC) that evaluated independent expert reports for non-DGM evidence on the relationship between the market risk premium and the risk free rate. Additionally, AGIG referred to the Sapere report for the AER's CRG regarding combining conditional and unconditional estimates.[367]
- ATCO considered that it was possible to set a mechanistic approach to use DGMs for calculating the market risk premium. ATCO submitted that the ERA could use judgement at the time of the instrument (for example, specifying model weights) but this could be codified in the instrument such that it could be updated at each access arrangement determination. However, ATCO doubted that the ERA could codify how conditional variables could be used as conditional variables required the use of judgement.[368]
- GGT only supported mechanical approaches for estimating the market risk premium, considering that no conditioning variables should be used.[369]

696. The CRG supported the ERA's working view, where the DGM should not be provided more weight than what was previously provided. Additionally, the CRG did not support assigning any explicit weight to the DGM due to concerns regarding DGM reliability. The CRG considered that the DGM was useful to determine any directional change of the market risk premium.[370]

A fixed or variable market risk premium

697. Stakeholders expressed diverging views on setting a variable market risk premium at the commencement of each access arrangement.

698. All network service providers supported an updating market risk premium approach at each access arrangement determination.[371, 372, 373]

- AGIG believed that it was possible to have a mechanical, non-discretionary approach in setting the expected risk premium, pointing to the AER's annual updates as an example.[374]

[366] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 7.
[367] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.
[368] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 11-13.
[369] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 22-23.
[370] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 20-24.
[371] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 6.
[372] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 14.
[373] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 24-25.
[374] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 6.

- ATCO supported a method that consistently matches a market risk premium with the risk free rate.[375] ATCO interpreted the National Gas Law such that the "prevailing conditions in the market for equity funds" and "interrelationships between financial parameters used" meant that it should be updated at each access arrangement decision.[376]
- ATCO noted that the timing difference between the setting of the instrument and the access arrangement determination could affect the rate of return in way that a mechanistic instrument cannot handle.[377]
- GGT considered that an updating market risk premium approach is correct in principle, but this would only be possible if the estimation process can be set as rules. GGT submitted that there is no need for regulatory discretion if the historical and calibrated DGM estimates were equally weighted and that both estimates could be specified mechanically.[378]

699. The CRG supported a variable market risk premium in principle, but preferred methods where the ERA could preserve the use of its regulatory discretion to ensure best estimates. The CRG doubted that the DGM or conditioning variables could be used mechanically. The CRG noted that as unexpected developments can affect the market risk premium, regulatory discretion is both necessary and appears effective in the Australian regulatory environment.[379]

10.3.4 2022 draft approach

700. The ERA's draft approach for the 2022 gas instrument will use a market risk premium of 6.2 per cent.

701. The market risk premium will remain fixed for the term of the gas instrument.

10.3.5 Reasoning

10.3.5.1 Development since the 2018 gas instrument

Market developments

702. 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.

703. 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.

704. 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.

[375] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 14.
[376] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 15.
[377] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 14.
[378] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 24-25.
[379] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 19-20.

705. The AER's 2021 annual rate of return update has provided market risk premium estimates across multiple methods and up to August 2020 where possible:[380]

- Historic market risk premium: the AER's update produced a range from 4.3 per cent to 6.6 per cent.
- Dividend growth model: the AER calculated a baseline estimate of 6.9 per cent.
- Surveys: recent market practitioner surveys produced a mean of 6.4 per cent and a median of 6.3 per cent.

Regulatory developments

706. With regard to the relationship between the market risk premium and the risk free rate, the Queensland Competition Authority made the following observations:[381]

- 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."

707. The AER commenced a review of the market risk premium as part of its 2022 rate of return instrument review.[382]

708. As part of its review the AER commissioned new consultant reports and other papers regarding the market risk premium. These new reports included:

- 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 Commission in the United States used DGMs and the New Zealand Commerce Commission used a combination of approaches.[383,384]
  - 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.[385]
- An AER working paper on CAPM and alternative return on equity models.[386]

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380 AER, *Rate of Return Annual Update,* December 2021, pp. 16-21.

381 QCA, *Draft Report: Rate of Return Review,* July 2021, pp. 51-52.

382 AER, *Equity Omnibus Draft working paper,* July 2021.

383 Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020, pp. 43-44.

384 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.

385 Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020.

386 AER, *CAPM and alternative return on equity models,* December 2020.

- A Partington and Satchell expert report on return on equity models:[387]
  - 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.[388]
  - Partington and Satchell stated that they found this implausible as this could result in negative market risk premiums.[389]
- A review of the relationship between the market risk premium and the risk free rate by CEPA:[390]
  - 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.[391]
  - 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.[392]
  - CEPA stated:[393]

    > 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.

- An AER working paper on rates of return in a low interest rate environment.[394] This paper sought comments on whether a low interest rate environment necessitated changes in the market risk premium.[395]

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387 Partington, G. and Satchell, S., *Report to the AER: Alternative Asset Pricing Models,* June 2020.

388 Partington, G. and Satchell, S., *Report to the AER: Alternative Asset Pricing Models,* June 2020, p. 23.

389 Partington, G. and Satchell, S., *Report to the AER: Alternative Asset Pricing Models,* June 2020, p. 23.

390 CEPA, *Relationship between RFR and MRP*, June 2021.

391 CEPA, *Relationship between RFR and MRP*, June 2021, p. 5.

392 CEPA, *Relationship between RFR and MRP*, June 2021, p. 6.

393 CEPA, *Relationship between RFR and MRP*, June 2021, pp. 6-7.

394 AER, *Term of the rate of return & Rate of return and cashflows in a low interest rate environment: Final working paper*, September 2021.

395 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.

709. The AER's final omnibus paper for its 2022 rate of return instrument review had an open position on the market risk premium. It considered that there were three options:[396]

- Maintenance of its current approach consistent with the AER's 2018 instrument.
- Using estimates from the DGM to inform point estimates of the market risk premium, within the range from the AER's current approach.
- Providing more weight to the DGM alongside the current AER approach.

710. 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: [397]

- 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

711. In February 2022, the AER held its concurrent evidence sessions, which included the consideration of the market risk premium.[398] Experts had different views on the market risk premium.

712. 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.

713. 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.

714. 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.
- *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).

715. 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.

396 AER, *Overall rate of return, equity and debt omnibus,* December 2021, p. 32.

397 QCA, *Final Report: Rate of return review*, November 2021, pp. 55-65.

398 AER, *Rate of Return Instrument Concurrent Evidence Session 3 of 4*, February 2022.

716. 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.

717. 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.

718. Experts did not discuss methods for determining the weighting of the different models in depth.

719. 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.

720. 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.

10.3.5.2 Historic market risk premium

721. 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.

722. 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.

723. The ERA estimates a historic market risk premium of 6.0 per cent.

724. The ERA's considerations on the estimation of the historic market risk premium are expanded in more detail below.

Sampling periods and method

725. 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.

726. 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.

727. 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.

728. 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).[399]

729. 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.[400,401]
- The dividend component of total returns estimated pre-1958 could have been overstated due to methodological issues from an equal weighting approach.[402]

730. The ERA's 2022 draft gas instrument is to have regard to more recent time periods and use post-1958 data.

731. For the estimation of the market risk premium for the 2022 draft gas instrument the ERA will use the following four overlapping periods:

- 1958 to current
- 1980 to current
- 1988 to current
- 2000 to current.

732. The ERA will maintain the use of multiple sub-periods. GGT was the only stakeholder to support using a single period. 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.

733. 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.

734. 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.

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399 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement,* December 2018, p. 177.

400 AER, *Rate of return instrument, Explanatory statement*, December 2018, pp. 240-244, 247-249.

401 Pink Lake Analytics, *Estimation of the Market Risk Premium*, December 2017, pp. 7-9.

402 AER, *Equity Omnibus, Draft working paper*, July 2021, p. 22.

735. 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).[403]
- 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.[404]

736. The NERA and BHM datasets prior to 1958 produce some different numbers. However, after 1936 the NERA and BHM datasets produce similar estimates.

737. 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.[405]

738. The ERA's approach for the 2022 draft 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.
- 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.

739. Submissions from stakeholders were largely supportive of the simplification and focus on more recent periods.

740. The ERA will not remove negative observations, as proposed by GGT. Doing so will likely result in an upward bias that reduces the value of the historic market risk premium as an unconditional estimate. The ERA maintains a view that the unconditional estimate in a sufficiently large sample will converge to the true value as positive and negative deviations from expectations average out. To alter the return distribution by removing negative observations is likely to undermine this process.

741. The ERA is unaware of techniques that might adjust for any survivorship bias in the calculation of average returns as submitted by the CRG. The ERA considers that the usage of capitalisation weighted indices is likely to moderate these issues, assuming that smaller firms are more likely to fail than large ones.

403 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.

404 NERA, *The market size and value premiums*, June 2013.

405 AER, *Rate of return instrument, Explanatory statement*, December 2018, pp. 248-249.

Averaging method

742. 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.[406]

743. The ERA has given further consideration to the use of the arithmetic and geometric means when calculating the historic market risk premium.

744. 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.

745. The 2018 gas instrument explanatory statement 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.[407]

746. There are mixed views as to the best averaging technique to apply to estimate the historic market risk premium.

[406] 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:

$$Geometric\ Mean\ for\ \%\ return = \sqrt[n]{(1 + x_1\%) \cdot (1 + x_2\%) \cdots (1 + x_n\%)} - 1$$

[407] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 197-201.

747. 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:[408,409]

- 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.[410,411]
- The geometric average normally gives a downward biased measurement of expected returns.[412] 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.

748. Indro and Lee extend Blume's analysis of the historic averages.[413] 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.
- Found that bias arising from the use of the arithmetic average increases as the investment horizon lengthens and also as the volatility of the returns increases.
- Found that bias arising from the geometric average increases as volatility of returns increases.

749. 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.[414,415]

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408 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.

409 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003.

410 Blume, M., *Unbiased Estimators of Long-Run Expected Rates of Return*, Journal of the American Statistical Association, 69, 1974, pp. 634-638.

411 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003, p. 3.

412 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003, pp. 46-53.

413 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.

414 Damodoran, A., *Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2016 edition*, March 2016, p. 33.

415 Jacquier, E., Kane, A. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, vol 59, 2003, pp. 46-53.

750. An unbiased estimate of the market risk premium is likely to be somewhere between the geometric average and the arithmetic average.[416,417]

751. Academics have proposed alternative methods to combine the geometric and arithmetic averages to give an approximately unbiased estimate of expected returns.[418]

752. 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.[419]

753. Partington and Satchell considered that it was clear that some weight should be attached to the geometric return.[420] 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 the AER compounds returns is not the relevant issue.[421]
- 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.[422]
- Some weight should be attached to the geometric return and that weight should be greater the more the concern for accuracy relative to unbiasedness.[423]
- 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.[424]
- Partington did not propose a weight and considered a regulator inevitably needs to exercise judgement in making this determination.[425]

754. The experts in the concurrent evidence session expressed divergent expert views on the use of arithmetic and geometric means.

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416 McKenzie, M. and Partington, G., *Supplementary report on the equity MRP*, February 2012, p. 5.

417 Jacquier, E., Kane, Al. and Marcus, A., *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, 2003, p. 4.

418 Blume, M., *Unbiased Estimators of Long-Run Expected Rates of Return*, Journal of the American Statistical Association, vol. 69, 1974, pp. 634-638.

419 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.

420 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, pp. 29-34.

421 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 30.

422 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 30.

423 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 34.

424 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 31.

425 Partington, G. and Satchell, S., *Report to the AER: Discussion of Submissions on the Draft 2018 Guideline*, November 2018, p. 34.

755. The AER in its estimation of the historic market risk premium considers both the arithmetic and geometric means. Due to the mathematical principles underpinning the two methods, the AER gives more weight to the arithmetic mean than the geometric.[426]

756. Submissions to the ERA on the use of the means when estimating the historic market risk premium submitted:

- Academic textbooks from noted finance professors have indicated that the arithmetic average is useful when estimating expected return in the future based on realised returns.
- An evaluation by Dr Lally on whether an arithmetic and geometric mean should be applied to historical data. Dr Lally's report found that the arithmetic mean was consistent with the 'present value principle'. Dr Lally submitted that if returns are identically and independently distributed (iid) then arithmetic means are more consistent with the NPV=0 principle.[427]
- The AER's expert session indicated that geometric means are useful in the presence of serial correlation. AGIG commissioned a memorandum from CEG that examined whether historical returns exhibited autocorrelation. There was weak evidence of serial correlation and therefore provided support for the arithmetic mean.

757. The ERA considers that both arithmetic and geometric means have an appropriate role to play as a combination and will not exclusively use one or the other. Given the nature of the regulatory task the ERA will provide greater weight to the arithmetic mean, but considers that geometric means are still necessary.

758. The ERA characterises the two averaging methods in the following manner:

a. Arithmetic means: utilising a series of realised returns to form a probability distribution that can be used to estimate the mean of a future return.

b. Geometric means: estimates a smoothed, compounded, periodic growth rate relevant for understanding historic performance across longer horizons.

759. 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.

760. In the Sapere report for the AER's Consumer Reference Group, Sapere state that the regulator is trying to "estimate the probability-weighted sum of all possible future returns" which lends itself towards using the arithmetic mean, not the geometric mean.[428]

426 AER, *Overall rate of return, equity and debt omnibus – Final working paper*, December 2021, p. 42.

427 Lally, M., *Review of the AER's Methodology for the Risk Free Rate and the Market Risk Premium*, March 2013, p. 40.

428 Sapere, *Estimation of the market risk premium and its relationship to the risk free rate in the context of regulation of electricity and gas energy networks: A report to the Australian Energy Regulator Consumer Reference Group*, February 2022, p. 45.

761. 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.[429]

762. 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.

763. The ERA considers that there is likely some bias present in the arithmetic average.

- The ERA has considered the CEG memorandum that analyses serial correlation. The ERA notes that there is some evidence of autocorrelation for the market risk premium that appears driven by the risk free rate as presented by CEG.
- The ERA understands that statistical tests of autocorrelation, stationarity or ergodicity may lack power, especially when tested at the annual frequency.
- Findings on serial correlation may depend on the frequency of returns, whether it is long or short term, and may be present in some periods, but not in others. This issue is also a matter of debate in financial economics, most recently in the literature regarding time series momentum.[430]

764. 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.

765. Various weighting schemes have been discussed above. 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.

766. Accordingly, the ERA considers 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.

767. The ERA notes that the geometric and arithmetic mean are approximately linked together by a term that represents volatility. The ERA does not consider that this volatility term can be linked to the regulatory arrangements of gas network service providers as suggested by the CRG. This is because the market risk premium is a market wide parameter for the price of risk. In setting efficient rates of return it would be inconsistent to deliberately adjust the market risk premium for any effects of regulation as an investor to hold the market portfolio.

768. The ERA considers the recognition of 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 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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429 The geometric mean formula can be expressed as: $\sqrt[n]{(P_n/P_0)} - 1$

430 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.

769. CEG's memorandum for AGIG provided an alternative geometric mean formula that it submitted should be considered instead of the ERA's current formula. The ERA is unclear why CEG believes that it is not possible to implement a trading strategy where an investor purchases the market portfolio and borrows the risk free asset to create a long-short portfolio that realises the market risk premium that is liquidated and reinvested across periods. Accordingly, the ERA will maintain the use of its existing formula.

770. The ERA has considered the available evidence on the use of the arithmetic and geometric means when estimating the market risk premium, including:

- experts views
- concurrent evidence
- stakeholder feedback
- academic papers.

771. For the 2022 draft gas instrument the ERA continues to consider that an unbiased estimate of the historic market risk premium is likely to be somewhere between the geometric average and the arithmetic average. The ERA continues to support the use of both the arithmetic and geometric means.

772. For the 2022 draft 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.
  - When compounding the arithmetic averages over time, sampling error can cause an upward bias.
  - Geometric averages can understate returns as it is based on a constant compounding, which does not account for actual variability of returns over time.
  - 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.

773. 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).

774. For the 2022 draft 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.

775. 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 premium estimate

776. Table 10 details the ERA's estimates of the historic market premium.

Table 10: Proposed historic market risk premium (with a 10 year risk free rate) (%)

Time period	Arithmetic mean	Geometric mean
1958-2022	6.77	4.56
1980-2022	6.84	4.77
1988-2022	6.55	5.11
2000-2022	6.84	5.30
Mean	**6.75**	**4.93**
Weights	**60**	**40**
Historic market risk premium estimate	**6.0**	

Source: ERA Analysis

777. Based on the ERA's draft 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.

10.3.5.3 Dividend growth model

778. The ERA has given further consideration to the DGM.

779. 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.

780. 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

781. 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

782. 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.

783. 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.[431]

784. The ERA considered that 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

785. 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 more confidence and a greater weight can be given to the DGM when estimating the market risk premium.

786. The ERA understood that the calibration referred to making monthly DGM estimates, which are then rescaled to fit a specified number over the entire sample period.[432] As described, the ERA noted that the method adjusts estimated long-term growth rates to fit a target mean market risk premium.

787. The ERA sought additional detail on the calibrated DGM and as part of its focused consultation sought stakeholder views.

788. Energy networks supported the adoption of the calibrated DGM and considered that it addressed the ERA's past concerns with the model. However, the CRG did not support the adoption of the calibrated DGM and raised concerns with the approach.

789. The ERA analysed the calibrated DGM and its adoption.

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431 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 30.

432 Frontier economics, *Implementation of a calibrated DGM,* available online.

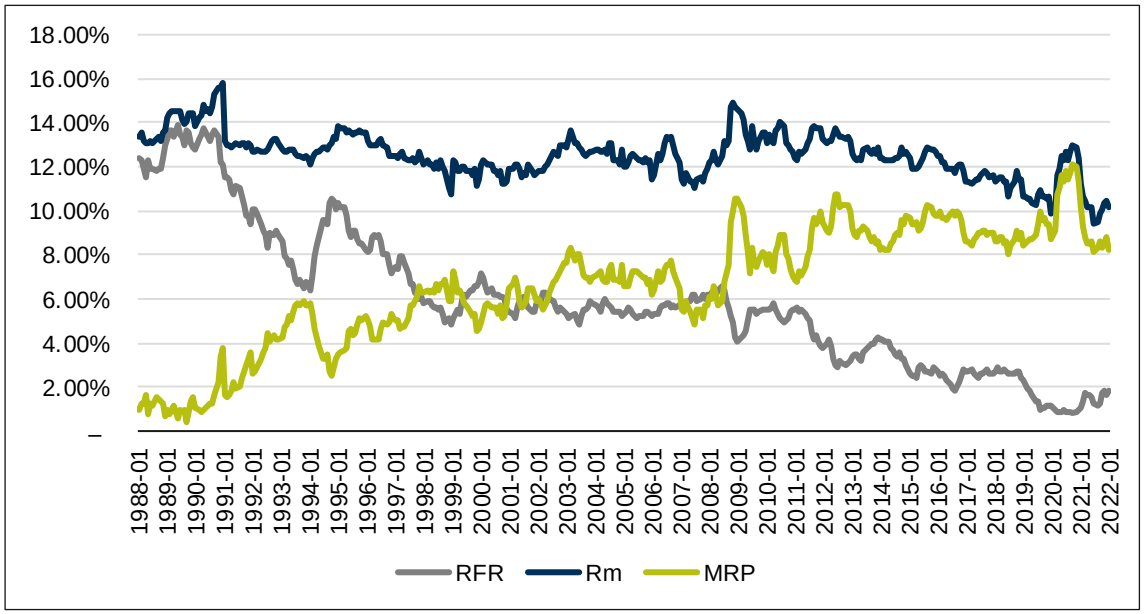
790. The calibrated DGM attempts to address concerns with the DGM usage by abstracting away the need to choose a long term growth rate and at the same time, on average, provides an estimate equal to the level of the historic market risk premium:

- 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.

791. Frontier Economics has provided its code and data to the ERA to allow the evaluation of the calibrated DGM.

792. The ERA has re-estimated the calibrated DGM model according to ERA parameters. The results are presented in Figure 2.

Figure 2: Calibrated DGM under ERA parameters



Source: Frontier Economics model, ERA analysis.

793. Figure 2 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 2 per cent and going to above 12 per cent).

Interpretation and theory

794. 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.

795. 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.

796. 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 later below.

797. 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.

798. A key 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.

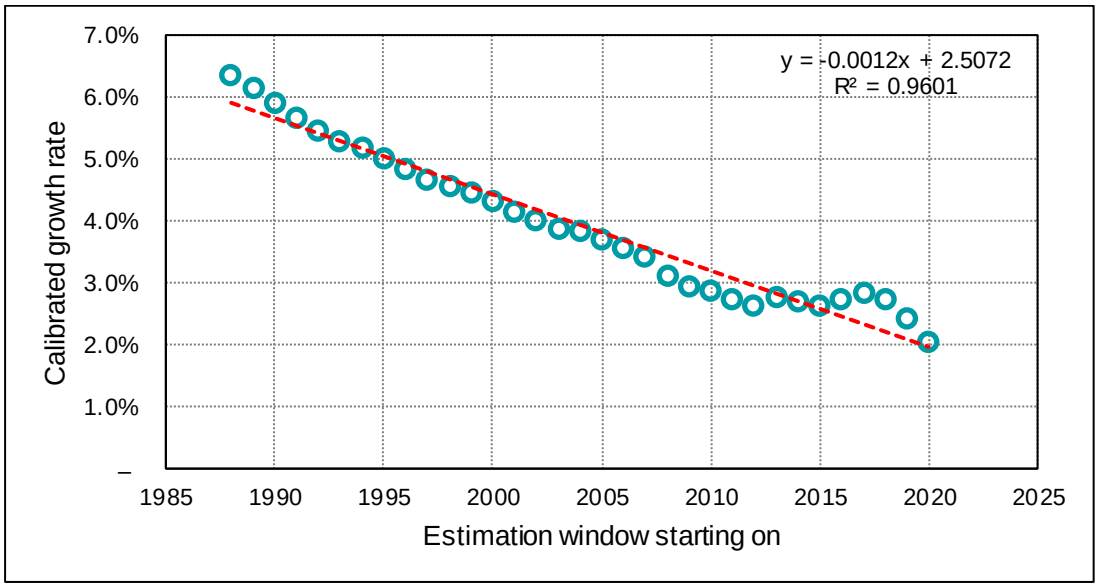
799. ERA analysis of the range of calibrated long term growth values reveals that the estimates can exceed plausible bounds. For example, the full sample calibrated long term growth rate is 6.4 per cent using ERA market parameters. This is significantly larger than most nominal GDP growth estimates, 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.

800. 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

801. The calibrated growth rates are very sensitive to the calibration window chosen, illustrated in Figure 3. 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 3: Implied growth rates by estimation window ending 2021



Source: Frontier Economics model, ERA analysis.

Transparency and replicability

802. 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.[433] 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.

803. 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.

804. 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

805. The ERA's analysis of the calibrated DGM has 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.

[433] SPPR from UNSW is used, along with Refinitiv.

- 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 whether calibration to a historical target reduces the usefulness of the calibrated DGM as a forward looking model.

806. These concerns reduce the confidence that the ERA has in the use of the calibrated DGM.

807. For the purposes of the 2022 draft gas instrument the ERA will not use the calibrated DGM.

Dividend growth model estimate

808. The ERA's 2022 draft gas instrument maintains the use of the DGM to contribute to the estimate of the market risk premium.

809. 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 dividend growth model estimate will retain a growth rate from Dr Lally of 4.6 per cent.

810. However, the analysis of the calibrated DGM and stakeholder feedback has revealed that DGM estimates can vary substantially month to month.

811. Accordingly, for the 2022 draft gas instrument, the ERA improves its estimation approach to reduce sensitivity through estimating the DGM monthly in the six months prior to the setting of the instrument. The six DGM estimates are provided in Table 11. The average of these estimates will be the DGM point estimate.

Table 11: Dividend growth model estimates

	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Mean
DGM implied return	9.10	9.34	9.33	9.10	9.36	9.54	9.29
Risk Free Rate	1.61	1.88	2.11	2.50	3.01	3.38	2.42
DGM market risk premium	7.49	7.46	7.22	6.60	6.35	6.16	6.88
DGM estimate							**6.9**

Source: ERA analysis.

812. The ERA estimates a market risk premium of 6.9 per cent from the dividend growth model.

813. 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.

10.3.5.4 Conditioning variables

814. For the 2022 draft gas instrument the ERA continues to consider conditioning variables when estimating the market risk premium.

815. 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.

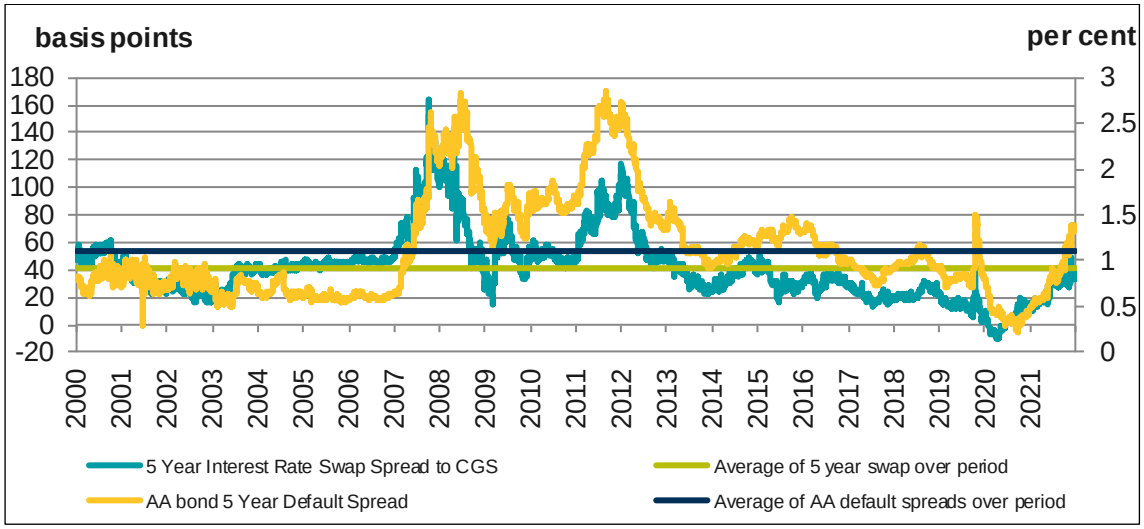
816. The ERA considers conditioning variables including:

- 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.

817. The ERA considers the current levels of conditioning variables relative to their historic averages and how these market conditions affect the market risk premium.

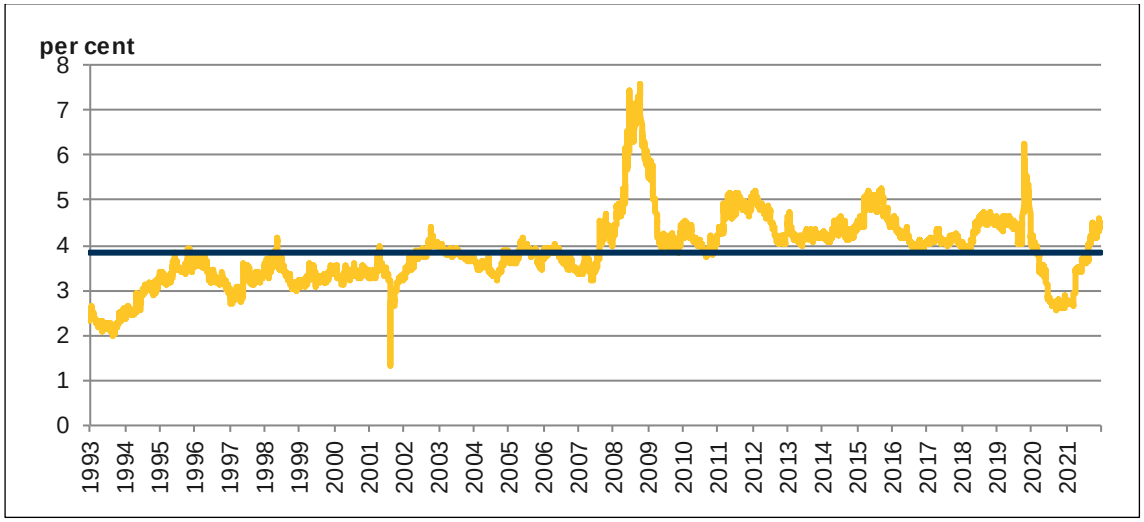
818. Each of these conditioning variables is presented in the following charts.

Figure 4: Five-year AA bond default spread and Five-year interest rate swap



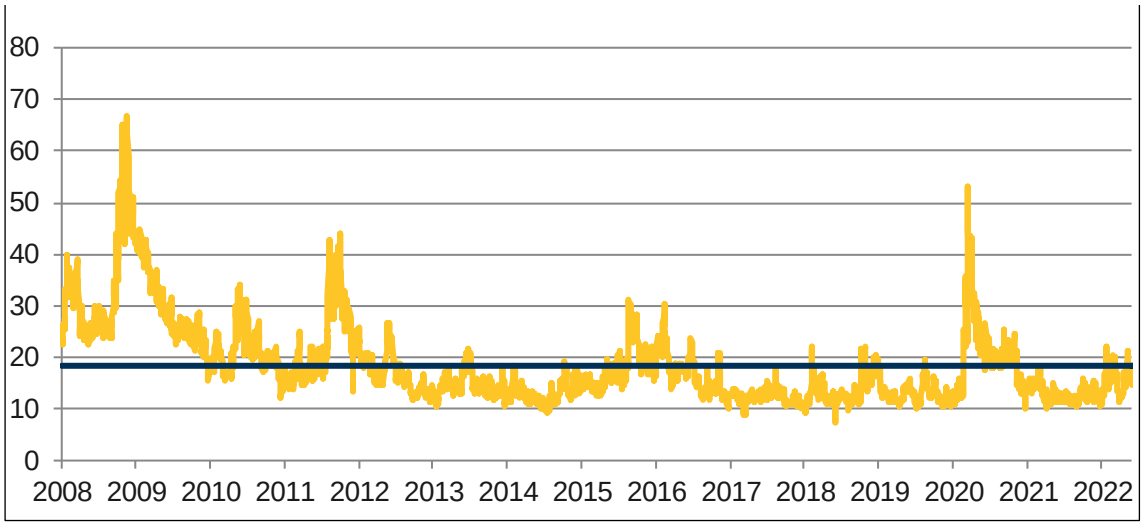
Source: Bloomberg

Figure 5: All Ordinaries Index annual dividend yield



Source: Bloomberg

Figure 6: Implied Volatity (ASX200 VIX)



Source: Bloomberg

819. On balance, the ERA considers that conditioning variables are currently at their historic averages and support a market risk premium at the midpoint of its range.

10.3.5.5 Relationship between the market risk premium and the risk free rate

820. The ERA has given consideration to the relationship between the market risk premium and the risk free rate.

821. 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.

822. 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.

823. This relationship also affects the broader relationship between the return on equity and the risk free rate.

824. 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.

825. 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.[434] Advice from Partington and Satchell indicated that the Wright approach:

- Has "no support based on any clear evidence in the Australian context."[435]
- "Runs contrary to the well accepted view that asset prices are inversely related to interest rates."[436]

826. 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 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.

827. 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.

828. The ERA notes CEPA's review of the relationship between the market risk premium and risk free rate:[437]

- 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.[438]
- CEPA stated:[439]

> 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.

434 ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 168-170.

435 Partington, G. and Satchell, S., *Report to the AER: Discussion of estimates of the return on equity*, April 2017, p. 28.

436 Partington, G. and Satchell, S., *Report to the AER: Cost of equity issues–2016 electricity and gas determinations*, April 2016, p. 31.

437 CEPA, *Relationship between RFR and MRP*, June 2021.

438 CEPA, *Relationship between RFR and MRP*, June 2021, p. 6.

439 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 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.

829. 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.

830. 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.

831. The ERA considers that the conditional market risk premium varies over time.

832. The ERA also considers that there is likely some relationship between the market risk premium and the risk free rate, but this relationship cannot be quantified in terms of the direction or magnitude. Furthermore, the ERA is unclear about what conditions are necessary for the relationship to hold and considers that the relationship itself is possibly time varying.

833. The ERA considers this matter is a contested area of finance.

834. While plausible explanations have been provided via consultation as to the theory for such relationships, the ERA is not convinced that this has been definitively established.

835. 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. This approach did not have wide support by experts in the AER's concurrent evidence session. One expert commented that when such adjustments were adopted in the US, they tended to break down over time. As the ERA has low confidence that such relationships can be econometrically identified, it will not rely on such adjustments.

836. Instead, to estimate the market risk premium the ERA includes multiple inputs, including forward looking DGM estimates and conditional variables, to develop the best estimate to apply for the gas instrument.

837. 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.

838. 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.

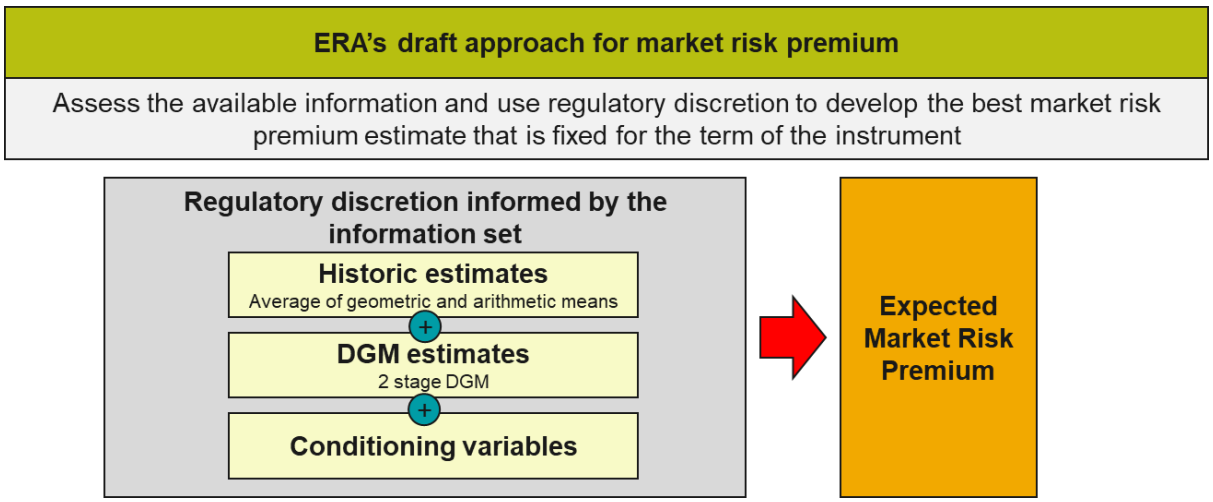
10.3.5.6 Determination of point estimate

839. For the 2022 draft gas instrument when estimating the point estimate for the market risk premium the ERA will consider historic estimates, DGM estimates and conditional variables.

840. There was some agreement from the concurrent evidence session that the best estimate of the market risk premium is likely to be provided through the consideration of a range of inputs.

841. The ERA's approach for the 2022 draft gas instrument to determining a market risk premium point estimate is summarised in Figure 7.

Figure 7: ERA's approach to determing a market risk premium point estimate



842. To determine a point estimate for the market risk premium for the 2022 draft 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.

843. 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.

844. 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.

845. These factors form the basis for the ERA's reliance and relatively high weighting to the historic market risk premium.

846. 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.

847. The ERA will also use conditioning variables to inform its regulatory discretion in determining the point estimate of the expected market risk premium.

848. The historical market risk premium estimate (6.0%) and the DGM estimate (6.9%) forms the information base for the exercise of the ERA's regulatory discretion. The ERA considers that the conditioning variables are currently at their historic averages and support a market risk premium at the midpoint of its range.

849. On the basis of all available information, together with its regulatory discretion, the ERA estimates a market risk premium of 6.2 per cent for the 2022 draft gas instrument.

850. The ERA will fix the market risk premium for the term of the gas instrument.

851. Gas network service providers have submitted that the market risk premium be updated at each access arrangement determination. However, the CRG considered that, as unexpected developments can affect the market risk premium, regulatory discretion is both necessary and appears effective in the Australian regulatory environment.[440]

852. 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.

853. After consideration of both the fixing and updating approaches, the ERA has concluded 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. 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.

854. The ERA holds concerns with the DGM and its sensitivity, and this detracts from its ability to be used in a mechanical way.

855. The ERA considers that there is no reliable method for the mechanical mapping of conditioning variables to the market risk premium.

856. 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.

[440] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 19-20.

10.4 Equity beta

857. 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.

858. 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.

859. 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.

860. 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:

$$R_i = R_f + \beta_i (R_M - R_f)$$

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.

861. 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.

862. This chapter outlines the ERA's working view on the approach to estimating equity beta that should be applied in the 2022 gas instrument.

10.4.1 2018 position

863. The 2018 gas instrument applied an equity beta of 0.7, which was fixed over the period of the instrument.[441]

[441] ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 34.

864. The equity beta estimate set out in the 2018 gas instrument was determined by applying the methods set out in Henry's advice to the Australian Competition and Consumer Commission (ACCC) in 2009.[442]

865. Henry's analysis used various time periods over which the data for equity beta estimation was observed. This included the longest available period, the post-tech boom excluding the global financial crisis and the five years preceding the analysis.[443]

866. The ERA considered that a five-year period with weekly returns for the equity beta balanced the trade-offs between relevance of the data and statistical robustness whilst being consistent with the regulatory reset period.[444]

867. The ERA estimated equity beta using the All Ordinaries Index and a sample of benchmark firms.

868. The ERA applied the Brealey-Myers formula with a zero debt beta to de-lever and re-lever the equity beta using the average gearing ratio of the same five-year period to the benchmark gearing level of 55 per cent.[445]

869. The 2018 gas instrument made no adjustment for low beta bias.[446]

870. The ERA's analysis using available data produced an equity beta of 0.7.[447]

10.4.2 Working views in the discussion paper

871. In the discussion paper, the ERA recognised the equity beta may be affected by current market volatility and reductions in the size of the domestic sample of energy networks.[448]

872. The ERA's working view in the discussion paper was to consider a change to the composition of the benchmark sample by including additional firms. Three options were considered:[449]

- domestic energy networks that include recently delisted firms
- domestic infrastructure firms
- international energy networks.

873. The ERA also put forward open questions as to how equity beta estimation could be affected by market shocks such as the COVID-19 pandemic, along with merger and acquisition (M&A) activity for the domestic sample.[450]

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442 Henry, O, *Estimating Beta: Advice Submitted to the Australian Competition and Consumer Commission*, April 2009.

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

444 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 34.

445 ERA, *Final Gas Rate of Return Explanatory Statement,* December 2018, p. 219.

446 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 34.

447 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 34.

448 ERA, *2022 Gas Rate of Return Instrument Review Discussion Paper*, December 2021, pp. 69-70.

449 ERA, *2022 Gas Rate of Return Instrument Review Discussion Paper*, December 2021, pp. 72-77.

450 ERA, *2022 Gas Rate of Return Instrument Review Discussion Paper*, December 2021, pp. 78-80.

874. The ERA's working view was to largely maintain the equity beta estimation approach adopted for the 2018 gas instrument, but with additional simplifications as to the data and methods in the interests of transparency and reproducibility.[451]

10.4.3 Consultation

10.4.3.1 Discussion paper

875. The ERA received six submissions in response to the discussion paper. All of these submissions discussed equity beta.

876. Stakeholder submissions discussed multiple equity beta matters including:

- statistical equity beta estimation method
- COVID and takeovers
- the domestic energy network sample
- the domestic infrastructure sample
- the international energy network sample
- other equity beta matters.

877. Each equity beta matter is discussed below.

Statistical equity beta estimation method

878. Five submissions discussed the equity beta estimation method proposed by the ERA.

879. There was broad stakeholder support for the ERA's general approach to estimating the equity beta and the methodological simplifications proposed in the discussion paper.[452, 453, 454, 455, 456]

880. AGIG submitted that the ERA's method of averaging equity beta estimates from the individual assets and portfolios is double counting.[457]

881. ATCO noted its support for the use of the Least Absolute Deviation (LAD) as the primary beta estimator to remove the impact of outliers from statistical estimates of beta.[458]

882. The CRG generally supported the ERA's working position except for two matters.

- Firstly, that monthly returns instead of weekly returns be used with a longer estimation window.[459]

[451] ERA, *2022 Gas Rate of Return Instrument Review Discussion Paper*, December 2021, pp. 80-82.
[452] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 27.
[453] ATCO, *Submission to Discussion Paper*, February 2022, p. 39.
[454] CRG, *Submission to Discussion Paper*, February 2022, pp. 20-21.
[455] GGT, *Submission to Discussion Paper*, February 2022, pp. 49-50.
[456] South32, *Submission to Discussion Paper*, February 2022, p. 5.
[457] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 27.
[458] ATCO, *Submission to Discussion Paper*, February 2022, p. 39.
[459] CRG, *Submission to Discussion Paper*, February 2022, pp. 70-71.

- Secondly, that the ERA explains why the LAD estimator is always necessary and given the same weight as the ordinary least squares (OLS) estimator.[460]

883. GGT was supportive of most of the ERA's working positions except for the use of the LAD estimator. GGT submitted that the LAD does not have the same correspondence that the OLS estimator has with the CAPM and that its use would be misleading.[461]

COVID-19 and M&A

884. Submissions generally did not support the removal of market data, but rather proposed methods to accommodate market shocks and recognised that regulatory discretion would be required.

885. AGIG submitted that the ERA should consider using robust estimation methods and its judgement when shocks occur, but it should not remove these observations.[462] AGIG suggested that it may be useful to consider equity beta estimates from other jurisdictions who may have avoided the shock.[463]

886. ATCO was cautious about any method that involved the removal of observations, so as to avoid arbitrary or inconsistent adjustment. ATCO referred to ENA analysis that concluded that unusual or extreme events should not be systematically identified and removed, but rather sensitivity should be taken into account when exercising judgement within the criteria of sustainability and longevity. ATCO noted that this point was further supported by Economic Insights that the statistical estimates of beta are just the starting point and should not be mechanically adopted.[464]

887. ATCO was supportive of using the LAD estimator as the primary estimator as it is less affected by outliers or extreme observations such as COVID-19 or M&A. ATCO referred to research commissioned by the ENA that showed how LAD was less subject to the influence from outliers.[465]

888. The CRG submitted that all observations should be included and the ERA should consider a longer estimation window.[466]

889. GGT recognised that shocks can affect the estimation of equity beta, but was unsure about the most appropriate way to handle them *ex-ante*. GGT suggested that longer estimation windows could address COVID-19, but not as a change to the general approach.[467]

890. South32 suggested that the market quickly bounced back after COVID-19, and therefore the true impact may not yet be evident in prices.[468]

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[460] CRG, *Submission to Discussion Paper*, February 2022, p. 71.

[461] GGT, *Submission to Discussion Paper*, February 2022, p. 50.

[462] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 29.

[463] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 29.

[464] ATCO, *Submission to Discussion Paper*, February 2022, pp. 36-37

[465] ATCO, *Submission to Discussion Paper*, February 2022, p. 37.

[466] CRG, *Submission to Discussion Paper*, February 2022, p. 66.

[467] CRG, *Submission to Discussion Paper*, February 2022, p. 48.

[468] South32, *Submission to Discussion Paper*, February 2022, p. 4.

Domestic energy network sample

891. In response to the discussion paper stakeholders expressed mixed views about solely relying on the use of a small domestic energy sample.

892. The CRG supported restricting the sample at this stage to the four domestic energy networks as this sample is the most relevant. The CRG considered that this may need to be done for the next instrument review.[469] The CRG requested clarification on what period would be used to estimate the DUET Group, given its delisting in 2017.[470]

893. AGIG submitted it was timely to now consider the issue of the small domestic sample size and agreed with an expansion to international firms. AGIG considered that, used alone, the domestic sample was too small, but supported its use alongside international comparators.[471] AGIG generally supported the ERA's working view equity beta estimate of 0.7, but submitted that more details were needed on how the ERA arrived at this estimate.[472]

894. ATCO generally supported the ERA's working view, where consideration should be provided to domestic comparators but that the small domestic sample size justified the examination of other countries. ATCO submitted that the New Zealand Commerce Commission (NZCC) has always faced the problem of limited domestic comparators and has put in place methods to consider foreign energy comparators.[473]

895. ATCO also submitted that the changing nature of gas networks meant that a forward looking equity beta could not be reliably estimated from past returns.[474]

896. ENA noted that, with the acquisition transactions for the two listed domestic energy network comparators, the ERA's domestic sample will be small and will not be viable in the future. ENA supported the development of a revised beta sample set.[475]

897. GGT supported the use of a domestic only sample for the 2022 gas instrument. GGT doubted whether methods to expand the sample could be developed and openly discussed through consultation, before the draft instrument.[476]

898. South32 did not support the use of the domestic energy network sample to estimate equity beta. South32 expressed concern that the available firms were too small and that they are increasingly moving away from what would be considered comparable benchmark firms.[477]

[469] CRG, *Submission to Discussion Paper*, February 2022, p. 17.

[470] CRG, *Submission to Discussion Paper*, February 2022, p. 65.

[471] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 26-27.

[472] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 26.

[473] ATCO, *Submission to Discussion Paper*, February 2022, pp. 28-29.

[474] ATCO, *Submission to Discussion Paper*, February 2022, p. 29.

[475] ENA, *Submission to Discussion Paper*, February 2022, p. 3.

[476] GGT, *Submission to Discussion Paper*, February 2022, p. 42.

[477] South32, *Submission to Discussion Paper*, February 2022, p. 4.

Domestic infrastructure sample

899. AGIG, GGT and South32's submissions supported the ERA's working view that it was not appropriate to increase the energy network sample to include domestic infrastructure firms:[478, 479, 480]

- GGT noted that Australian infrastructure firms may not have similar risks to energy network service providers and noted that this universe is also shrinking.[481]

900. ATCO considered that adding domestic infrastructure firms was the second-best option compared with using international energy networks. ATCO encouraged the ERA to provide more details on the domestic infrastructure it considered and why it was not suitable.[482]

901. The CRG considered that the expansion of the sample to include other domestic infrastructure firms may be appropriate if those firms are sufficiently similar. The CRG considered that it was not necessary to expand the sample at this time.[483]

International energy network sample

902. In response to the discussion paper stakeholders expressed mixed views about an international energy network sample.

903. AGIG generally agreed with the ERA's working view on potentially using a sample of international energy networks. AGIG supported the use of selected jurisdictions, noting that they have similar legal and market characteristics. It also suggested that the sample be limited to English-speaking countries to facilitate the availability of usable information.[484] AGIG supported the use of estimating a domestic CAPM for the international sample, but requested further information. AGIG submitted that the ERA should consider gas only comparators, noting that there might be a sufficient number of international comparators.[485] Further, AGIG argued that if electricity and gas network equity beta were the same, then it would not be necessary to sample both electricity and gas networks and it would be sufficient to just sample gas networks.

904. AGIG also doubted whether it was possible to automate the calculation of equity beta for the purposes of the instrument once international data is included and that the use of regulatory judgement might be necessary.[486]

[478] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 27.
[479] South32, *Submission to Discussion Paper*, February 2022, p. 4.
[480] GGT, *Submission to Discussion Paper*, February 2022, p. 42.
[481] GGT, *Submission to Discussion Paper*, February 2022, p. 42.
[482] ATCO, *Submission to Discussion Paper*, February 2022, p. 30.
[483] CRG, *Submission to Discussion Paper*, February 2022, p. 66.
[484] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 27.
[485] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 28.
[486] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, p. 30.

905. ATCO supported the ERA's working position on international energy network comparators.[487] ATCO submitted that any differences or comparisons of the average estimated equity beta between countries should be analysed with reference to the standard error of the estimates.[488] ATCO referred to evidence from the Brattle Group that was used in a Canadian regulatory matter that suggested that estimated US and Canadian betas appear to be have been increasing (however, the standard errors of the estimates were not examined).[489]

906. ATCO considered that the US, Canada, UK and New Zealand have sufficiently informationally efficient capital markets with stable regulatory regimes.[490] ATCO suggested that the ERA select jurisdictions with financial markets that are sufficiently diversified such that market movements are not dominated by any one sector.

907. ATCO submitted that some of the QCA and IPART selection criteria could also be used for the ERA.[491]

908. The ENA supported the development of a revised equity beta sample, requesting more clarity and discussion of the ERA's method.[492]

909. South32 supported examining international comparators, but cautioned that there could be differences due to market structure, operations and diversification differences. South32 expressed a tentative view that as South America, Asia and Africa progress their development and regulatory maturity they could be considered in the future.

910. South32 supported the ERA's working view on equity beta, but that it should provide greater weight to domestic betas.[493]

911. The CRG disagreed with using an international energy network sample as it was not appropriate given the material differences in capital markets, indices, characteristics and regulatory arrangements. The CRG considered that estimates from large, liquid capital markets are not sufficient, and that the ASX would be sufficient in meeting this criterion. The CRG submitted that if the ERA were to consider international firms, it would need to focus on comparators with significant regulated revenues, or which have similar revenue and profit protection as Australian energy network businesses. This would likely exclude non-regulated activities and firms with vertical integration.[494]

[487] ATCO, *Submission to Discussion Paper*, February 2022, p. 30.

[488] ATCO, *Submission to Discussion Paper*, February 2022, pp. 31-32.

[489] ATCO, *Submission to Discussion Paper*, February 2022, p. 32.

[490] ATCO, *Submission to Discussion Paper*, February 2022, p. 33.

[491] ATCO, *Submission to Discussion Paper*, February 2022, p. 34.

[492] ENA, *Submission to Discussion Paper*, February 2022, p. 3.

[493] South32, *Submission to Discussion Paper*, February 2022, p. 4.

[494] CRG, *Submission to Discussion Paper*, February 2022, p. 67.

912. GGT disagreed with the use of international comparators, stating that there was no support at this stage to consider an international sample given insufficient time.[495] Further, it stated that even if there was sufficient time it would still be inappropriate.[496] However, if an international sample was to be considered GGT suggested that the selected jurisdictions have a broadly similar legal system, with a comparison of regulatory regimes being necessary to understand the effect of risk.[497] GGT noted that North America comparators were usually not pureplays and doubted that market indices could be used without adjustments to reflect ASX weights.[498] GGT also submitted that gearing needed to be examined for differences in monetary policy, financing strategies and tax regimes.[499]

Other equity beta matters

913. AGIG submitted that low beta bias be considered as part of the application of regulatory judgement. AGIG provided the example where if empirically estimated betas appeared to drop with no clear reason, then low beta bias could be examined as a potential explanation.[500]

914. GGT considered that the ERA needed to focus on the degree of risk faced by each individual network which would inform its choice of comparators:[501]

- GGT submitted that under this approach it would result in gas networks receiving high betas, with GGT receiving a higher beta given its higher risk exposure due to its size, significant natural resources exposure and lack of diversification.[502]
- GGT noted the competitive environment for gas pipelines servicing regional mining loads, stating that as a consequence it was one of the higher risk assets in the APA Group's portfolio. GGT suggested that the ERA consider the equity beta determined for the Pilbara Networks Access Code process, suggesting that it should receive the same result as the Alinta network.[503]

10.4.3.2 Focused consultation

915. Following the ERA's review of submissions on the discussion paper and the concurrent expert sessions, the ERA considered that there was further value that could be gained through focused consultation before the publication of the draft gas instrument.

916. The ERA identified equity beta as a topic for which it considered additional consultation will assist the ERA to make decisions that contribute to the achievement of the national gas objective. Further focused consultation was generally supported by submissions received on the discussion paper.

[495] GGT, *Submission to Discussion Paper*, February 2022, p. 42.
[496] GGT, *Submission to Discussion Paper*, February 2022, p. 42.
[497] GGT, *Submission to Discussion Paper*, February 2022, pp. 42-43.
[498] GGT, *Submission to Discussion Paper*, February 2022, p. 43.
[499] GGT, *Submission to Discussion Paper*, February 2022, p. 43.
[500] Australian Gas Infrastructure Group, *Submission to Discussion Paper*, February 2022, pp. 29-30.
[501] GGT, *Submission to Discussion Paper*, February 2022, p. 36.
[502] GGT, *Submission to Discussion Paper*, February 2022, pp. 36-41.
[503] GGT, *Submission to Discussion Paper*, February 2022, p. 41.

917. The ERA published a discussion paper for this focused consultation outlining specific questions on equity beta.[504] An online session was also conducted with interested stakeholders. The ERA received written stakeholder submissions for the focused consultation in May 2022. The CRG also provided a supplementary submission in response to stakeholder submissions.

918. The ERA received four submissions regarding equity beta as part of its focused consultation.

919. Stakeholder submissions discussed multiple equity beta matters including:

- COVID and M&A
- the domestic energy network sample
- the domestic infrastructure sample
- the international energy network sample
- international equity estimation
- other equity beta matters.

920. Each equity beta matter is discussed below.

COVID-19 and M&A

921. AGIG submitted that any filter for M&A activity for international firms should also be employed for domestic firms as well. AGIG submitted that nearly all the domestic sample firms have been affected by M&A activity which could distort the estimation of equity beta.[505] ATCO made a similar point to AGIG on the exclusion of firms subject to M&A.[506]

Domestic energy network sample

922. In response to the focussed consultation, stakeholders continued to express mixed views on the domestic energy network sample.

923. The CRG's submission re-iterated its position for the sole use of the domestic energy network sample. The CRG considered that international comparators were not appropriate as they would introduce bias and are unnecessary given the long-term stability of Australian equity betas. The CRG considered that the ERA needed to provide evidence that the jurisdictions chosen were comparable to Australia in terms of economic and risk characteristics.[507]

[504] ERA, *Focused consultation for the 2022 gas rate of return instrument review* – Discussion paper, April 2022.

[505] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 2.

[506] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 4.

[507] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.

924. The CRG did not agree with the CEG evidence commissioned by APGA regarding differences in equity beta between countries. They noted that there was some evidence that the null hypothesis of no differences being rejected at the 10 per cent level for OLS estimators. Nonetheless, the CRG submitted that the inability to reject the null hypothesis does not mean that one concludes that there are no differences, merely that there was insufficient evidence to confirm a statistical difference. The CRG further submitted that the observed differences between equity betas could be reconciled with their conceptual approach.[508]

925. ATCO submitted that AusNet Services and Spark Infrastructure should be removed if the ERA were to remove foreign firms due to M&A.[509]

926. GGT stated that reliance on the domestic sample was problematic as the beta estimates for the three live firms during 2021 were not stable over time.[510] GGT noted that the estimated betas were increasing prior to COVID-19, then dropped after December 2019. GGT calculated that using data to December 2021 suggests that the betas are levelling. GGT expressed a belief that the betas for the three live comparators have not been stable since December 2013.[511]

International energy network sample

927. In response to the focused consultation stakeholders expressed mixed views about an international energy network sample.

928. AGIG's submission to the focused consultation largely agreed with the initial list of international comparators, but suggested that additional filtering mechanisms used by the Alberta Utilities Commission and the Queensland Competition Authority be examined, along with the regulated income filter employed by CEG.[512] AGIG disagreed that regulatory risk is a systematic risk, but that it would be an important dimension to compare "like with like".[513]

929. AGIG also reiterated its point from the discussion paper that the ERA's task is to estimate a gas beta. AGIG noted that in the past the available pool of domestic firms necessitated the assumption of similar systematic risk between electricity and gas networks. However, AGIG asserted that this was never formally tested, but with access to international data it was possible to have a sample of gas only firms that is likely large enough for statistical robustness.[514]

930. AGIG submitted that the only adjustment for international betas was for leverage, agreeing with the ERA's working view that choosing the right set of filters is a better approach than making post-estimation adjustments to beta as being more transparent method.[515]

[508] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 5-7.

[509] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 4.

[510] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 7-8.

[511] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 8.

[512] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 1.

[513] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 2.

[514] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 2.

[515] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 3.

931. ATCO's submission to the focused consultation provided additional support for examining international comparators. ATCO generally considered that the initial list was appropriate and suggested some additions and deletions. ATCO also suggested additional filters to select comparators could be used, such as level of regulated activities, liquidity, removing firms affected by M&A, full stock price availability and additional criteria.[516]

932. GGT's submissions to the focused consultation represents a change in position from its submission to the discussion paper. Whilst acknowledging the points made by the CRG, it stated that the current need of regulatory practice is shaped by current circumstances. GGT noted that other regulators such as the NZCC and the QCA when faced with similar circumstances identified non pureplay comparators that were likely to reflect a degree of risk similar to the benchmark entity.[517]

933. GGT referred to the CEG report for APGA and presented by AGIG during the focused consultation. GGT noted that the confidence intervals of international beta estimates generally lie within the domestic beta confidence intervals.[518] Additionally, GGT referred to the beta decomposition analysis in the same report, supporting CEG's findings that the three sub-components of equity beta are similar for domestic and international estimates.[519]

934. GGT examined scenarios of potential approaches and concluded that a pragmatic approach of estimating beta from carefully selected international comparators that may not exactly match the Australian benchmark gas pipeline service provider can provide an appropriate beta estimate.[520]

935. AGIG, ATCO and GGT did not support the inclusion of any other jurisdictions:[521, 522, 523]

- AGIG submitted that the ERA should consider the trade-off between representativeness and statistical robustness. If a country less similar to Australia was selected, the ERA should use its judgement to determine whether the reduction in similarity was worth the increase in statistical robustness from additional observations.
- ATCO noted that as a pragmatic manner adding more markets that have a limited number of comparators is unhelpful.

936. The CRG's submissions to the focused consultation re-iterated its preference for a domestic only sample given the material differences in capital markets, economic features of international firms (vertical integration and other business lines) and differences in regulatory arrangements.[524] The CRG suggested that increasing the estimation window of the domestic sample would increase the number of observations without needing to examine international comparators.[525]

[516] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 3-4.
[517] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 7.
[518] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 9-10.
[519] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 10.
[520] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 12-14.
[521] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 2.
[522] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.
[523] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 15.
[524] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 9.
[525] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 7,13.

937. The CRG further submitted that there is a difference between equity beta estimates between domestic and foreign comparators.[526] The CRG disagreed with the CEG report for APGA, stating that even if it is the case that it is difficult to demonstrate a material difference in the statistical components of the beta, this does not amount to evidence of no differences between an Australian domestic beta and the international beta estimates.[527]

938. The CRG drew on theoretical and conceptual reasons as to why there should be differences, such as differing economic conditions, operational and structural characteristics, leverage differences and regulatory arrangements that affect systematic risk.[528] The CRG submitted that there was also no well-defined method for adjusting for such risk differences.[529]

939. The CRG considered that the use of filters to select comparable international firms would not address the fundamental issues with utilising an international sample.[530]

940. The CRG noted that other regulators such as Ofgem and Ofwat appear to be comfortable with small sample sizes.[531] The CRG also noted that the AER's preliminary position for its rate of return instrument is to not consider international estimates.[532]

941. If the international estimates were to be formally recognised, the CRG considered that the ERA would need to establish that the regulatory and economic environments in these other countries provided similar revenue and profit protection as for the Australian economic regulation of network energy businesses.[533]

942. The CRG also commented that whilst the CEG report for APGA used a regulated revenue filter, they did not control for the extent of vertical integration and other activities.[534]

943. In relation to the screening criteria, the CRG considered that it was not necessary to insist that stock price information should be available for the entire observation period, particularly where a long period of data is available. The CRG considered that the additional data can improve the statistical precision of the estimate assuming the sample is representative of the true beta.[535]

[526] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 9-10.
[527] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, p. 8.
[528] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 8.
[529] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 8.
[530] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, p. 4.
[531] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 7.
[532] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 13.
[533] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 10.
[534] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 6.
[535] CRG, *Submission to Focused Consultation Discussion Paper – Further submission*, May 2022, p. 7.

International equity beta estimation

944. The ERA's focused consultation put forward three potential approaches for discussion:

- *Full pooling* - Combining all estimates and equally weighting them.
- *Country pooling* - Separating estimates by country, estimating country means that 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).

945. In response to the focused consultation stakeholders expressed mixed views about how international estimates should be incorporated into the equity beta estimation method.

946. All submissions did not support the reweighting or adjustment of market indices for the equity beta estimation of international comparators:[536, 537, 538, 539]

- AGIG agreed with the notion that investors in different markets are trading stocks considering risk against the actual market in that country, not some imaginary market derived by re-weighting. AGIG considered that the beta resulting from a re-weighted index would have an unclear meaning. AGIG stated that calls to reweight indices ignore the time series variation in the composition of the ASX. AGIG did not support approaches that adjust market structures in time and space.
- ATCO stated that this method has been considered by other regulators and has consistently been rejected.
- The CRG considered that there was no clear interpretation of the resulting estimate. The CRG also considered that changing the composition of the market index is not a widely used technique with unknown reliability.

947. AGIG considered the combination options for the international sample detailed in the focused consultation:[540]

- AGIG did not support the domestic anchoring approach.
- AGIG stated that a full pooling approach would result in an equity beta that would be a US energy network that did not give sufficient weight to the full spread of data.
- AGIG considered that whilst a country pooling approach would solve the US problem in full pooling, there were a limited number of firms in the UK and NZ country pools.
- AGIG also noted submissions from the ENA and the CEG report for APGA that suggested using ranges and overlaps of confidence intervals to select a beta.
- AGIG concluded that, regardless of approach, the ERA will need to exercise its regulatory discretion and judgement as none of the options were perfect. AGIG submitted that in exercising its discretion the ERA should be transparent.

[536] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 2-3.

[537] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 6.

[538] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 8.

[539] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 15.

[540] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 4.

948. ATCO submitted that the ERA should mechanically estimate betas and then use regulatory judgement for the final point estimates.[541] Considering the options in the focused consultation, ATCO:[542]

- Did not support the domestic anchoring approach.
- Stated that the full pooling approach should be used if the underlying assumption is that all betas are comparable, referring to the CEG report for APGA as evidence of no differences between domestic and international comparators.
- Noted that the country pooling approach would potentially overweight jurisdictions that did not have a large number of sampled firms, along with only being able to control for anomalies in Canada and the US. ATCO queried if the single/small sample observations from the NZ, UK and Australia were as good as the mean observation from the US and Canada.
- Submitted that regulatory judgement should be exercised by considering the overlapping ranges of estimates for each country, along with estimates calculated by regulators in the sampled jurisdictions.

949. GGT only supported the full pooling approach as the equally weighted average of domestic and international comparators. GGT stated that if the comparators were sufficiently similar due to the selection process then they can be considered to be drawn from the same statistical population as the benchmark.[543]

950. On methodological matters, the CRG suggested that a 10-year estimation window could be used to increase the number of observations, with a preference for monthly data.[544]

Other equity beta matters

951. AGIG's submission to the focused consultation submitted that low beta bias be considered as a factor that affects investor expectations in the exercise of regulatory judgement.[545]

952. The CRG re-iterated its earlier position that regulation lowers risk in the sense that gas networks will receive cashflows sufficient to recover all efficient costs over the regulatory period. The CRG submits that this would result in lower systematic risk. The CRG referred to a chart from the AER that purported to show that beta decreases as regulated revenues increase.[546]

953. GGT's submission to the focused consultation re-iterated its concern that no consideration has been given to its specific risk profile and that it should have a similar risk characteristic to other regulated assets in the Pilbara.[547]

[541] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 6.
[542] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 7-9.
[543] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 16.
[544] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 9.
[545] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 3.
[546] CRG, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 11.
[547] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 5.

10.4.4 2022 draft approach

954. The ERA's draft approach for the 2022 gas instrument will use an equity beta of 0.7.

955. The equity beta will remain fixed for the term of the gas instrument.

10.4.5 Reasoning

10.4.5.1 Developments since the 2018 gas instrument

Market volatility

956. 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.

957. Financial markets have been volatile and affected by shocks such as the conflict in the 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.

958. 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.

959. 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

960. Listed regulated and long-term infrastructure businesses in Australia have been actively sought after and acquired.

961. In 2021 there were takeover bids for both Spark Infrastructure and Ausnet.[548,549] 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).

[548] AusNet Services, *Foreign Investment Review Board approval received in relation to proposed Scheme*, online.

[549] Spark Infrastructure, *Scheme Booklet in relation to the proposed acquisition of Spark Infrastructure*, online.

962. 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.

963. 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 APA Group, the one energy network business not yet acquired, may have been affected by its unsuccessful takeover offer for AusNet Services in 2021.

Regulatory developments

964. The New South Wales Independent Pricing and Regulatory Tribunal (IPART) reviewed its equity beta approach in 2020. The approach can be summarised as:,[550]

- 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.

965. 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.[551]

966. 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.[552]
- 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:[553]
  - Estimation period and implications of recent market developments.

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550 IPART, *Estimating Equity Beta for the Weighted Average Cost of Capital, final report*, August 2020.

551 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final Working Paper,* December 2021.

552 Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020.

553 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses,* June 2021.

  - The firm comparator set.

967. The AER's preliminary position on equity beta can be summarised as:[554]
    - Maintaining the 2018 instrument approach to determining beta in the 2022 instrument.
    - Placing the most weight on the longest period estimates.
    - Retaining the existing comparator set and not using international energy firms, domestic infrastructure firms or other regulator's decisions to inform the estimate range for beta.
    - Not adjusting equity beta or the rate of return for a low beta bias.

968. The AER maintains an open position on the following matter: [555]
    - The live comparator set may decline further, so there is a need to consider suitable approaches to lay the foundation for future reviews:
      - Approaches that gradually place less weight on delisted firms.
      - Approaches in which other information such as domestic infrastructure and international energy firms can be used to inform the decision on beta.

969. The AER's information paper was still actively considering equity beta methods and sought further stakeholder views.[556]

Concurrent evidence

970. In February 2022 the AER held its concurrent evidence sessions, which included the consideration of beta.[557] Experts did show divergence of views on the equity beta.

971. Mr Kumareswaran summarised the challenge of best estimating equity beta along two dimensions, detailed in Figure 8.

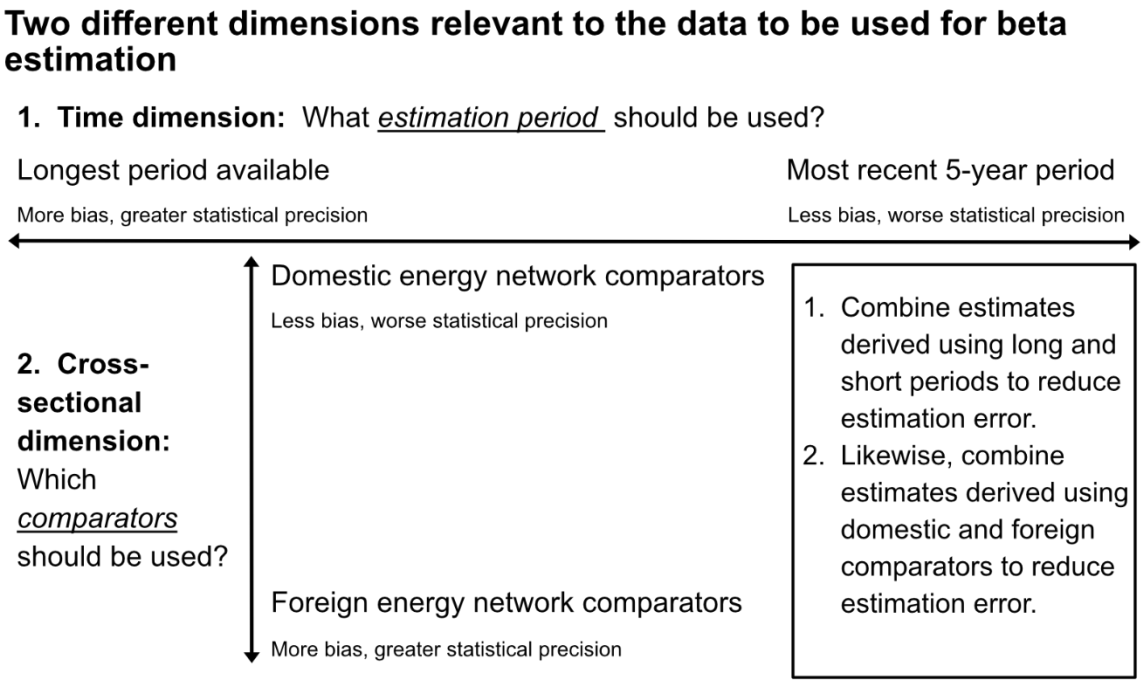
554 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final Working Paper,* December 2021, p. 102.

555 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final Working Paper,* December 2021, p. 102.

556 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final Working Paper*, December 2021.

557 AER, *Rate of Return Instrument Concurrent Evidence Session 1 of 4*, February 2022.

Figure 8: The two dimensional challenges of estimating equity beta



Source: Dinesh Kumareswaran

972. 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.

973. 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.

10.4.5.2 Statistical estimation method

974. The ERA's approach for the 2022 gas instrument is to maintain a similar statistical equity beta estimation method to the 2018 gas instrument.

975. The ERA's considerations on the statistical equity beta estimation method are detailed below.

Sample period

976. 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.

977. 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.

978. For the 2018 gas instrument, the ERA considered that a five-year period with weekly data balanced these trade-offs while being consistent with the regulatory reset period.

979. 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.

980. The ERA notes that the current five-year window includes market shocks such as COVID-19 and the conflict in the 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.

981. 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.

982. The ERA's approach for the 2022 draft gas instrument is to retain the use of a five-year estimation window with weekly data, and to also estimate 10-year betas.[558]

983. 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.

[558] Weekly returns strike the appropriate balance as daily estimates are too noisy, and monthly reduces the number of observations given the five-year window. 10-year estimates will also use weekly returns for consistency.

- 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

984. The ERA will largely adopt the estimation method and techniques as described in the 2018 gas explanatory statement.[559]

985. The ERA will simplify its approach as described in the discussion paper in the interests of making it easier for all stakeholders to understand and replicate its approach.

986. For the 2022 draft 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.
- 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.

987. 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).

988. 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 a robust equity beta estimation.

989. The ERA continues to use the OLS estimator as it is commonly used to estimate equity beta.

990. While noting concerns expressed by some stakeholders on the use of the LAD, the ERA continues to consider that the LAD estimator contributes 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.

[559] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement,* December 2018, pp. 216-224.

- 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.
- 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.

991. For the 2022 draft gas instrument the ERA's approach uses OLS and the LAD estimators for estimating equity beta.

Low beta bias

992. The ERA has given further 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.

993. The ERA considered low beta bias for the 2018 gas instrument and concluded that:[560]
- 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.

994. Partington and Satchell found that no regard should be given to the low beta bias when estimating the forward-looking required return on equity.[561]

995. The AER's proposed approach for the 2022 Instrument is to give no recognition to low beta bias.[562, 563]

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 has received no new evidence to support the consideration of low beta bias.

998. For the 2022 draft gas instrument the ERA gives no consideration and makes no adjustment for low beta bias.

560 ERA, *2018 Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 232-236.

561 Partington G. and Satchell, S., *Report to the AER: Discussion of submissions on the Draft 2018 Guideline*, November 2018, p. 15.

562 AER, *Equity Omnibus, Draft working paper*, July 2021, p. 15.

563 AER, *Overall Rate of Return, Equity and Debt Omnibus: Final Working Paper,* December 2021, p. 102.

10.4.5.3 Selection of the benchmark sample

999. The ERA's 2018 gas instrument benchmark sample included the DUET Group, Spark Infrastructure, AusNet Services and the APA Group.

1000. 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.

1001. 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.

1002. 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.

1003. Given this small sample size the ERA undertook consultation and sought expert views on how to develop a benchmark sample best estimate equity beta.

1004. The ERA has 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.

1005. The ERA's considerations of these options are discussed in more detail below.

1006. For the purposes of the 2022 draft gas instrument the ERA will estimate 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 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:

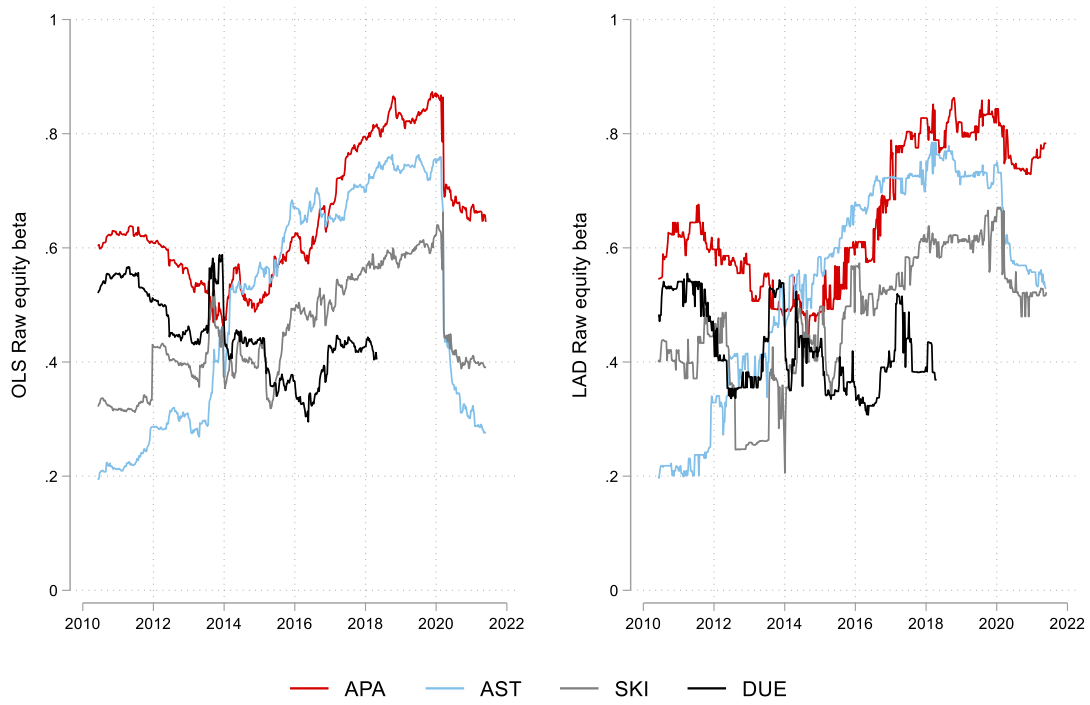
- The benchmark sample is kept within Australian capital markets and includes the closest, comparable pure-play energy networks.
- The approach is consistent with prior practice, regulatory approach and precedent.

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. Five year rolling equity beta for each of the Australian energy networks is provided in Figure 9.

Figure 9: Rolling raw OLS beta estimates for the Australian energy network sample



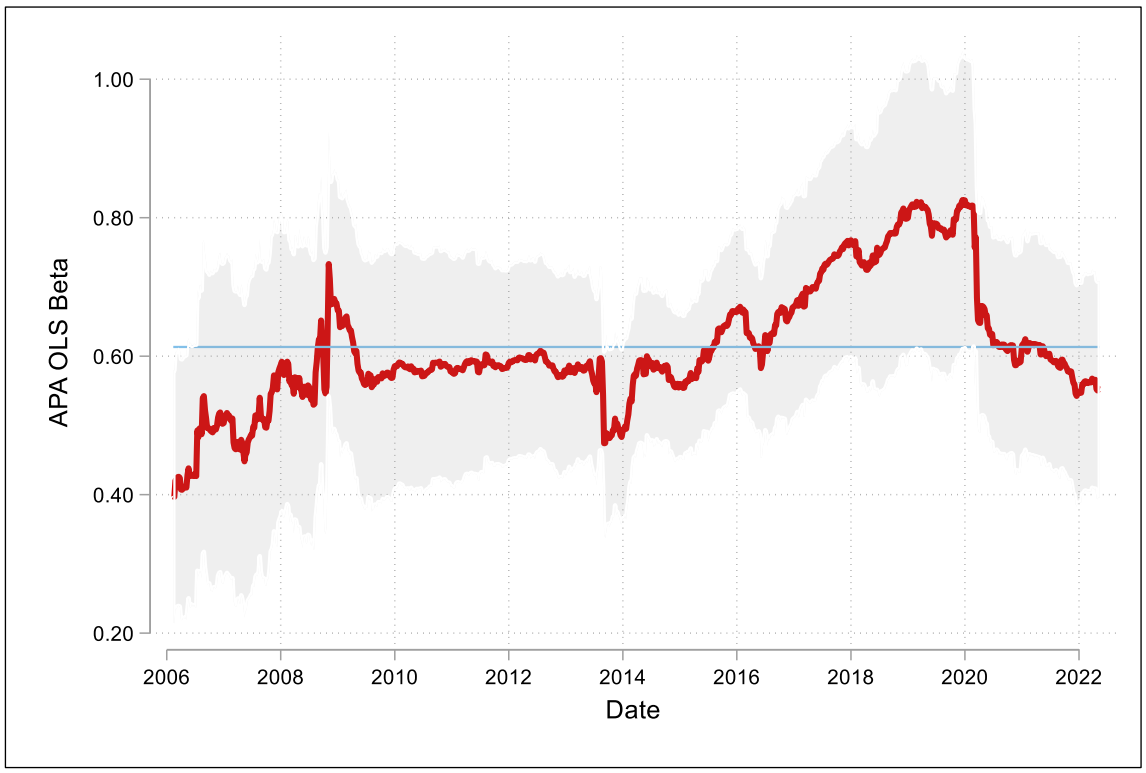
Source: ERA analysis, Bloomberg.

1015. The ERA has analysed equity beta stability for the domestic sample by examining rolling beta estimates. Realised equity betas have generally not been stable for the last decade, but the impact of the COVID-19 pandemic is obvious and has resulted in observed betas dropping significantly.

1016. Given the delistings of Spark Infrastructure and AusNet Services, it is impossible to determine what the post-COVID equity betas would behave like and whether shocks were transitory or not. It is only possible to examine APA as it is the only live firm, but reliance on a single firm is statistically problematic.

1017. Nonetheless, the ERA analysed the historical behaviour of APA's equity beta to understand the implications of relying on it as the sole live firm in the domestic sample. This is illustrated in Figure 10.

Figure 10: APA Group rolling raw OLS equity beta



Source: ERA analysis, Bloomberg.

Note: Five-year rolling raw OLS equity betas estimated using the draft instrument methodology. The red line represents the equity beta estimate, the blue line represents the average. 95% confidence intervals of each estimate are represented by the shaded region.

1018. APA's beta appears to be exhibit substantial volatility. This volatility may be the result of systematic risk changes, behavioural effects or estimation errors. The ERA is not confident that there is a reliable quantitative method that can identify the cause of volatility. The ERA considers that this volatility raises concerns on placing a high reliance on the APA Group.

1019. Accordingly, the ERA will include in its domestic benchmark sample recently delisted firms alongside the APA Group.

1020. On balance, for the purposes of equity beta estimation for the 2022 draft 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

1021. Under the expanded domestic sample option, the ERA considered the use of other listed domestic infrastructure companies alongside energy networks.

1022. 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.

1023. The ERA is unaware of any Australian regulator that uses this approach.

1024. Submissions to the ERA's discussion paper and focused consultation did not support this approach.

1025. The ERA considers 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.

1026. The ERA considers 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.

1027. 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

1028. 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.

1029. 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."[564]
- 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."[565, 566]

1030. 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 discussion paper and focused consultation process.

564 IPART, *Review of our WACC method*, February 2018, p. 7.

565 QCA, *Final Report: Rate of Return Review*, November 2021, p. 71.

566 QCA, *Final Report: Rate of Return Review*, November 2021, p. 72.

1031. 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.

1032. With regard to market factors, the ERA looks to countries with capital markets that are sufficiently deep, liquid, large and informationally efficient.

1033. 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. The ERA notes that submissions supported the use of these comparator jurisdictions.

1034. AGIG also proposed that jurisdictions be chosen where English was the language used for company disclosures to assist analysis and verification. The ERA agrees that this would improve transparency and replication by stakeholders.

1035. The ERA has examined listed firms operating energy networks in the United States, Canada, United Kingdom and New Zealand.

1036. The ERA provided an initial list of international comparators to stakeholders in the discussion paper and this formed part of the matters considered during the focused consultation session.

1037. As a result of this stakeholder feedback, 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.

1038. Submissions to the focused consultation also provided additional information about the suitability of the initially identified international comparators:

- AGIG referred to advice prepared by CEG that resulted in a sample of 24 highly regulated international energy networks.[567]
- ATCO submitted that some firms be excluded due to low levels of regulated revenue, not providing utility services, sub-investment grade credit ratings, size and M&A activity. ATCO also submitted that some firms be included due to domicile classification and meeting the initial filtering criteria.[568]
- GGT submitted that some firms be excluded due to significant other business lines, parental ownership and propane activities.[569]

1039. The ERA has evaluated the submissions regarding the international comparators to refine the initial list provided in the discussion paper and focused consultation.

1040. The ERA has accepted some of the suggestions by stakeholders, the reasoning is provided in Appendix 4.

[567] Australian Gas Infrastructure Group, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 1.

[568] ATCO, *Submission to Focused Consultation Discussion Paper*, May 2022, pp. 18-19.

[569] GGT, *Submission to Focused Consultation Discussion Paper*, May 2022, p. 14.

1041. The ERA has 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 draft gas instrument.

1042. The ERA considers that the international sample option has the following advantages:

- An extended sample size results in equity beta estimates that are more 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.

1043. The ERA has previously had reservations about the use of international comparators.[570] 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 create 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.

1044. 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 closest extent possible given market realities.

1045. 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. This method is similar to a selection on observables approach that attempts to create an environment where the conditional independence assumption may hold to adjust for any unobserved differences:

- 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.
- 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.[571]

[570] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, December 2018, pp. 44-45, 230.

[571] NZCC, *Input Methodologies (Electricity distribution and gas pipeline services) – Reasons paper*, December 2010, pp. 540-542.

1046. 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 the two equity beta reports commissioned by APGA do not have significant overlap between the proposed samples for gas networks and regulated energy networks. Whilst the two reports were for slightly different purposes, the lack of intersection implies that there is not a large number of international regulated gas businesses. The ERA considers that the regulated energy network characteristic is relatively more important than the gas characteristic.

1047. 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.

1048. 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.[572]
- 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.

10.4.5.4 Equity beta estimation

1049. The ERA's considerations on the statistical equity beta estimation method are detailed below.

Market volatility

1050. Since the 2018 gas instrument Australian markets have been affected by the COVID-19 pandemic, the conflict in the Ukraine and merger announcements.

1051. 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.

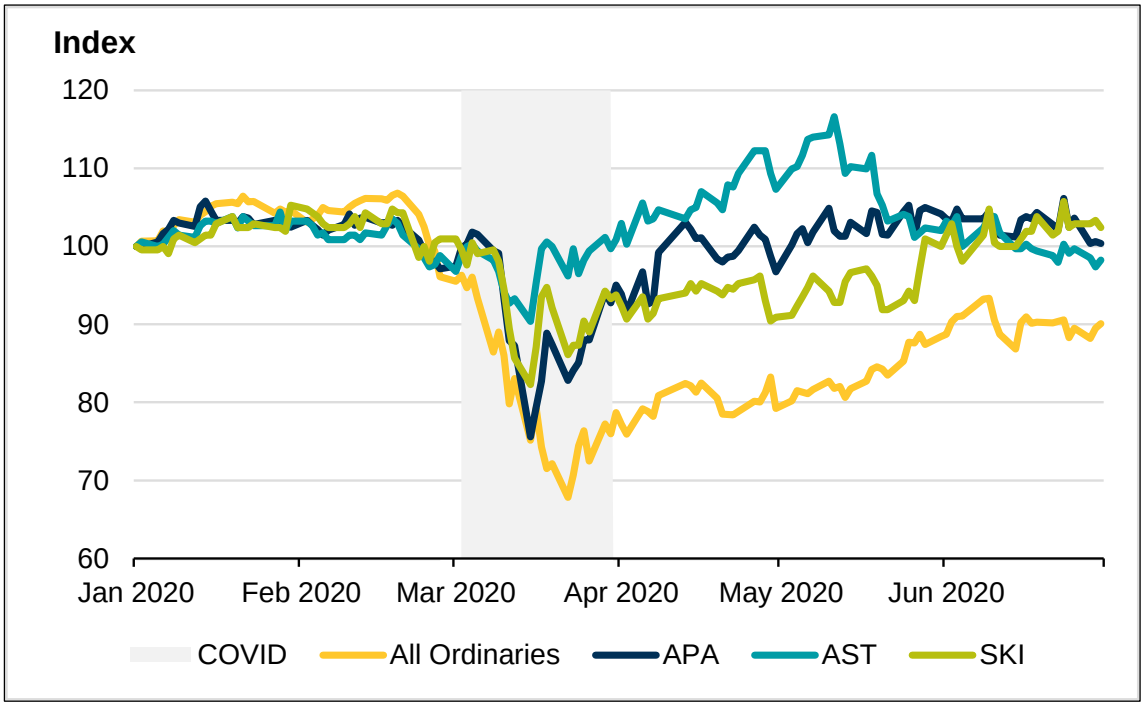
1052. The ERA notes that these market events affect the empirical estimates of equity beta in Australia.

1053. COVID-19 was a common shock present for the three listed energy networks, whilst the Ukraine conflict is only present for the APA Group. The ERA analysed the pandemic shock given the greater availability of data to examine if there were differential impacts on the covariance of returns.

1054. The ERA observed that during the period of the COVID-19 pandemic there has been increased market volatility. Volatility is persistent in historical returns data. The volatility of the Australian market index and domestic energy networks is shown in Figure 11.

[572] Partington, G. and Satchel, S., *Report to the AER: Alternative Asset Pricing Models*, June 2020, pp. 28-34.

Figure 11: Market volatility of Australian market index and domestic energy networks



Source: Bloomberg data, ERA analysis
Note: Share prices have been converted into a price index rebased to 100 as at January 2020.

1055. The ERA's positions on the volatility associated with the COVID-19 pandemic can be summarised as:

- An estimation window is intended to capture returns throughout the economic cycle which also includes downturns. Economic shocks are a natural part of the economic cycle and to remove these observations would be to affect the distribution of returns.
- Shocks can provide local evidence about the true systematic risk of a firm, where the revealed preference of investors is that during a market-wide shock the domestic energy network sample were not as affected as the market portfolio.
- 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 COVID-19 could be considered to be such an outlier.
- Submissions to the discussion paper and focused consultation 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.

1056. For the purposes of the 2022 draft gas instrument the ERA's approach is that the COVID-19 shock does not require an adjustment of the returns in the estimation sample, but will be analysed through the examination of 5 and 10-year beta estimates, along with regulatory discretion.

Mergers and acquisitions

1057. All firms in the Australian energy network sample have been the subject of takeover offers, or have been part of takeover bids.

1058. 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.

1059. Merger and acquisition announcements are firm-specific events that can be considered idiosyncratic, though the ERA notes that industry merger waves could be suggestive of a broader systematic issue.

1060. The ERA relies on market data for equity beta estimation. In the event that certain observations are outliers or would otherwise not be representative then it may be possible for statistical techniques to be employed to make adjustments:

- Winsorisation and trimming could be used to address outliers.[573]
- A greater reliance on robust regression techniques could also be used to moderate outlier effects on OLS estimates.[574]

1061. The ERA's position on the effect of takeover offers can be summarised as:

- The ERA acknowledges that the returns on announcement dates likely reflect idiosyncratic news rather than systematic risk. Removing the announcement day return from the sample as a data cleaning step could be justified on this basis.
- The ERA is unclear how returns pre-takeover and post-takeover announcement should be treated, where idiosyncratic takeover information may prevent systematic or fundamental information being incorporated into prices.
- However, the ERA notes that its current estimation approach of using robust estimators would moderate the impact of outliers, where takeover announcements could be considered to be such an outlier.

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573 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.

574 Robust regression techniques are ones that are not as reliant on the traditional assumptions underlying ordinary least squares regression. This is useful in the presence of observations that either are vertical outliers or bad leverage points. Rousseeuw, P. and Leroy, A., *Robust Regression and Outlier Detection*, 2003, Wiley.

1062. Submissions to the discussion paper and focused consultation did not support methods such as winsorisation or trimming to deal with acquisitions. Some stakeholders interpreted the ERA's working views as to remove an entire firm from the benchmark sample if there were material M&A transactions.

1063. The ERA considers that the removal of firms 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. The ERA's approach will be to do the following:

- For M&A transactions that result in the delisting of a firm, the observations from announcement to close will be excluded and not counted as a valid observation.
- For all other transactions, if the size of the transaction is material then the ERA will identify affected firms and exercise its regulatory discretion in considering the resulting estimates.

1064. The ERA's approach is that securities that may be affected by takeover offers will be examined and the ERA assessing whether to exclude the firm from the sample. The ERA will not winsorise or trim observations.

10.4.5.5 Determination of the final point estimate

1065. The 2022 draft 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 submissions are 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.
- The factors listed by GGT are idiosyncratic factors which are not systematic risk factors. Accordingly, they are not compensable under the CAPM and GGT will receive the same reward for systematic risk as all other gas network service providers.
- The regulatory frameworks for rail and the Pilbara network are not comparable to the regulatory regime for gas network service providers covered by the gas instrument. The considerations, objectives and purpose under those regulatory frameworks has resulted in an equity beta method that was specific for that regulatory regime. It is not appropriate for the results from one process to be substituted into another as the regulatory environments and risk profiles are entirely different.

1066. The ERA conducted focused consultation regarding methods to combine domestic and international estimates to form the point estimate for the gas instrument.

1067. 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 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).

1068. The CRG did not prefer a method given its position of not using international comparators. Among the other stakeholders there was no support for a domestic anchoring approach. The full pooling and country pooling options were considered to have advantages and disadvantages, with more support for the full pooling approach.

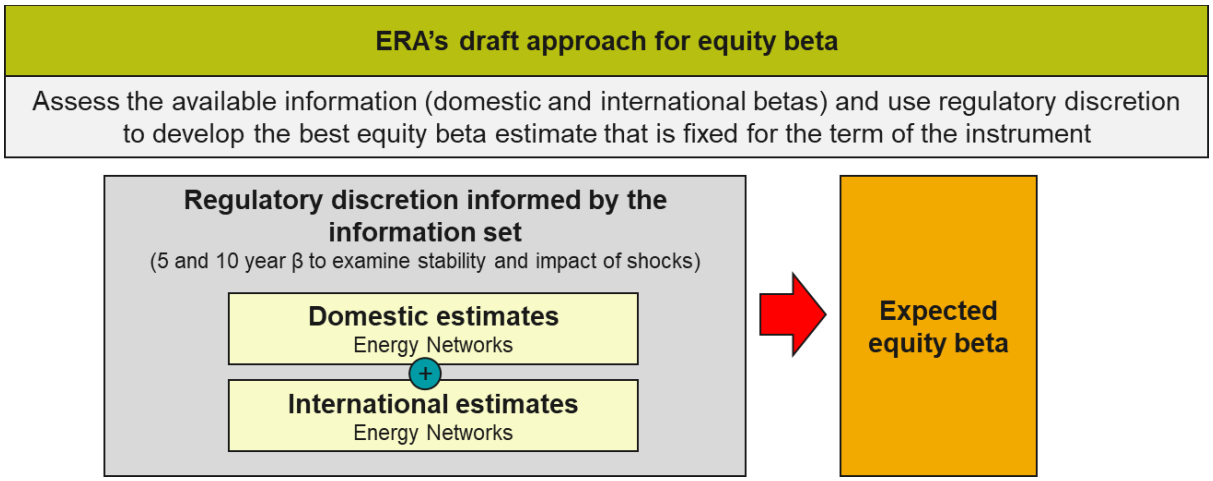
1069. Alternatives to having explicit weights were also submitted, In these cases the ERA could examine ranges of beta estimates, along with examining overlapping confidence intervals as suggested by CEG for APGA.

1070. AGIG and ATCO considered that the ERA would likely need to exercise regulatory discretion in considering the mechanically estimated equity betas. AGIG submitted that in exercising its discretion the ERA needed to carefully and transparently explain its approach such that it could be replicated.

1071. For the 2022 draft gas instrument when estimating the point estimate for the equity beta the ERA will consider domestic estimates and international estimates.

1072. The ERA's approach to determining an equity beta point estimate for the 2022 draft gas instrument is summarised in Figure 1212.

Figure 12: ERA's approach to determing an equity beta point estimate



1073. To determine a point estimate for equity beta for the 2022 draft 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.

1074. The equity beta will be fixed for the term of the instrument.

1075. 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.

1076. 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, it 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 draft gas instrument equity beta estimates

1077. 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.

1078. For the purposes of the 2022 draft gas instrument the ERA uses a five-year (January 2016 to December 2021) and 10-year (January 2011 to December 2021) sample period.

1079. As the ERA is considering international comparators, the ERA has examined equity beta on a country-by-country basis.

1080. 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.

1081. The Australian domestic energy sample estimates are detailed in Table 12 and Table 13.

Table 12: 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	0.76	0.25	0.44	0.40	**0.46**	0.52	0.49	**0.51**	**0.48**
LAD	0.88	0.47	0.43	0.49	**0.57**	0.68	0.70	**0.69**	**0.63**
Mean All Methods	**0.82**	**0.36**	**0.44**	**0.45**	**0.52**	**0.60**	**0.60**	**0.60**	**0.56**

Source: ERA analysis.

Table 13: 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	0.38	0.42	**0.49**	0.53	0.50	**0.52**	**0.50**
LAD	0.84	0.54	0.32	0.49	**0.55**	0.60	0.60	**0.60**	**0.58**
Mean All Methods	**0.80**	**0.47**	**0.35**	**0.46**	**0.52**	**0.57**	**0.55**	**0.56**	**0.54**

Source: ERA analysis.

1082. The Australian energy network sample produces a range of individual firm beta estimates from 0.3 to 0.9. The average beta estimate from the Australian energy network sample is 0.5.

1083. A summary of the domestic and international energy sample estimates is detailed in Table 14. Detailed beta estimates are provided in Appendix 5.

Table 14: 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	0.48	1.08	0.95	0.95	0.64	**0.82**
LAD	0.63	0.76	0.86	0.82	0.58	**0.73**
Mean All Methods	**0.56**	**0.92**	**0.90**	**0.88**	**0.61**	**0.78**
Panel B: 10 year estimates						
OLS	0.50	0.96	0.96	0.93	0.59	**0.79**
LAD	0.58	0.74	0.88	0.80	0.51	**0.70**
Mean All Methods	**0.54**	**0.85**	**0.92**	**0.86**	**0.55**	**0.75**

Source: ERA analysis.

1084. The ERA considers that the domestic energy sample provides a range of equity beta estimates from 0.5 to 0.6. When international comparators are examined, this provides a range of estimates from 0.5 to 1.1. The average beta estimate across all countries is 0.77.

1085. To select a point estimate for equity beta, the ERA considers all available information and uses its discretion to select a point estimate. Given the imprecision in the estimation process the ERA will continue its practice of rounding to the nearest first decimal place.

1086. The ERA considers 0.7 as the best estimate for equity beta for the benchmark network. This number has been selected as being below the international estimates to recognise that Australian equity beta estimates are generally lower than international estimates.

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

11. Debt and equity raising costs

1088. Debt and equity raising costs and debt hedging costs are the administrative costs and other charges incurred by businesses when obtaining and hedging finance.

1089. 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.

1090. 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.

1091. This chapter outlines the ERA's reasoning for its current position on debt and equity raising costs as outlined in the 2022 draft gas instrument.

11.1 2018 position

1092. The 2018 gas instrument set out that the rate of return included:[575]

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

1093. 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.[576] 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.

1094. 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.[577]

1095. 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.[578]

[575] ERA, *Final Rate of Return Guidelines (2018)*, December 2018, pp. 35-36.

[576] The Allen Consulting Group, *Debt and Equity Raising Transaction Costs: Final Report*, December 2004.

[577] The Allen Consulting Group, *Debt and Equity Raising Transaction Costs: Final Report*, December 2004.

[578] The Allen Consulting Group, *Debt and Equity Raising Transaction Costs: Final Report*, December 2004.

11.2 Working views in the discussion paper

1096. The ERA's working view in the discussion paper was to maintain an allowance to account for:

- 0.100 per cent for debt raising costs
- 0.114 per cent for debt hedging costs.

1097. The ERA noted that it had engaged Chairmont Consulting to review debt issuing and hedging costs for a regulated benchmark energy network that is operating efficiently consistent with the ERA's debt approach. The ERA noted that it would undertake further consultation on the findings of Chairmont's review when it was complete.

11.3 Consultation

11.3.1 Discussion paper

1098. There was one substantive submission to the discussion paper that provided stakeholder comments on debt raising and hedging costs.

1099. ATCO supported the ERA to undertake further consultation on the Chairmont's findings. ATCO submitted that the ERA should include indirect costs as part of debt raising costs and widen its scope of analysis from debt raising costs to debt portfolio management costs.[579]

11.3.2 Further consultation

1100. The ERA published the Chairmont Consulting report on debt raising and hedging costs on 15 March 2022. The Chairmont report proposed to increase:[580]

- 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.

1101. The ERA received three submissions from AGIG, ATCO and GGT in response to the debt raising and hedging cost report from Chairmont.[581,582,583]

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579 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 15-16.

580 Chairmont, *Debt Raising and Hedging Costs*, December 2021.

581 Australian Gas Infrastructure Group, *Submission to ERA on Chairmont Debt Raising and Hedging Cost Report*, April 2022.

582 ATCO, *Submission to ERA on Chairmont Debt Raising and Hedging Cost Report*, April 2022.

583 Goldfields Gas Transmission Pty Ltd, *Submission to ERA on Chairmont's Debt Raising and Hedging Cost Report*, April 2022.

1102. All submissions:

- provided support for Chairmont's proposed increase of debt hedging costs
- provided general support for Chairmont's proposed increase of debt raising costs.

1103. ATCO commissioned expert consultant Competition Economists Group (CEG) to review debt raising costs and Chairmont's report. CEG's report provided a detailed review of debt raising costs and focused on the costs of issuing debt through a third-party arranger, and liquidity management costs of maintaining an investment grade credit rating.[584]

1104. AGIG and GGT commented on the size of the benchmark debt issuance.

- AGIG noted that under the 10-year trailing average with 10 equal annual tranches, the size of the benchmark debt issuance ($AUD 250 million onshore and $USD 100 million offshore) equalled a regulatory asset base of around $7 billion with a gearing of 55 per cent. This was more than twice the regulated asset base of the Dampier to Bunbury Natural Gas Pipeline (the largest of the three regulated gas networks in Western Australia).[585]
- GGT also considered that the benchmark debt allowance was an inappropriate benchmark for its business, which had a much smaller capital base of around $370 million.[586]

1105. AGIG submitted that as global geopolitical conditions have changed from the time Chairmont wrote its report, Chairmont may want to consider if recent events in Ukraine, and the political and market reactions to them, have created cost changes that are likely to be more transitory in nature.[587]

1106. All submissions sought the inclusion of five additional areas when setting the debt raising costs:

- higher arranger fees based on Bloomberg data
- issue price discount
- liquidity facilities costs
- three-month refinancing fee
- Environmental, Social and Governance (ESG) costs.

1107. The five additional costs associated with debt raising costs raised by stakeholders are discussed below.

584 CEG, *Debt arranging and liquidity management costs*, April 2022.

585 Australian Gas Infrastructure Group, *Submission to ERA on Chairmont Debt Raising and Hedging Cost Report*, April 2022, p. 1.

586 Goldfields Gas Transmission Pty Ltd, *Submission to ERA on Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 3.

587 Australian Gas Infrastructure Group, *Submission to ERA on Chairmont Debt Raising and Hedging Cost Report*, April 2022, p. 2.

11.3.2.1 Higher arranger fees

1108. 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.

1109. CEG disputed the transparency of Chairmont's internal confidential survey of market participants to determine arranger fees. CEG instead proposed to use a reproducible method that used Bloomberg to report actual arranger fees from issued bonds for investment grade bonds for Australian domiciled companies. CEG also noted that the AER favours the Bloomberg estimates for estimating the arranger fees.[588]

1110. ATCO considered that the arranger fee for bond issues should be revised upwards to 55 basis points, which is approximately 20 basis points higher than Chairmont's estimate. The 20-basis point increase is associated with the 2.6 basis point per annum increase in debt raising costs.[589]

11.3.2.2 Issue price discount

1111. Arrangers or underwriters commonly discount the issue price of bonds relative to the market price.

1112. CEG submitted that the arranger fee consisted of a second component, the issue price discount, that was not included in the Chairmont's review.[590] CEG submitted that:

- The issue price discount is a form of compensation paid by the issuer to the arranger.
- It is common for issuers and arrangers to substitute lower arranger fees for higher issue price discounts (and vice versa). Therefore, estimating arrangement costs without regard to the issue price discount will be incomplete and liable to error.
- The ERA's method did not take this cost of issue price discount into account as the ERA's cost of debt method relied on estimates of the 10-year bond yield in the secondary market.
- The estimate of 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. To calculate the issue price discount, CEG used Bloomberg data and estimates of market prices over five days to review issued bonds for investment grade bonds for Australian domiciled companies.

1113. Adding the two components to the arranger fee, ATCO submitted that Chairmont's estimate of the arranger fee was understated by up to 59 basis points (equivalent to approximately 7.6 basis points per annum in debt raising cost).[591]

11.3.2.3 Liquidity facilities costs

1114. 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.

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588 CEG, *Debt arranging and liquidity management costs,* April 2022, p. 5.

589 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, pp. 1-2.

590 CEG, *Debt arranging and liquidity management costs*, April 2022, pp. 5-6.

591 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

1115. All submissions supported the inclusion of liquidity facilities costs in the debt raising cost estimates:

- AGIG submitted that the liquidity and commitment facility fees are an important cost and should be considered as part of an efficient debt raising process. Based on a benchmark issuance of $250 million and a minimum 30-day bridge facility term, AGIG estimated the cost to be $33,000.[592]
- CEG submitted that liquidity management costs were incurred by an issuer to achieve an investment grade credit rating.[593]
  - CEG considered that one form of these costs related to holding of undrawn committed facilities with banks that allow the firm to draft on that facility if required. The firm will need to pay the relevant financial institution a commitment fee to have the facility available.
  - CEG detailed, that as adviser to Energy Networks Australia, it has access to all AER-regulated firms' debt portfolios and that it is public knowledge that these include many undrawn committed facilities that attract commitment fees.
- ATCO submitted that credit rating agencies require issuers to engage in liquidity management activities to reduce refinancing risk so as to maintain an investment grade consistent with the benchmark debt strategy. ATCO considered that a prudent business would hold undrawn committed facilities with banks that allow the firm to draw on that facility if required.[594]
- GGT submitted that allowance should be made for liquidity fees. A facility providing liquidity prudently protects against uncertain events which might adversely affect future cash flows. GGT considered that rating agencies would not rate without facilities providing liquidity being in place.[595]

11.3.2.4 Three-month refinancing fee

1116. 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 consider 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.

1117. AGIG considered that the three-month refinancing fee was an important cost and should be considered as part of an efficient debt raising process. AGIG submitted that no efficient company would leave the rollover of debt to the day prior to the expiry of existing debt.[596]

1118. CEG submitted that a benchmark efficient entity will engage in debt raising materially prior to existing debt maturing.[597]

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592 Australian Gas Infrastructure Group, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 1.

593 CEG, *Debt arranging and liquidity management costs,* April 2022, p. 32.

594 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

595 GGT, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

596 Australian Gas Infrastructure Group, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 1.

597 CEG, *Debt arranging and liquidity management costs*, April 2022, p. 31.

1119. ATCO submitted that liquidity management activities required for prudent financial management typically involve refinanced debt being raised at least three months prior to maturity (and ideally 12 months prior).[598]

1120. ATCO and CEG considered that the liquidity costs from both liquidity facilities and 3-month refinancing fee equalled 11 basis points to 13 basis points per annum in debt raising cost. Though this cost estimate did not separately detail liquidity facility and three-month refinancing costs.[599,600]

11.3.2.5 ESG costs

1121. ESG costs refer to the administrative costs of measuring, reporting and compliance relating to ESG matters. ESG issues are usually referred to as the non-financial issues that are difficult to measure in monetary terms and that do not form part of traditional financial metrics.[601]

1122. All submissions provided high-level comments on the ESG issues related to debt raising costs. However, no stakeholder provided any recommendations on how ESG costs should be estimated:

- AGIG submitted that ESG reporting was something that should be monitored by the ERA. AGIG considered that gas companies which are (at present) associated with fossil fuel are more affected by ESG concerns in the marketplace than electricity utilities are. However, AGIG considered there does not appear to be any compelling case for any change yet.[602]
- ATCO considered that the role of ESG on debt raising costs is an emerging issue that will likely result in additional costs being incurred to raise debt during the life of the gas instrument and the access arrangement periods to which it applies. ATCO submitted that costs of obtaining an ESG score from an appropriate agency was likely to be a cost that would be incurred for the purpose of obtaining access to reasonably priced debt.[603]
- GGT submitted that the effects of ESG issues on cost of capital should be considered. Rather than close monitoring, GGT considered that the ESG changes needed to be considered now for setting the cost of capital for gas transmission assets as the effects of ESG were likely to materialise during the period of the 2022 gas instrument.[604]

598 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

599 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

600 CEG, *Debt arranging and liquidity management costs*, April 2022, pp. 32-33.

601 CFA Institute, *Environmental, Social, and Governance Issues in Investing: A Guide for Investment Professionals*, October 2015, p. 1.

602 Australian Gas Infrastructure Group, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

603 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

604 GGT, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 3.

11.4 2022 draft approach

11.4.1 Debt raising costs

1123. The ERA's draft approach for the 2022 gas instrument will apply debt raising costs for the benchmark efficient entity of 0.165 per cent per annum.

1124. The debt raising cost allowance will be added to the return on debt.

1125. The debt raising cost will remain fixed for the period of the instrument.

11.4.2 Debt hedging costs

1126. An annual swap allowance of 0.123 per cent will be provided to firms to compensate for the cost of conducting hedging for exposure to movements in the risk free rate.

1127. The hedging cost allowance will be added to the return on debt.

1128. The debt hedging cost will remain fixed for the period of the instrument.

11.4.3 Equity raising costs

1129. 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.

11.5 Reasoning

11.5.1 Debt raising costs

1130. Regulators across Australia have typically included an allowance to account for debt raising costs in their regulatory decisions.

1131. Debt raising costs may include underwriting fees, legal fees, company credit rating fees and any other costs incurred in raising debt finance. A company must pay debt raising costs over and above the debt risk premium. Such debt raising costs are likely to vary between each issuance of debt depending on the borrower, lender and market conditions.

1132. Australian regulators use benchmark estimates when determining debt raising costs. In doing so, regulators attempt to derive an estimate of debt raising costs that mimics debt raising costs that would be incurred by a well-managed efficient benchmark business operating in a competitive market.

1133. Based on the advice from the Allen Consulting Group in December 2004, the ACCC reaffirmed that debt raising costs were a legitimate expense that should be recovered through the revenues of a regulated utility.[605]

[605] The Australian Competition and Consumer Commission, *Final Decision: NSW and ACT Transmission Network Revenue Cap, TransGrid 2004-05 to 2008-09*, April 2005, p. 144.

1134. The costs included in the estimates of the debt raising costs, as indicated by the Allen Consulting Group in its 2004 estimate and adopted by the ACCC, are outlined below:

- *Gross underwriting fee*: This includes management fees, selling fees, arranger fees and the cost of an underwriter for the debt.
- *Legal and road show fee*: This includes fees for legal documentation and fees involved in creating and marketing a prospectus.
- *Company credit rating fee*: 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 fee*: A separate credit rating is obtained for each debt issue.
- *Registry fee*: The maintenance of the bond register.
- *Paying fee*: Payment of a coupon and principal to the security holder on behalf of the issuer.

1135. 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.[606] 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.[607]

1136. 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.

1137. 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.[608]

1138. The ERA and several other 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 15).

606 Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. xiii.

607 Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. xix.

608 Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. 53.

Table 15: Debt raising costs in Australian regulatory decisions

Regulator	Year	Allowance (bppa)
ESCOSA[609]	2016	12.5
IPART[610]	2018	12.5
ERA[611]	2018	10.0
AER[612]	2021	8.2
ESC[613]	2021	15.0
QCA[614]	2021	10.0
OTTER[615, 616]	2022	8.0

Source: ERA analysis

1139. 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.[617]

1140. 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.[618]

1141. Stakeholder submissions on the Chairmont report supported the proposed increase of debt raising costs.

1142. The ERA notes the submissions from AGIG and GGT commenting that the size of the benchmark debt issuance was too large and not reflective of their businesses.[619,620]

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

610 IPART, *Review of our WACC Method, Final Report*, February 2018, p. 24.

611 ERA, *2018 Final Rate of Return Guidelines*, December 2021, p. 35.

612 AER, *Final Decision: Jemena Distribution Determination 2021-2026 Attachment 3 Rate of Return*, April 2021, p. 10.

613 ESC, *2023 Water Price Review: Guidance paper*, 26 October 2021, p. 40.

614 QCA, *Final Report – Rate of Return Review*, November 2021, p. 51.

615 OTTER, *Investigation into TasWater's Prices and Services for the Period 1 July 2022 to 30 June 2026 Draft Report*, February 2022, p. 67.

616 OTTER rate was informed by the AER's decisions on debt raising costs.

617 Chairmont consulting, *Debt Raising and Hedging Costs*, 21 December 2021.

618 Chairmont consulting, *Debt Raising and Hedging Costs*, 21 December 2021, p. 2.

619 Australian Gas Infrastructure Group, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 1.

620 GGT, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 3.

1143. 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. Therefore, the ERA will continue the current benchmark debt issuance size that has formed the basis for the calculation of debt issuing costs over time.

1144. The ERA notes AGIG's submission which stated that global geopolitical conditions have changed since the time Chairmont wrote its report and that the markets' reactions may have created cost changes of a transitory nature.[621]

1145. The ERA considers that it is unclear that changed geopolitical conditions have led to changes in the administrative costs for debt raising.

1146. 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.

1147. The ERA responds to each of these areas in turn below.

11.5.1.1 Higher arranger fee

1148. 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.

1149. 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:[622]

- 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.

1150. 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.[623]

621 Australian Gas Infrastructure Group, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 2.

622 ATCO, *Submission to Chairmont's Debt Raising and Hedging Cost Report*, April 2022, p. 9.

623 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, pp. 1-2.

1151. CEG details an alternative method to estimate the arranger fee based on actual bond issuance data collected from Bloomberg. CEG considers that its method is transparent and replicable. In considering bond issuance data CEG also applied the following criteria to estimate the arrangement fees:[624]

- 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.

1152. 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.[625]

1153. 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.[626]

1154. CEG considers that its method is transparent and replicable, in contrast to Chairmont's confidential survey.[627]

1155. CEG has previously submitted a similar method to the AER and noted that the AER favours the Bloomberg estimates for estimating the arranger fees.[628] The ERA understands that the AER uses Bloomberg estimates for the arranger fee and Chairmont's 2019 report for the remaining debt raising costs.[629]

1156. 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.[630]

1157. 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:[631]

- 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.

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624 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 13.

625 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 14.

626 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 17.

627 CEG, *Debt arranging and liquidity management costs*, April 2022, p. 13.

628 CEG, *Debt arranging and liquidity management costs*, April 2022, p. 5.

629 AER, *Attachment 3: Rate of return – Fina decision – SA Power Networks 2020-25*, June 2020, pp. 3-14.

630 CEG, *Debt transaction costs and PTRM timing benefits*, January 2019, pp. 7, 8-10.

631 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, pp. 4-7.

- 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.

1158. 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.[632]

1159. 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.[633] This compares to the CEG's estimate of an average arrangement fee of 55 basis points.

1160. 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.

1161. The ERA recognises the merits and limitations of Chairmont's and CEG's methods in estimating the debt raising costs.

1162. 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.

1163. Chairmont undertook informal interviews with several financial market intermediaries and service providers to assist with determining the debt raising costs.[634]

1164. The ERA considers that the Bloomberg analysis provides an additional source of public data on the arranger fee estimate that may help to supplement Chairmont's debt issuing cost analysis. The ERA considers that the market data from Bloomberg indicates a higher arranger fee than the Chairmont's estimate by approximately 2.6 basis points per annum. However, this estimate is based on a bond sample comprising a broad range of firms, credit ratings and industries. On this basis, the ERA considers that a notional increase of 1 basis point per annum on the arranger fee may be warranted for a benchmark debt raising cost allowance.

1165. On the basis of this analysis, the ERA will increase the Chairmont's arranger fee by 1 basis point per annum.

632 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 7.

633 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, pp. 23-26.

634 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p .23.

11.5.1.2 Issue price discounts

1166. 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.[635]

1167. 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.[636] 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).[637]

1168. CEG considered that it is common for issuers and arrangers to substitute lower arranger fees for higher issue price discounts and vice versa.[638]

1169. 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.[639]

1170. Chairmont has not reported issue price discount as part of the arranger fee estimate in its recent debt raising cost review for the ERA.

1171. 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.[640]

1172. 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.[641]

- 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.

635 CEG, *Debt arranging and liquidity management costs*, April 2022, pp. 5-6.

636 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, pp. 6, 17.

637 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 5.

638 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 5.

639 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 5.

640 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 16.

641 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.

1173. 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 draft gas instrument.

11.5.1.3 Liquidity facilities costs

1174. 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.

1175. All submissions supported the inclusion of liquidity facilities costs in the debt raising cost estimates.

1176. 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.[642] 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.[643]

1177. The AER considered these costs as indirect costs and did not compensate for that in its previous regulatory decision on South Australia Power Networks.[644]

1178. 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.

1179. Based on the information above, the ERA recognises that liquidity facility costs may be incurred by an efficient prudent energy network.

1180. The ERA notes that the hybrid trailing average approach does not include liquidity facilities.[645]

1181. The ERA notes the 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.[646] It is therefore possible that the liquidity facilities costs are indirect costs which are not necessary to maintain a BBB+ credit rating.

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642 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 6.

643 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 16.

644 AER, Draft Decision – *SA Power Networks 2020-25, Attachment 3: Rate of Return*, October 2019, p. 16.

645 ERA, *Final Gas Rate of Return Guidelines: Explanatory Statement*, 18 December 2018, p. 80.

646 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 17.

1182. In addition, the ERA considers that the liquidity management costs would be accommodated by regulatory cashflows and/or in the working capital allowance and the return on working capital. Adding an additional allowance item to debt raising cost may overcompensate a regulated gas pipeline by double counting the liquidity management costs.

1183. On this basis, the ERA considers that liquidity facilities costs should not be included in the debt raising cost allowance for the 2022 draft gas instrument.

11.5.1.4 Three-month refinancing fees

1184. 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.

1185. 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.[647]

1186. Chairmont's recent analysis continues to exclude the three-month facility fee from the debt raising cost allowance.[648]

1187. 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.[649] It is therefore possible that the three-month refinancing fees are indirect costs which are not necessary to maintain a BBB+ credit rating.

1188. 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 and there are also other mechanisms for the regulated gas pipelines to manage refinancing risk, 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.

1189. 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 draft gas instrument.

647 ATCO, *Submission to Chairmont's Debt Raising and Hedging Costs Report*, April 2022, p. 36.

648 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 6.

649 Chairmont Consulting, *Debt Raising Costs*, 29 June 2019, p. 17.

11.5.1.5 ESG costs

1190. 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.[650,651] In the long term, ESG investing may improve corporate practices given that investors better understand these factors.[652]

1191. 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. [653]

1192. 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 this point in time there does not appear to be any material impact of ESG on debt raising costs. With ESG changes quickly spreading the ERA should closely monitor ESG developments and its impact on regulated entities.[654]

1193. 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.

1194. 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.

1195. 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.

1196. 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.

1197. The ERA considers that there is not sufficient evidence at this stage to indicate that ESG will materially affect a firm's debt raising costs. Therefore, the ESG costs should not be included in debt raising costs for the 2022 gas instrument.

1198. ESG reporting would appear to be better classified as operating expenditure. Therefore, should ESG reporting costs materialise, these costs should be appropriately justified as efficient as part of a gas pipeline's access arrangement.

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650 OECD, *ESG Investing and Climate Transition: Market Practices, Issues and Policy Considerations*, 2021, p. 3.

651 Harvard Law School Forum on Corporate Governance, *Introduction to ESG*, 1 August 2020.

652 OECD, *ESG Investing and Climate Transition: Market Practices, Issues and Policy Considerations*, 2021, p. 10.

653 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 20.

654 Chairmont Consulting, *Debt Raising and Hedging Costs*, December 2021, p. 22.

11.5.1.6 Resulting estimate of debt raising costs

1199. The ERA maintains that debt raising costs should be based on direct costs consistent with established regulatory practices.

1200. 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.

1201. The ERA does not support the inclusion of new indirect costs being proposed by stakeholders.

1202. On the basis of the above information and for the purposes of the 2022 draft gas instrument, the ERA considers that debt raising costs of 0.165 per cent per annum are appropriate.

1203. The debt raising cost allowance will be added to the return on debt.

1204. The debt raising cost will remain fixed for the period of the instrument.

1205. 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.

1206. 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.

1207. 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.

1208. 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 start of an access arrangement for 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.

1209. No swaps will be required for floating rate Australian dollar notes.

1210. 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:[655]

- 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.

1211. The factors of each hedging cost component have been weighted as follows:[656]

- 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.

1212. Based on Chairmont's advice, the ERA calculates the weighted cost of hedging as follows (see Table 16):

Table 16: 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

1213. That sum gives a total cost of hedging of 12.3 basis points per annum.

1214. 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.[657]

1215. Based on the information above, the ERA will allow hedging costs of 12.3 basis points per annum for the 2022 draft gas instrument.

655 Chairmont Consulting, *Debt Raising and Hedging Costs*, 21 December 2021, pp. 29-30.

656 Chairmont Consulting, *Debt Raising and Hedging Costs*, 21 December 2021, p. 6.

657 Chairmont Consulting, *Debt Raising and Hedging Costs*, 21 December 2021, p. 2.

1216. The ERA continues to use the benchmark debt strategy to determine debt raising cost allowance. Given the complexity of these costs and their small contribution to the return on debt, the ERA may consider simplifying the process in the future.

11.5.2 Debt hedging costs

1217. The ERA published the Chairmont Consulting report on debt raising and hedging costs on 15 March 2022.

1218. The Chairmont report proposed to increase 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.

1219. Stakeholder supported updating these costs.

1220. For the 2022 draft gas instrument an annual swap allowance of 0.123 per cent will be provided to firms to compensate for the cost of conducting hedging for exposure to movements in the risk free rate.

1221. The hedging cost allowance will be added to the return on debt.

1222. The debt hedging cost will remain fixed for the period of the instrument.

11.5.3 Equity raising costs

1223. Firms may need to issue new equity in order to maintain the benchmark debt-to-equity ratio following increases in the regulated asset base.

1224. The issuance of new equity will have transaction costs, depending on the way in which the equity is raised.

1225. 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.

12. Inflation

1226. Inflation is the rate of change in the general level of prices of goods and services.

1227. To invest, debt and equity investors will require compensation for inflation.

1228. A nominal rate of return incorporates the real rate of return, compounded with a rate that reflects expectations of inflation.

1229. 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

1230. The expected rate of inflation will be required:

- For the roll forward of the regulatory 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.

1231. 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 regulatory asset base is indexed to actual inflation. Actual inflation is used to ensure that regulatory assets remain fixed in real terms.

1232. 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.

1233. This chapter outlines the ERA's reasoning for its current position on the approach to determining the expected rate of inflation outlined in the 2022 gas instrument.

12.1 2018 position

1234. 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.

1235. The term of the resulting average expected inflation rate was five years, consistent with the length of the access arrangement period.

1236. The Treasury bond implied inflation approach uses the Fisher equation and the observed yields of:[658]

- 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.

1237. 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.

1238. The expected inflation rate is estimated consistent with the estimate of the risk free rate by adopting an averaging period of 20 trading days.

1239. 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.[659]

12.2 Working views in the discussion paper

1240. The ERA's working view was that the approach to estimating inflation in the 2018 gas instrument should be maintained for the 2022 gas instrument, including:

- using the Treasury Bond implied inflation approach
- adopting a five-year term for inflation.

12.3 Consultation

1241. Five of the submissions to the discussion paper provided shareholder comments on inflation.

1242. AGIG, ATCO, the CRG and South32 supported the ERA's working views on the approach to inflation:[660, 661, 662, 663, 664]

- ATCO submitted that the market expectations provide the best estimates of expected inflation for the regulatory period.[665]

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658 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.

659 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.

660 Australian Gas Infrastructure Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 34.

661 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 40.

662 Consumer Reference Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 72.

663 Goldfields Gas Transmission Pty Ltd, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 12.

664 South32, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 5.

665 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 40.

- The CRG agreed that the alternative RBA approach provides more of an estimate of a policy target rather than a market-based estimate of expected inflation. In addition, given the lag inherent in the RBA approach, the outcomes can be a negative real risk free rate that may not be appropriate.[666,667]

1243. GGT did not support the use of the Treasury bond implied inflation approach of the estimation of expected inflation.[668]

- GGT preferred adoption of the RBA approach whereby the expected inflation forecast would adopt the RBA's inflation forecasts the first and second years of the forecast horizon and the mid-point of the RBA's target range for inflation (2.5 per cent) for the third, fourth and fifth years.[669]
- GGT acknowledged some weaknesses to the RBA approach but considered that, overall, the RBA approach was a better understood approach for estimating expected inflation.[670]

1244. While acknowledging the merits of the Treasury Bond implied inflation approach, GGT also outlined that this approach has the following weaknesses:[671]

- The linear interpolation required to derive bond yields leads to error in the expected inflation estimates because the term structure of bond yields is typically non-linear.
- The indexation of Treasury-indexed bonds over time leads to error in the expected inflation estimates, though this error may not be substantial.
- Treasury-indexed bonds are less liquid than nominal bonds and their yields may include liquidity premiums that are unrelated to inflation.
- Nominal Treasury bonds included an inflation risk premium, which may be positive or negative.

12.4 2022 draft approach

1245. The ERA will apply the Treasury bond implied inflation approach for estimating expected inflation. This will be applied as follows:

- Using the yields on five-year Treasury bonds.
- Estimating the expected inflation rate consistent with the estimate of the risk free rate.
- Using 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.

666 Consumer Reference Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 72.

667 The RBA approach uses the RBA inflation forecast and target band method to develop the expected inflation forecast. The expected inflation forecast estimates the expected inflation rate for years one and two using the mid-point of the RBA's headline inflation rate forecast range from the most recent RBA statement on monetary policy. Expected inflation for the remaining years of the forecast is assumed to be the mid-point of the RBA's target inflation band of 2 per cent to 3 per cent, or some path to achieve the 2.5 per cent mid-point by some future point in time.

668 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 51.

669 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 51.

670 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, p. 53.

671 Goldfields Gas Transmission Pty Ltd, *Submission to Discussion Paper*, February 2022, pp. 51-53.

- The nomination of the averaging period for inflation is outlined in Chapter 7.4.1.

12.5 Reasoning

12.5.1 Estimation method

1246. The ERA has considered methods for best estimating expected inflation for the 2022 gas instrument, including use of:
    - the Treasury bond implied inflation approach
    - the RBA inflation forecast approach.

1247. The challenge in determining a method that is likely to result in the best estimate of inflation expectations is that these forward-looking expectations are not directly observable. Furthermore, no method to estimate expected inflation is perfect.

1248. The ERA's consideration of forecasting expected inflation has taken place during a time of high uncertainty regarding inflation. During this time:
    - Near-term inflation has been volatile and uncertain due to the effects of economic recovery from the COVID-19 pandemic, uncertainty around central bank monetary policy and global supply chain concerns.
    - Domestic inflation has increased significantly, after a prolonged period of low inflation. Consumer Price Index (CPI) inflation for the 12 months ended March 2022 was 5.1 per cent.[672] In contrast, between when the 2018 gas instrument came into effect and March 2021, Australia's annual inflation growth remained persistently below historical average levels and below the mid-point of the RBA's inflation target band of 2.5 per cent. Annual inflation last exceeded 2.5 per cent in June 2014.[673]
    - There is uncertainty whether current high inflation is transitory or more permanent.
    - There have been significant increases in market and central bank expectations of future inflation. The RBA has recognised that the current outlook for domestic inflation is materially higher than it previously expected and subject to uncertainty going forward stemming from continued supply-side disruptions, a tight labour market and the effects of the withdrawal of economic stimulus. In light of domestic developments in inflation and employment, the RBA increased its cash rate target by 25 basis points in May 2022. This is sooner than the RBA's previous expectation that an increase in the cash rate target would not be warranted until 2024 at the earliest.[674]

1249. The ERA considers 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.

672 ABS, Catalogue number 6401.0, April 2022.

673 ABS, Catalogue number 6401.0, April 2022.

674 Reserve Bank of Australia, *Statement of Monetary Policy*, May 2022, pp. 1-4; Reserve Bank of Australia, *Statement of Monetary Policy*, February 2021, p. 4.

1250. Having regard to the available evidence, the ERA considers that the Treasury bond implied inflation approach provides the best estimate of inflation expectations for a regulatory period:

- 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 easily to calculate.

1251. An alternative method to estimate inflation is the RBA approach that uses the RBA inflation forecast and target band method. This approach estimates the expected inflation rate using:

1252. The mid-point of the RBA's headline inflation rate forecast range for years one and two from the most recent RBA statement on monetary policy.

1253. The mid-point of the RBA's target inflation band of 2 per cent to 3 per cent for the remaining years of the period, or some path to achieve the 2.5 per cent mid-point by some future point in time.

1254. The RBA inflation forecast approach has the following advantages:

- It is adopted by other Australian regulators.
- The method is relatively easy to calculate.
- The method incorporates the RBA's short-term inflation forecasts for years one and two.

1255. The RBA inflation forecast approach has the following disadvantages:

- The RBA's statement of monetary policy is updated infrequently so may not reflect changing inflation expectations.
- Given a weight is placed on the mid-point of the RBA's target, the inflation forecast may be somewhat static and may not reflect changing inflation expectations.
- Inflation has gone for extended periods of being below the mid-point of the inflation range.
- As the RBA only publishes short-term forecasts of inflation, this method requires assumptions to be made to develop a forecast of inflation for the remaining years of the forecast period including:
  - The return of inflation to the mid-point of the inflation range (2.5 per cent) over a forecast period or at some other future point in time.
  - The speed of the glide-path to reaching the mid-point.
- In an environment of low or high inflation and a shorter inflation forecast term, this may assume that inflation quickly moving over the forecast period to reach the mid-point. This assumption may not accurately reflect investor expectations of inflation.

- The approach may also not accommodate situations where the RBA's short-term inflation estimates for year one and year two are in the lower bounds of the target range or close to the mid-point, but inflation is expected by investors to accelerate above the mid-point over the remaining years (or vice versa).
- The approach may not be consistent with the market inflation expectations built into the market yields for the risk free rate.

1256. 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 and have shown that inflation can deviate significantly from the RBA's target range for extended periods.
- Uncertainty around the future inflation is high.
- It is consistent and aligns with market forecasts built into other WACC parameters. This minimises the risk that the real WACC is distorted either too high or too low (or negative).

1257. The Treasury bond implied inflation approach has the following disadvantages:

- This method assumes efficient pricing of Treasury bonds, in that observed yields must reflect the value that the market places on these instruments at a given moment in time. A decrease of liquidity for Treasury indexed bonds may lead to a lack of frequent trading and observed yields not reflecting efficient pricing.
- There is an inherent bias, due to investors demanding an inflation premium to compensate for being exposed to uncertainty around the future inflation rate. The size of these premia may vary over time. However, the size of biases may be small and using a five-year period may likely further reduce the size of these potential effects.

1258. GGT does recognise these drawbacks of the Treasury bond implied inflation approach.

1259. The ERA's views on the weaknesses raised by GGT are as follows:

- GGT raises concern with the use of linear interpolation to derive bond yields. As GGT itself notes, Dr Lally finds that any error in the expected inflation estimates arising from the fact that the term structure of bond yields is typically non-linear while interpolation assumes linearity is unlikely to be substantial.[675]
- GGT raises concern with the indexation timing of bonds. Any error in the expected inflation estimates arising from the indexation of Treasury indexed bonds over time is likely to be small. [676]

[675] Dr Lally, *Review of the AER's inflation forecasting methodology,* July 2020, p. 10.

[676] Dr Lally, *Review of the AER's inflation forecasting methodology,* July 2020, p. 10.

- GGT raises concern with the liquidity of indexed bonds. The ERA acknowledges that Treasury-indexed bonds are less liquid than nominal bonds, however, considers that the current market liquidity for the indexed bonds is sufficient for applying the Treasury bond implied inflation method to derive inflation.[677] Given the current level of liquidity in the market for Treasury-indexed bonds the ERA does not consider that their yields would include material liquidity premiums that are unrelated to inflation.
- GGT raises concern that the nominal Treasury bonds include an inflation risk premium that reflects the level of uncertainty. The ERA acknowledges that there may be an inflation risk premium. However, as GGT notes Dr Lally details it is uncertain whether this premium is positive or negative.[678] The ERA does not consider that this premium would be material, particularly for a bond with a shorter term of five years.

1260. The challenge in determining a method that is likely to result in the best estimate of inflation expectations is that these forward-looking expectations are not directly observable. Furthermore, no method to estimate expected inflation is perfect and it is up to regulators to use their discretion to decide, on balance, which method may provide the best estimate of expected inflation for the regulatory period.

1261. On balance, the ERA considers that the Treasury bond implied inflation approach will achieve the best estimate of inflation for the regulatory period. The Treasury bond implied inflation approach is therefore in the long-term interests of consumers, because it would likely promote efficient investment in, and use of, gas networks services.

1262. For the 2022 draft gas instrument the ERA will apply the Treasury bond implied inflation approach.

1263. For illustrative purposes, the five-year expected inflation forecast was 2.80 per cent for the 20 trading days to 29 April 2022.

12.5.2 Term of inflation

1264. The ERA considers that the term of expected inflation should be five years, consistent with the length of the access arrangement period. This is the best estimate of what inflation is expected to be over the access arrangement period.

1265. 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 period (through the indexation of the RAB).

1266. 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.[679]

1267. Dr Lally's recent advice to the AER confirmed that the NPV=0 principle implies the best estimate of expected inflation should match the regulatory period.[680]

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677 Issuance of Treasury indexed bonds in 2020-2021 was approximately $2.5 billion, which represents issuance broadly in line with the past issuance trend. Australian Office of Financial Management, Annual Report 2020-21, Part 2: Performance and outcomes.

678 Dr Lally, M., *Review of the AER's inflation forecasting methodology*, July 2020, pp. 11-12.

679 Dr Lally, M., *Review of the AER's inflation forecasting methodology*, July 2020, pp. 4-9.

680 Dr Lally, M., *The appropriate term for the allowed cost of capital*, April 2021, p. 52.

13. Value of imputation credits (gamma)

1268. 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.

1269. 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.

1270. The ERA factors the value of imputation credits into its regulatory determination allowances via adjustments to the taxation building block and market risk premium.

1271. This chapter outlines the ERA's reasoning for its current position on determining gamma outlined in the 2022 draft gas instrument.

13.1 2018 position

1272. The 2018 gas instrument applied a gamma of 0.5, which is fixed over the period of the instrument.[681]

1273. 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 credits.

1274. 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 16

1275. The distribution rate represents the proportion of imputation credits created that is expected to be distributed to investors. The ERA considered that the distribution rate was a firm-specific, rather than a market-wide, parameter.[682]

1276. The ERA applied an estimate of 0.9 for the distribution rate. This was determined based on the financial reports of the 50 largest Australian Securities Exchange-listed (ASX) firms.[683]

1277. The utilisation rate is the weighted average of the utilisation rates of individual investors, with investors able to fully use the credits having a rate of one and those unable to use them having a rate of zero. The ERA considered that the utilisation rate was a market-wide rather than a firm-specific parameter.

681 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 40.

682 ERA, *Final Rate of Return Guidelines (2018),* December 2018, p. 39.

683 Dr Lally, M., *Estimating the Distribution Rate for Imputation Credits for the Top 50 ASX Companies*, October 2018, p. 4.

1278. The ERA applied an estimate of 0.6 for the utilisation rate. The ERA derived this estimate by applying the equity ownership approach to determine the percentage of domestic investors in the Australian equity market. The utilisation rate was estimated for all Australian equity from the national accounts of the Australian Bureau of Statistics (ABS).[684]

13.2 Working views in the discussion paper

1279. The ERA's working view in the discussion paper was that gamma should continue to be estimated using the utilisation approach and that a gamma of 0.5 should be maintained. Gamma would remain fixed for the life of the gas instrument.

13.3 Consultation

1280. Two of the submissions to the discussion paper provided stakeholder comments on the estimation of gamma.

1281. AGIG provided the following comment on gamma:

- Absent of the Australian Taxation Office (ATO) providing any different advice, the result of 0.5 appears reflective of the current data used by the ERA to determine gamma.[685]
- That distribution and use of imputation credits does not vary significantly over time, and therefore that the value of gamma is less likely than other WACC parameters to change and the costs of keeping it fixed may be relatively small.[686]

1282. ATCO did not support the ERA's working view on gamma:[687]

- ATCO requested that the ERA seek clarification from the ATO about the ATO's tax statistics.[688]
- ATCO considered that the application of the Monkhouse formula does not give rise to the best estimate of gamma. ATCO submitted that the ERA adopt the ATO method of calculating gamma based on franking credits redeemed divided by franking credits created in order to avoid an estimate based on inconsistent data.[689]

684 ERA, *Final Gas Rate of Return Guidelines*, December 2018, p. 40.

685 Australian Gas Infrastructure Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 34.

686 Australian Gas Infrastructure Group, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 8.

687 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 2, 41.

688 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 41.

689 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, p. 41.

13.4 2022 draft approach

1283. The ERA determines gamma based on the utilisation approach using the Monkhouse formula as the product of the distribution rate and the utilisation rate.

1284. The 2022 draft gas instrument applies a gamma of 0.5.

1285. Gamma will remain fixed for the life of the gas instrument.

13.5 Reasoning

1286. Over the course of its reviews of electricity, gas and rail rates of return, the ERA has considered gamma. The ERA's current and proposed draft 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.

1287. The ERA has used a gamma of 0.5 for its most recent rate of return determinations.[690, 691, 692, 693, 694]

1288. The ERA considers that its draft 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.

1289. The ERA's estimate of gamma is derived by applying the Monkhouse formula.

1290. The ERA has separately estimated the distribution rate and utilisation rate.

13.5.1 Distribution rate

1291. 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.

690 ERA, *Final decision on proposed revisions to the Dampier to Bunbury Natural Gas Pipeline access arrangement 2021 to 2025,* April 2021, p. 312.

691 ERA, *Final decision on proposed revisions to the Goldfields Gas Pipeline Access Arrangement for 2020 to 2024*, December 2019, p. 154.

692 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.

693 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.

694 ERA, *Final Determination 2018 and 2019 Weighted Average Cost of Capital for the Freight and Urban Networks and Pilbara Railways*, August 2019, Chapter 9.

1292. 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.[695] Further, the ERA considers 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.[696]

1293. The ERA's estimate of the distribution rate is 0.9.

13.5.2 Utilisation rate

1294. 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.

1295. 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.[697] Further, all of the privately owned regulated gas businesses in Western Australia are majority-owned or wholly-owned subsidiaries of listed firms.[698]

1296. 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.

1297. 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.[699] The ERA considers the ABS data is the best available data to estimate the utilisation rate.

1298. The ERA's estimate of the utilisation rate is 0.6.

1299. The AER's 2021 annual rate of return update used data from the ABS to produce a range for the utilisation rate of 0.62 to 0.70. The ERA's estimated utilisation rate is close to the lower bound of this range.[700]

13.5.3 Gamma estimate

1300. The ERA's estimate of gamma is derived by applying the Monkhouse formula as the product between the distribution rate and the utilisation rate.

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695 Dr Lally, M., *Estimating the Distribution Rate for Imputation Credits for the Top 50 ASX Companies*, June 2021, p. 3.

696 Dr Lally, M., *Estimating the Distribution Rate for Imputation Credits for the Top 50 ASX Companies,* June 2021, pp. 3-4.

697 Dr Lally, M., *Gamma and the ACT Decision,* May 2016, p. 26.

698 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.

699 ABS, *Australian National Accounts: Finance and Wealth, Catalogue 5232.0,* Tables 48 and 49.

700 AER, *Rate of Return Annual Update,* December 2021, pp. 29-30.

1301. The ERA's estimate of gamma is 0.5.

1302. ATCO suggested using ATO data to estimate gamma. ATCO submitted 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.[701]

1303. The ERA has considered the use of ATO data to estimate gamma in previous gas instrument reviews, however, it was not adopted due to issues with the ATO data.

1304. Hathaway identified a discrepancy with the tracking of imputation credits in the ATO taxation statistics. Using these statistics, the distributed credits and hence the distribution rate could be estimated using either tax data or dividend data. He found that the franking account balance data and dividend payment data within the ATO data gives two significantly different estimates of the distribution rate.[702]

1305. In May 2018, the ATO issued a note to the AER advising that the ATO's 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.[703] In the previous gas instrument review the ERA therefore considered it inappropriate to use ATO data to estimate gamma.

1306. In December 2018, the ATO issued another note to the AER affirming and expanding on the statements of May 2018.[704]

> 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 attempt to reconcile the franking account balance.

1307. In March 2021, the AER requested further assistance from the ATO on the analysis provided to the AER in 2018 to estimate gamma.[705] The AER has sought further detail on two confidential estimates:

- Net franking credit usage.[706]
- Imputation credits distributed to residents versus non-residents as a percentage of imputation credits distributed.

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701 ATCO, *Submission to ERA Rate of Return Instrument Discussion Paper*, February 2022, pp. 2, 41.

702 Hathaway, N., *Imputation Credit Redemption: ATO data 1988-2011: Where have all the credits gone?*, September 2013, p. 16.

703 ATO, *Note to the AER regarding imputation*, May 2018.

704 ATO, *Note to the AER regarding imputation*, December 2018.

705 AER, *Rate of return Overall rate of return: Draft working paper*, July 2021, p. 43.

706 The ATO defines "net franking credit usage" as the proportion of franking offset used by individuals, superannuation funds, Self-Managed Super Funds and charities compared to the net franking credits distributed. ATO, *Note to the AER regarding franking account reconciliation*, October 2021.

1308. The ATO issued a note in October 2021 outlining that:[707]

- 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.
- 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.

1309. Given that issues with the reliability of the use of ATO tax statistics for estimating the value of imputation credits remain unresolved, the ERA does not consider that the ATO tax statistics can be used as a basis for estimating gamma.

1310. With regards to the distribution rate specifically, the ATO data distribution rate is estimated for all firms (not just listed equity), which is inappropriate for regulated businesses. As detailed in paragraph 1294, the ERA considers that the distribution rate should be estimated based on listed equity due to the different considerations regarding dividend policy in listed and unlisted businesses. Significant discrepancies have been identified between the estimates of the distribution rate when using ATO tax data depending on whether the estimate is for all equity or only listed equity.[708]

1311. The ERA considers 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:[709]

- 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 major inconsistencies in the ATO data.
- Data from listed firms will not include the effects of dividend policies associated with unlisted firms.

1312. The ERA therefore does not use ATO tax data to estimate gamma.

1313. On the basis of the above information, for the 2022 draft gas instrument the ERA applies the Monkhouse formula and considers a gamma of 0.5 is warranted.

[707] ATO, *Note to the AER regarding franking account reconciliation*, October 2021.

[708] Handley, J., *Advice on the value of imputation credits,* September 2014, p. 28.

[709] Lally, M., *Estimating the distribution rate for imputation credits,* July 2015, p. 3.

Appendix 1 – Acronyms

Table 17: 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	Regulatory 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 18: Comparator firms considered by the ERA and stakeholders

Ticker	Company Name	CEG 2021	CEG 2022	ATCO	GGT	ERA Draft
Canada						
ACO/X CN Equity	ATCO LTD -CLASS I					
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					
SPB CN Equity	SUPERIOR PLUS CORP					
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					
AEP US Equity	AMERICAN ELECTRIC POWER					
AES US Equity	AES CORP					
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					
ENB US Equity	ENBRIDGE INC					
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					

Ticker	Company Name	CEG 2021	CEG 2022	ATCO	GGT	ERA Draft
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					
OGS US Equity	ONE GAS INC					
OKE US Equity	ONEOK INC					
OTTR US Equity	OTTER TAIL CORP					
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					
SPH US Equity	SUBURBAN PROPANE PARTNERS LP					
SR US Equity	SPIRE INC					
SRE US Equity	SEMPRA ENERGY					
SWX US Equity	SOUTHWEST GAS HOLDINGS INC					
TCP US Equity	TC PIPELINES LP					
UGI US Equity	UGI CORP					
UTL US Equity	UNITIL CORP					
WEC US Equity	WEC ENERGY GROUP INC					
XEL US Equity	XCEL ENERGY INC					

Table 19: Comparator firms removed by the ERA from its initial sample

Ticker	Reason
ACO/X CN Equity	Will use the Canadian Utilities listing instead
SPB CN Equity	Will not use propane companies
AEP US Equity	Low exposure to regulated activities
AES US Equity	Low exposure to regulated activities
ENB US Equity	Will use the Canadian listing given dominant domicile
OKE US Equity	Low exposure to regulated activities
OTTR US Equity	Significant other business lines
SPH US Equity	Will not use propane companies
TCP US Equity	Will use TC Energy in Canada instead
UGI US Equity	Significant other business lines

Table 20: Comparator firms added by the ERA from its initial sample

Ticker	Reason
TRP CN Equity	Will use instead of TC Energy in the US
ENB CN Equity	Will use instead of Enbridge in the US

Appendix 5 – Beta estimates for comparator sample

Table 21: ERA asset beta estimates for its sample of comparator firms

Ticker	Company Name	5 year asset betas			10 year asset betas		
		Gearing	OLS	LAD	Gearing	OLS	LAD
Canada							
ALA CN Equity	ALTAGAS LTD	55%	0.61	0.45	47%	0.69	0.58
AQN CN Equity	ALGONQUIN POWER & UTILITIES	37%	0.49	0.43	39%	0.46	0.39
CU CN Equity	CANADIAN UTILITIES LTD-A	50%	0.44	0.34	46%	0.45	0.36
EMA CN Equity	EMERA INC	56%	0.24	0.23	52%	0.27	0.26
FTS CN Equity	FORTIS INC	51%	0.29	0.28	52%	0.28	0.27
H CN Equity	HYDRO ONE LTD	47%	0.27	0.24	47%	0.26	0.23
TRP CN Equity	TC ENERGY	46%	0.54	0.55	45%	0.51	0.53
ENB CN Equity	ENBRIDGE INC	42%	0.54	0.57	42%	0.53	0.57
	Mean	**48%**	**0.43**	**0.39**	**46%**	**0.43**	**0.40**
United Kingdom							
NG/ LN Equity	NATIONAL GRID PLC	40%	0.54	0.50	47%	0.32	0.31
SSE LN Equity	SSE PLC	47%	0.31	0.24	35%	0.51	0.42
	Mean	**43%**	**0.43**	**0.37**	**41%**	**0.42**	**0.36**
New Zealand							
VCT NZ Equity	VECTOR LTD	42%	0.29	0.26	44%	0.27	0.23
	Mean	**42%**	**0.29**	**0.26**	**44%**	**0.27**	**0.23**
United States							
AEE US Equity	AMEREN CORPORATION	36%	0.45	0.34	38%	0.39	0.33
AGR US Equity	AVANGRID INC	33%	0.41	0.36	33%	0.39	0.33
ALE US Equity	ALLETE INC	32%	0.60	0.42	34%	0.52	0.39
ATO US Equity	ATMOS ENERGY CORP	28%	0.50	0.38	32%	0.44	0.37
AVA US Equity	AVISTA CORP	43%	0.44	0.20	44%	0.39	0.22
BKH US Equity	BLACK HILLS CORP	48%	0.53	0.30	45%	0.48	0.34
CMS US Equity	CMS ENERGY CORP	43%	0.43	0.28	46%	0.35	0.24
CNP US Equity	CENTERPOINT ENERGY INC	50%	0.61	0.39	50%	0.51	0.29
CPK US Equity	CHESAPEAKE UTILITIES CORP	29%	0.44	0.39	28%	0.44	0.41
D US Equity	DOMINION ENERGY INC	38%	0.39	0.25	39%	0.35	0.26
DTE US Equity	DTE ENERGY COMPANY	42%	0.51	0.29	41%	0.44	0.30
DUK US Equity	DUKE ENERGY CORP	48%	0.37	0.18	47%	0.31	0.18
ED US Equity	CONSOLIDATED EDISON INC	45%	0.31	0.21	43%	0.26	0.20
EIX US Equity	EDISON INTERNATIONAL	48%	0.47	0.41	42%	0.43	0.34
ES US Equity	EVERSOURCE ENERGY	39%	0.52	0.35	39%	0.45	0.35
ETR US Equity	ENTERGY CORP	53%	0.45	0.24	53%	0.38	0.26
EVRG US Equity	EVERGY INC	41%	0.48	0.27	41%	0.42	0.31
EXC US Equity	EXELON CORP	48%	0.50	0.40	47%	0.42	0.38
FE US Equity	FIRSTENERGY CORP	51%	0.42	0.30	55%	0.33	0.28
HE US Equity	HAWAIIAN ELECTRIC INDS	36%	0.38	0.34	37%	0.34	0.34
IDA US Equity	IDACORP INC	28%	0.58	0.36	31%	0.52	0.41
KMI US Equity	KINDER MORGAN INC	47%	0.56	0.58	47%	0.56	0.56
LNT US Equity	ALLIANT ENERGY CORP	35%	0.53	0.38	36%	0.46	0.36
MGEE US Equity	MGE ENERGY INC	19%	0.44	0.38	19%	0.44	0.39
NEE US Equity	NEXTERA ENERGY INC	28%	0.56	0.43	34%	0.44	0.35
NFG US Equity	NATIONAL FUEL GAS CO	35%	0.42	0.41	31%	0.49	0.49
NI US Equity	NISOURCE INC	50%	0.38	0.29	49%	0.37	0.31
NJR US Equity	NEW JERSEY RESOURCES CORP	34%	0.52	0.48	32%	0.50	0.48

Ticker	Company Name	5 year asset betas			10 year asset betas		
		Gearing	OLS	LAD	Gearing	OLS	LAD
NWE US Equity	NORTHWESTERN CORP	42%	0.61	0.42	43%	0.50	0.36
NWN US Equity	NORTHWEST NATURAL HOLDING CO	40%	0.39	0.32	40%	0.36	0.32
OGE US Equity	OGE ENERGY CORP	34%	0.72	0.46	33%	0.62	0.42
OGS US Equity	ONE GAS INC	34%	0.52	0.44	34%	0.49	0.45
PCG US Equity	P G & E CORP	68%	0.52	0.37	54%	0.58	0.36
PEG US Equity	PUBLIC SERVICE ENTERPRISE GP	37%	0.56	0.39	34%	0.49	0.38
PNM US Equity	PNM RESOURCES INC	47%	0.56	0.27	48%	0.48	0.29
PNW US Equity	PINNACLE WEST CAPITAL	40%	0.53	0.23	37%	0.49	0.28
POR US Equity	PORTLAND GENERAL ELECTRIC CO	40%	0.49	0.31	41%	0.43	0.30
PPL US Equity	PPL CORP	45%	0.63	0.37	47%	0.50	0.31
RGCO US Equity	RGC RESOURCES INC	32%	0.32	0.27	29%	0.26	0.17
SJI US Equity	SOUTH JERSEY INDUSTRIES	52%	0.41	0.39	45%	0.42	0.43
SO US Equity	SOUTHERN CO/THE	46%	0.46	0.30	43%	0.39	0.27
SR US Equity	SPIRE INC	45%	0.41	0.26	44%	0.37	0.27
SRE US Equity	SEMPRA ENERGY	41%	0.50	0.33	39%	0.47	0.36
SWX US Equity	SOUTHWEST GAS HOLDINGS INC	44%	0.50	0.36	40%	0.47	0.36
UTL US Equity	UNITIL CORP	41%	0.49	0.43	42%	0.41	0.36
WEC US Equity	WEC ENERGY GROUP INC	33%	0.50	0.30	34%	0.41	0.29
XEL US Equity	XCEL ENERGY INC	39%	0.47	0.28	41%	0.37	0.24
	Mean	**41%**	**0.48**	**0.34**	**40%**	**0.43**	**0.33**

Table 22: ERA equity beta estimates at target leverage for its sample of comparator firms

Ticker	Company Name	5 year target betas			10 year target betas		
		Gearing	OLS	LAD	Gearing	OLS	LAD
Canada							
ALA CN Equity	ALTAGAS LTD	55%	1.35	0.99	47%	1.53	1.29
AQN CN Equity	ALGONQUIN POWER & UTILITIES	37%	1.08	0.96	39%	1.02	0.88
CU CN Equity	CANADIAN UTILITIES LTD-A	50%	0.97	0.76	46%	1.00	0.80
EMA CN Equity	EMERA INC	56%	0.54	0.51	52%	0.60	0.58
FTS CN Equity	FORTIS INC	51%	0.65	0.63	52%	0.63	0.59
H CN Equity	HYDRO ONE LTD	47%	0.59	0.54	47%	0.58	0.50
TRP CN Equity	TC ENERGY	46%	1.19	1.23	45%	1.14	1.17
ENB CN Equity	ENBRIDGE INC	42%	1.19	1.27	42%	1.17	1.26
	Mean	**48%**	**0.95**	**0.86**	**46%**	**0.96**	**0.88**
United Kingdom							
NG/ LN Equity	NATIONAL GRID PLC	40%	1.21	1.11	47%	0.71	0.68
SSE LN Equity	SSE PLC	47%	0.69	0.53	35%	1.14	0.93
	Mean	**43%**	**0.95**	**0.82**	**41%**	**0.93**	**0.80**
New Zealand							
VCT NZ Equity	VECTOR LTD	42%	0.64	0.58	44%	0.59	0.51
	Mean	**42%**	**0.64**	**0.58**	**44%**	**0.59**	**0.51**
United States							
AEE US Equity	AMEREN CORPORATION	36%	1.00	0.75	38%	0.87	0.74
AGR US Equity	AVANGRID INC	33%	0.91	0.79	33%	0.86	0.72
ALE US Equity	ALLETE INC	32%	1.33	0.93	34%	1.15	0.87
ATO US Equity	ATMOS ENERGY CORP	28%	1.11	0.83	32%	0.97	0.83
AVA US Equity	AVISTA CORP	43%	0.98	0.45	44%	0.87	0.49

Ticker	Company Name	5 year target betas			10 year target betas		
		Gearing	OLS	LAD	Gearing	OLS	LAD
BKH US Equity	BLACK HILLS CORP	48%	1.19	0.66	45%	1.07	0.76
CMS US Equity	CMS ENERGY CORP	43%	0.95	0.63	46%	0.77	0.53
CNP US Equity	CENTERPOINT ENERGY INC	50%	1.35	0.86	50%	1.13	0.65
CPK US Equity	CHESAPEAKE UTILITIES CORP	29%	0.98	0.87	28%	0.98	0.90
D US Equity	DOMINION ENERGY INC	38%	0.86	0.56	39%	0.78	0.57
DTE US Equity	DTE ENERGY COMPANY	42%	1.14	0.64	41%	0.99	0.66
DUK US Equity	DUKE ENERGY CORP	48%	0.83	0.39	47%	0.69	0.41
ED US Equity	CONSOLIDATED EDISON INC	45%	0.68	0.46	43%	0.58	0.44
EIX US Equity	EDISON INTERNATIONAL	48%	1.04	0.90	42%	0.96	0.75
ES US Equity	EVERSOURCE ENERGY	39%	1.16	0.77	39%	1.00	0.79
ETR US Equity	ENTERGY CORP	53%	1.01	0.53	53%	0.85	0.57
EVRG US Equity	EVERGY INC	41%	1.06	0.59	41%	0.92	0.69
EXC US Equity	EXELON CORP	48%	1.11	0.88	47%	0.93	0.85
FE US Equity	FIRSTENERGY CORP	51%	0.93	0.67	55%	0.74	0.61
HE US Equity	HAWAIIAN ELECTRIC INDS	36%	0.84	0.76	37%	0.76	0.75
IDA US Equity	IDACORP INC	28%	1.29	0.79	31%	1.15	0.90
KMI US Equity	KINDER MORGAN INC	47%	1.25	1.29	47%	1.25	1.24
LNT US Equity	ALLIANT ENERGY CORP	35%	1.17	0.84	36%	1.02	0.79
MGEE US Equity	MGE ENERGY INC	19%	0.98	0.83	19%	0.97	0.86
NEE US Equity	NEXTERA ENERGY INC	28%	1.24	0.95	34%	0.99	0.78
NFG US Equity	NATIONAL FUEL GAS CO	35%	0.93	0.90	31%	1.10	1.09
NI US Equity	NISOURCE INC	50%	0.84	0.65	49%	0.82	0.68
NJR US Equity	NEW JERSEY RESOURCES CORP	34%	1.15	1.06	32%	1.10	1.07
NWE US Equity	NORTHWESTERN CORP	42%	1.35	0.93	43%	1.12	0.80
NWN US Equity	NORTHWEST NATURAL HOLDING CO	40%	0.86	0.71	40%	0.79	0.71
OGE US Equity	OGE ENERGY CORP	34%	1.61	1.03	33%	1.38	0.93
OGS US Equity	ONE GAS INC	34%	1.16	0.97	34%	1.10	1.00
PCG US Equity	P G & E CORP	68%	1.15	0.82	54%	1.28	0.80
PEG US Equity	PUBLIC SERVICE ENTERPRISE GP	37%	1.25	0.87	34%	1.10	0.84
PNM US Equity	PNM RESOURCES INC	47%	1.25	0.60	48%	1.06	0.64
PNW US Equity	PINNACLE WEST CAPITAL	40%	1.18	0.52	37%	1.08	0.63
POR US Equity	PORTLAND GENERAL ELECTRIC CO	40%	1.10	0.69	41%	0.95	0.68
PPL US Equity	PPL CORP	45%	1.39	0.83	47%	1.11	0.68
RGCO US Equity	RGC RESOURCES INC	32%	0.70	0.60	29%	0.58	0.38
SJI US Equity	SOUTH JERSEY INDUSTRIES	52%	0.91	0.87	45%	0.93	0.97
SO US Equity	SOUTHERN CO/THE	46%	1.02	0.66	43%	0.86	0.59
SR US Equity	SPIRE INC	45%	0.90	0.58	44%	0.82	0.61
SRE US Equity	SEMPRA ENERGY	41%	1.12	0.72	39%	1.04	0.81
SWX US Equity	SOUTHWEST GAS HOLDINGS INC	44%	1.11	0.80	40%	1.04	0.80
UTL US Equity	UNITIL CORP	41%	1.09	0.94	42%	0.91	0.81
WEC US Equity	WEC ENERGY GROUP INC	33%	1.11	0.68	34%	0.92	0.64
XEL US Equity	XCEL ENERGY INC	39%	1.04	0.62	41%	0.83	0.53
	Mean	**41%**	**1.08**	**0.76**	**40%**	**0.96**	**0.74**