



Rate of return

**International regulatory
approaches to rate of
return**

Draft working paper

August 2020

© Commonwealth of Australia 2020

This work is copyright. In addition to any use permitted under the Copyright Act 1968, all material contained within this work is provided under a Creative Commons Attributions 3.0 Australia licence, with the exception of:

- the Commonwealth Coat of Arms
- the ACCC and AER logos
- any illustration, diagram, photograph or graphic over which the Australian Competition and Consumer Commission does not hold copyright, but which may be part of or contained within this publication. The details of the relevant licence conditions are available on the Creative Commons website, as is the full legal code for the CC BY 3.0 AU licence.

Requests and inquiries concerning reproduction and rights should be addressed to the Director, Corporate Communications,
Australian Competition and Consumer Commission,
GPO Box 3131,
Canberra ACT 2601
or publishing.unit@acc.gov.au.

Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 520
Melbourne Vic 3001

Tel: 1300 585165

Email: RateOfReturn@aer.gov.au

AER Reference: 65402

Amendment Record

Version	Date	Pages
1.0	27 August 2020	23

Contents

	Shortened forms	iv
1	Overview	1
	1.1 . The rate of return.....	1
	1.2 . Why this topic?.....	1
	1.3 . Possible options for 2022	2
	1.4 . Next steps	3
2	Process background.....	5
	2.1 . What is the rate of return instrument?	5
	2.2 . What is our 'Pathway to 2022'?	5
	2.3 . What is the intent of the working paper series?.....	5
	2.4 . Interactions with other working papers	6
3	Framework for comparing international regulators	8
4	Brattle report findings	9
	4.1 . Key Brattle conclusions	14
5	Use in the 2022 rate of return review.....	15
	5.1 . Frequency of reviews and updates.....	16
	5.2 . Potential adjustments	18
6	Glossary.....	21

Shortened forms

Shortened form	Extended form
2018 Instrument	The rate of return instrument published on 17 December 2018
2022 Instrument	The rate of return instrument to be published in December 2022
ACM	Authority for Consumers and Markets (a Dutch regulator)
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ARERA	Italian Regulatory Authority for Energy, Networks & the Environment
Brattle	The Brattle Group
CAPM	Capital asset pricing model (Sharpe-Lintner CAPM)
CGS	Commonwealth government securities
DGM	Dividend growth model
FERC	Federal Energy Regulatory Commission (a US regulator)
Instrument	Rate of return instrument
MRP	Market risk premium
NEL	National electricity law
NEO	National electricity objective
NGL	National gas law
NGO	National gas objective
NZCC	New Zealand Commerce Commission
Ofgem	Office of Gas and Electricity Markets (a UK regulator)
Ofwat	Office of Water Services (a UK regulator)
PTRM	Post-tax revenue model
SL CAPM	Sharpe-Lintner capital asset pricing model (or just CAPM)
STB	Surface Transportation Board (a US regulator)
UK	United Kingdom
US	United States of America
WACC	Weighted average cost of capital

1 Overview

This working paper is part of a series that we will produce as part of our pathway to the 2022 rate of return instrument. The outcomes from these working papers will feed in to the active phase of our 2022 instrument review. This information will assist us to develop a 2022 rate of return instrument that sets a rate of return that contributes to the achievement of the National Gas Objective (NEO) and National Electricity Objective (NEO).¹ These objectives focus on the long term interests of consumers.² In advancing consumers' interests we aim to promote efficient investment in and operation of regulated energy businesses.

1.1 The rate of return

Investors in any business expect to receive an additional return above their initial investment (or capital). We use the phrase 'rate of return on capital'—or just 'rate of return'—to refer to this additional amount when expressed as a percentage of the initial investment.

We estimate the rate of return for regulated energy businesses by combining the returns of two sources of funds for investment: equity and debt. The rate of return provides the business with funds to service the interest on its loans and give a return to shareholders.

An accurate estimate of the rate of return is necessary to promote efficient prices in the long term interests of consumers. If the rate of return is set too low, the network business may not be able to attract sufficient funds to be able to make the required investments in the network and reliability may decline. Conversely, if the rate of return is set too high, the network business may seek to spend too much and consumers will pay inefficiently high tariffs.

Therefore there is a need to evaluate the two sources of funds for investment, to determine what return investors expect to receive, and to set a regulated rate of return that is sufficient to attract capital investment.

1.2 Why this topic?

Estimating the rate of return is difficult and contentious. It requires regulatory judgement to assess the complex and sometimes conflicting evidence; and to engage with finance theory, academic literature and market practice. There is no one 'right answer' to be found.

¹ NGL, cl. 23; NEL, cl. 7.

² The NEO 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. The NEO is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interest of consumers of electricity with respect to: price, quality, safety and reliability, and security of supply of electricity; and the reliability, safety and security of the national electricity system.

We are not the only regulator making this type of assessment. Regulators in many overseas jurisdictions also grapple with some of the same issues. A high-level comparison of regulatory approaches allows us to consider these international approaches, and learn from what has worked (or has not worked) overseas.

When comparing rate of return approaches or outcomes between regulators in different countries, it is important to consider the overall regulatory environment in which each operates. The rate of return approach adopted in one area may be materially affected by other rate of return decisions made elsewhere, the overall rate of return approach or the regulatory framework. To help us understand overseas regulatory regimes, we commissioned expert advice from The Brattle Group (Brattle), which is released alongside this working paper.³ Brattle has a global presence and extensive experience providing economic and financial advice in many countries.

We considered international regulators when developing the 2018 Rate of Return Instrument (2018 Instrument). A key challenge was that we could not reliably quantify and adjust their rate of return decisions to allow suitable comparison.⁴ Therefore, as part of this working paper, we seek to:

- Compare and evaluate differences between our current rate of return approach and the approaches used by international regulators.
- Identify options for potential changes to our current approach.
- Seek submissions on the use of international approaches for informing the rate of return.

1.3 Possible options for 2022

The Brattle report concludes that there is a degree of commonality amongst international regulators in their objectives and broad regulatory frameworks. This congruence provides a basis for comparison across countries, though careful consideration is still warranted. The core shared features of regulators' rate of return approaches include the use of a weighted average cost of capital; the use of a benchmark return on debt informed by market data; and the use of the Sharpe-Lintner capital asset pricing model (SL CAPM) to estimate the return on equity.

We agree that there are shared aspects between international regulators but we seek further stakeholder input on the extent of these similarities and whether the rate of return can be meaningfully compared across them.

Although there are shared objectives and high level frameworks, the Brattle report documents the substantial variation between regulators when it comes to implementing those objectives. Even where there is a core shared approach, each regulator makes a number of implementation adaptations that may not be adopted by other regulators. These are driven by a range of factors such as regulatory judgement, different

³ Brattle, *A review of international approaches to regulated rates of return*, Prepared for the AER, 30 June 2020.

⁴ AER, *Rate of return instrument, Explanatory statement*, December 2018, p. 156.

economic factors and implementation of the SL CAPM. Key examples of these different implementation decisions include:

- The method for estimating the market risk premium, including use of historical data or the dividend growth model, and whether a total market return approach is used.
- The period of observation of the risk free rate.
- The econometric methods used for estimating equity beta, as well as choice of comparator firms.
- Use of adjustments that have regard to other data and/or models.

We invite stakeholder submissions on any element of this draft working paper. When suggesting overseas rate of return approaches that could be incorporated into our approach, we request that stakeholders engage with the regulatory context in which those overseas approaches are used, as explained in the Brattle report.

However, we propose that specific options for change arising from the international review are best dealt with in working papers looking directly at those topics (or discussion papers in the main phase of the 2022 review, as appropriate). One pertinent example is that our third working paper (released at the same time as this paper) deals with options for the use of various return on equity models. In such a case, we think it will be constructive for stakeholders to make submissions in those more specific processes.

Notwithstanding this point, we highlight several issues that might prompt stakeholder responses to this draft working paper:

- We invite stakeholder comments on the relationship between the AER's overall approach and the international approaches presented in the Brattle report. This could also include comparison of our rate of return outcomes relative to international outcomes, noting that such a comparison needs careful consideration.
- The Brattle report makes a number of conclusions around the frequency of the AER's rate of return reviews and the application of those review outcomes to regulated entities. Chapter 5 describes our initial assessment of these options and some of the challenges that would need to be overcome. We welcome stakeholder submissions in response.
 - We have also described the strengths and weaknesses of another option, to annually update the risk free rate during a regulatory period.
- Several international regulators make adjustments (of various types) to the overall rate of return or return on equity or debt. These options could be discussed in stakeholder responses to this paper. We present some advantages and disadvantages of the most prominent of these (Ofgem's adjustment for expected incentive outperformance) in chapter 5.

1.4 Next steps

We invite stakeholder submissions in response to this working paper by 9 October 2020.

Our normal practice is to hold a public forum during the submission period, where stakeholders can ask questions of the AER and interact directly to hear each other's perspectives. However, government restrictions in response to the COVID-19 pandemic mean this cannot be an in-person meeting.

Our current intent is to hold an online event on Wednesday 16 September 2020. Information about the online forum will be available on the AER's website in due course.

After consideration of submissions, we expect to conclude this working paper topic with the release of a final working paper in December 2020.

Making a submission

Written submissions should be emailed to the AER at RateOfReturn@aer.gov.au, by close of business, 9 October 2020.

Alternatively, submissions can be sent to:

Mr Warwick Anderson
General Manager, Network Finance and Reporting
Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601

We prefer that all submissions be sent in an electronic format in Microsoft Word or other text-readable document form and publicly available, to facilitate an informed, transparent and robust consultation process.

Submissions will be treated as public documents and posted on the AER's website unless prior arrangements are made with the AER to treat the submission, or portions of it, as confidential. Those wishing to submit confidential information are requested to:

- clearly identify the information that is the subject of the confidentiality claim; and
- provide a non-confidential version of the submission in a form suitable for publication.

All non-confidential submissions will be placed on the AER's website at www.aer.gov.au. For further information regarding the AER's use and disclosure of information provided to it, see the ACCC/AER Information Policy, June 2014 available on the AER's website.

Enquiries about this paper, or about lodging submissions, should be directed to the Network Reporting and Finance branch of the AER on (03) 9290 1800.

2 Process background

2.1 What is the rate of return instrument?

The rate of return instrument specifies how we determine the allowed rate of return on capital in regulatory determinations for energy networks. It specifies the mathematical formulae we will use to calculate the rate of return, and how we will obtain inputs for those formulae. It specifies some inputs (fixed for the duration of the instrument) and for others specifies the process by which we will measure market data and use it as an input at the time of a decision.

The current rate of return instrument was published on 17 December 2018 (the 2018 Instrument). In December 2022 we will publish the next rate of return instrument (the 2022 instrument). This binding instrument will determine the allowed rate of return on capital for the following four year period.

Estimating the rate of return is a complex task. We estimate the returns required by investors in view of the risks associated with energy network companies compared to their other investment opportunities. We make this judgement by examining a broad range of evidence including financial market data, models of financial returns, the latest investment knowledge and the views of all stakeholders.

2.2 What is our 'Pathway to 2022'?

We use the term 'Pathway to 2022' to describe the process by which we will develop the 2022 Instrument. We consulted with stakeholders about what steps should be included and what role various reference groups should play.⁵ We issued a position paper in May 2020 setting out our high level plan.⁶

The active phase of the 2022 review will commence in mid-2021. Prior to this, our pathway to 2022 includes:

- Rate of return annual updates—to provide information on rate of return data in the years between reviews; particularly updated times series data used in the 2018 instrument (or used to inform the development of the 2018 Instrument).
- Establishing reference groups—to ensure we hear stakeholder perspectives from consumers, investors and retailers.
- Working papers—such as this paper.

2.3 What is the intent of the working paper series?

Our rate of return working papers discuss issues and evidence on key rate of return topics, and allow us to hear from stakeholders in response. We intend that all this

⁵ AER, *Consultation paper, Pathway to the 2022 rate of return instrument*, November 2019; see also The Brattle Group, *Stakeholder feedback on the AER's process for the 2018 rate of return instrument*, 27 June 2019.

⁶ AER, *Position paper, Pathway to the 2022 rate of return instrument*, 29 May 2020.

material will feed in to the main phase of the review, providing a foundation for constructive discussion and helping alleviate time pressure in the active phase.

On each chosen topic, we expect to release a draft working paper (usually accompanied by an expert report), before a submission period. We will facilitate discussion with stakeholders within the restrictions arising from the COVID-19 pandemic, such as by hosting an online meeting. We will then release a final working paper with our response to submissions.

In selecting topics for working papers, we have had regard to whether topics could be constructively considered as discrete issues in advance of the active phase of the review.⁷ We have also taken into account stakeholder feedback on the topics of interest or importance.⁸

We intend that all this material will feed in to the main phase of the review, providing a foundation for constructive discussion and helping alleviate time pressure in the active phase.

The topic of this paper (international regulatory comparison) was selected because it encompassed a more holistic consideration of the approach to setting the rate of return and how international regulators conduct this task. Our view is that these matters could be appropriately addressed ahead of the active phase of the review and have the potential to lead to further work on aspects of our approach.

2.4 Interactions with other working papers

We have published this paper simultaneously with our third draft working paper, on the capital asset pricing model (CAPM) and alternative return on equity models.⁹ It provides a framework for evaluating these models and assesses candidate models for their suitability for use in our regulatory framework. That working paper is accompanied by an expert report by Professors Graham Partington and Stephen Satchell.¹⁰

We have released these documents simultaneously because there are areas of overlap between the two topics. In particular, consideration of international rate of return approaches necessarily includes their method for estimating the return on equity and use of return on equity models (as well as return on debt, gearing, tax, and the overall rate of return).

To reduce duplication, we discuss overlapping material in one location only. The *CAPM and alternative return on equity models* working paper contains our primary discussion on:

- return on equity models (whether prompted by the Partington and Satchell report, or the international review conducted by The Brattle Group).

⁷ AER, *Position paper, Pathway to the 2022 rate of return instrument*, 29 May 2020, pp. 9–10.

⁸ AER, *Position paper, Pathway to the 2022 rate of return instrument*, 29 May 2020, p. 22.

⁹ AER, *Rate of return, CAPM and alternative asset pricing models, Draft working paper*, 27 August 2020.

¹⁰ Partington and Satchell, *Report to the AER, Alternative asset pricing models*, 30 June 2020.

- the technical methodology for estimating return on equity model parameters including the use of international comparators and international data.

Our first draft working paper was on the energy networks' debt data.¹¹ It looked at evidence on actual debt costs incurred by regulated networks and discussed how this data might be used to inform the 2022 instrument. There is some overlap between this paper and that one, because this paper includes analysis of return on debt approaches used internationally. However, the overlap is relatively minimal, because the debt data working paper is focused on a particular practical question (what use can be made of the actual debt data collected from Australian networks). The draft working paper on debt was released in June 2020, and we expect to release the final working paper at the end of October 2020.

¹¹ AER, *Rate of return, Energy networks debt data, Draft working paper*, 26 June 2020. The project page is <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/energy-network-debt-data-pathway-to-rate-of-return-2022>.

3 Framework for comparing international regulators

Brattle has applied the following broad framework for comparing across international regulators in its report:

- How does the overall regulatory framework interact with the rate of return framework?
- In view of that context, review and compare rate of return approaches and framework between regulators.
- Identify differences and similarities between regulators.

The comparison of rate of return outcomes is made more difficult because of differences in how and when the rate of return is calculated. There can be:

- Format differences in the rate of return framework (e.g. form of the rate of return in terms of being post-tax or pre-tax; real or nominal).¹²
- Time differences between when each regulator determines its rate of return.¹³
- Market differences, as the rate of return set by each regulator reflects information from different markets and countries.

To improve comparability, Brattle has adjusted the form of rate of return to be aligned between regulators.¹⁴ It has not adjusted for market differences or timing differences, though it has selected the most recent decision from each regulator.

In selecting international regulators, Brattle has chosen a broad spread of regulators:

- the Dutch Authority for Consumers and Markets (ACM)
- the United States (US) Federal Energy Regulatory Commission (FERC)
- the US Surface Transportation Board (STB)
- the Italian Regulatory Authority for Energy, Networks & the Environment (ARERA)
- the New Zealand Competition Commission (NZCC)
- the United Kingdom (UK) Office for Gas and Electricity Markets (Ofgem)
- the Water Services Regulation Authority (Ofwat)

All the international regulators determine a rate of return as part of their revenue/price regulation and most regulate the gas and electricity distribution and transmission industries (with some regulating additional industries).¹⁵

¹² Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 31.

¹³ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 3.

¹⁴ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 47.

¹⁵ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 18.

4 Brattle report findings

This section summarises key findings from the Brattle report.

The Brattle report concludes that there is a degree of commonality amongst international regulators in their objectives and broad regulatory frameworks, the form of regulatory control, length of regulatory period and use of the Sharpe-Lintner capital asset pricing model (see Table 4.1 on the following page).

We observe that all regulators estimate the rate of return as a weighted average of the return on equity and return on debt.

When estimating the return on equity, Brattle found that:

- All international regulators use the standard Sharpe-Lintner capital asset pricing model in some manner to estimate the return on equity, with most solely using the SL CAPM.¹⁶
- Regulators differ in their implementation of the SL CAPM:¹⁷
 - Regulators differ in the benchmark term which ranges from 5 years (the NZCC) to 30 years (the FERC) and length of averaging periods which ranges from 1 month (Ofgem and Ofwat) to 3 years (ACM).
 - Some regulators use exclusively domestic firms and others include international firms when estimating equity beta.
 - Most international regulators rely on historical data to inform the market risk premium. The FERC is an exception as it relies exclusively on a forward-looking market risk premium that is calculated using the dividend growth model (DGM). The NZCC and Ofwat use both.¹⁸
 - Three regulators (the ARERA, Ofgem and Ofwat) use historical total market return methodology (the 'Wright approach') to estimate the market risk premium. Both the ACM and STB use historical excess returns.¹⁹
- The FERC and STB use multiple models to estimate the return on equity.
 - Both regulators use the CAPM and DGM.
 - However, the FERC implementation of the CAPM also has regard to a 'size factor', where there an increase in the return on equity for smaller businesses (based on market capitalization) and reduced return on equity for larger businesses.²⁰

¹⁶ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 33–34.

¹⁷ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 39–44.

¹⁸ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 43–44.

¹⁹ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 79, 100.

²⁰ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 92.

Table 4.1 Brattle comparison of overall objectives and key features²¹

	AER	ACM	FERC	STB	ARERA	NZCC	Ofgem	Ofwat
[1] High-level legal objective	Efficiency / consumer interest	Efficiency	Just and reasonable rates	Reasonable max rate where no competitive alternative	Efficiency / competition / consumer interest	Consumer interest / promote competition	Consumer interest / promote competition	Consumer interest / promote competition
[2] Form of regulatory control	Revenue cap Price cap Other	✓	✓	✓	✓	✓	✓	✓
[3] Rate of return proceeding separate from revenue determination?	Yes	No	Sometimes ⁺	Yes	Yes	Yes	No	No
[4] Length of control period (years)	5	5	varies*	1**	6	5	5	5
[5] Years between rate of return proceedings	4	NA	NA	1	3/6 ^Δ	7 ^{ΔΔ}	NA	NA
[6] Rate of return framework	Real vanilla WACC CAPM r_e ; trailing average r_d	Real pre-tax WACC CAPM r_e ; trailing average/ forecast r_d	Determine r_e r_e based on various models; embedded r_d	Nominal vanilla WACC r_e based on various models; embedded r_d	Real pre-tax WACC r_e based on a variant of CAPM; r_d is r_f plus a premium	Real vanilla WACC r_e based on a variant of CAPM; r_d is r_f plus a premium	Real vanilla WACC CAPM r_e with an uplift; trailing average r_d	Real vanilla WACC CAPM r_e ; trailing average r_d
[7] Components of the rate of return that are updated during the control period	r_d is updated annually; r_f determined at the beginning of control period	No updating after the control period starts	NA	Annually updated	Results of rate of return proceeding flow through immediately into revenues	r_d and r_f determined at the beginning of control period, no updating	r_f and r_d updated annually	r_d updated annually***

Notes:

* FERC price determinations are evergreen, until the utility or customers (or FERC itself) requests a new determination.

** STB determines the rate of return annually, although these determinations do not automatically flow through into rates.

*** While Ofwat does not update the cost of debt annually, it has indicated that the cost of debt would get trued up at the end of the control period.

+ FERC rate of return methodology is usually not revisited in individual revenue determinations; methodology can be reviewed in a separate proceeding; for ISO/RTOs with multiple transmission owner members, FERC determines ROE only, not revenue requirements.

Δ Inflation, MRP and risk-free rate are updated every 3 years, with the overall rate of return re-determined every 6 years.

ΔΔ Parameters and methodology must be reviewed at least every 7 years.

²¹ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 20.

- The FERC also uses a risk premium model to inform its return on equity for electricity transmission companies (but not gas pipelines). It recognises an inverse relationship between interest rates and the equity risk premium and estimates a return on equity based on a linear regression of its equity risk premium in past decisions and Moody's Baa-rated index of utility bond yields.²²
- Cross checks and adjustments:
 - Ofgem adjusts the return on equity based on its cross checks.²³
 - Ofgem also adjust its authorised return on equity for incentive schemes, though Brattle distinguishes this from an adjustment to the return on equity estimate itself.²⁴
 - The FERC adjusts its return on equity estimate for the regulated businesses' risk profile, although it does not specify a set criteria for evaluating risk.²⁵
 - The FERC also adjusts its return on equity for certain schemes, though Brattle distinguishes this from an adjustment to the return on equity estimate itself.²⁶

The Brattle report noted the following on international regulators' return on debt:

- Three regulators (the ACM, Ofgem, and Ofwat) use a trailing average while the remaining regulators rely on various debt estimation approaches.²⁷
- Of the regulators that set a benchmark term for debt, most regulators use a term of 10 years or more (the ACM and UK regulators) while the NZCC use a benchmark term of 5 years.²⁸ The remaining regulators do not specify a benchmark term.
- Some regulators (the ACM, NZCC and Ofwat) include debt raising costs in the return on debt.²⁹
- Most international regulators use market-based data on debt yield to estimate the return on debt (the ARERA, Ofgem, Ofwat, NZCC, ACM and STB).³⁰
- Cross checks and adjustments:
 - Ofwat adjusts its return on debt based on its expectations for future debt costs.

²² In this context, 'equity risk premium' means the difference between the risk free rate and the overall return on equity. Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 93.

²³ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 34.

²⁴ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 56, 123.

²⁵ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 93–94.

²⁶ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 85.

²⁷ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 46.

²⁸ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 108, 115, 121, 129–130.

²⁹ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 45, 122.

³⁰ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 76, 99, 108, 114–115, 121, 129–130.

Brattle noted the following on gearing:

- Four regulators (the ACM, STB, NZCC and Ofwat) apply a single benchmark gearing value for their regulated sectors. The ARERA, NZCC and Ofgem set different benchmark gearing depending on the sector.³¹
- A gearing assumption of 60% is set by the UK regulators while the ACM, ARERA and NZCC have slightly lower gearing values of between 40–50%. The STB applies a gearing level of 17%.³²
- Four regulators (ACM, NZCC, STB and ARERA) use information from relevant comparator firms to estimate gearing.³³

We observe the majority of international regulators do not make any adjustments to the output rate of return (weighted average cost of capital or WACC) once it has been estimated. The exceptions are the NZCC and Ofwat. It appears that the NZCC increases its estimate to reflect uncertainty and asymmetric consequences of over- or under- investment. Ofwat reduces its weighted average cost of capital by 0.04% to remove the impact of its comparator firms also operating in the retail water sector which carries higher systematic risk.³⁴

Table 4.2 (on the following page) summarises the international regulators' rate of return. Brattle has adjusted the numbers to increase comparability across the various regulators.³⁵

Key points from Table 4.2:

- We have the lowest equity beta estimate compared to the other international regulators.³⁶ Brattle suggests that this may be due to our reliance on data from a longer estimation period while most other regulators rely on a shorter horizon.³⁷
- Our market risk premium estimate is lower than the other regulators' values except for the ACM and ARERA.³⁸
 - This may be due to the FERC, STB and NZCC using the dividend growth model (DGM) in some manner to estimate the market risk premium while the UK regulators implement the Wright (or total market return) approach.
 - The ACM and ARERA set lower market risk premiums because they put substantial weight on the historical geometric average.³⁹ The ARERA's

³¹ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 107; and Ofgem, *RIO-2 Draft determinations- Finance annex*, July 2020, p. 92.

³² Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 49.

³³ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 70, 80, 103, 109, 127.

³⁴ The adjusted WACC accounts for a lower level of systematic risk in English wholesale businesses; Ofwat, *PR19 final determinations, Allowed return on capital technical appendix*, December 2019, p. 15; Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 131

³⁵ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 47.

³⁶ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 57.

³⁷ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 61.

³⁸ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 57.

³⁹ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 79, 109.

methodology uses a weighted average of the geometric and arithmetic means of the real total market return. The ACM takes the simple average of the arithmetic and geometric means of excess returns for the Eurozone.

- We set a higher return on debt than most international regulators.⁴⁰ The difference may be due to the different data sources and approaches used to estimate the return on debt (for example, difference in benchmark credit rating and term).⁴¹ We are also currently transitioning to the 10-year trailing average approach. Consequently, more weighting has been given to high return on debt values that were estimated in prior years.
- We set a higher estimate of expected inflation than other international regulators (where estimates have been provided).

Table 4.2 Brattle comparison of rate of return (WACC) outcomes⁴²

		AER	ACM	FERC	STB	ARERA	NZCC	Ofgem	Ofwat
Decision year		2020	2016	2020	2018	2019	2019	2019	2019
Nominal									
Cost of debt	[1]	4.76%	2.19%		4.16%		2.92%		
Cost of debt, excluding issuance cost	[2]	4.76%	2.04%		4.16%		2.72%		
Cost of equity	[3]	4.69%	5.02%	10.05% *	13.86% *		5.87%		
Equity beta	[4]	0.60	0.74	0.84	1.11		0.65		
MRP	[5]	6.10%	5.05%	8.60%	6.91%		7.29%		
Rf	[6]	1.03%	1.28%	2.70%	3.02%		1.12%		
Real									
Cost of debt	[7]	2.49%				2.39%		1.93%	2.14%
Cost of debt, excluding issuance cost	[8]	2.49%				2.39%		1.93%	2.04%
Cost of equity	[9]	2.42%				5.77%		4.80%	4.19%
Equity beta	[10]	0.60				0.706		0.76	0.71
MRP	[11]	6.10%				5.50%		7.32%	7.89%
Rf	[12]	-1.24%				1.89%		-0.75%	-1.39%
Other factor	[13]					0.49%			
Gearing, tax and inflation									
Gearing	[14]	60%	50%		16.92%	44%	42%	60%	60%
Tax rate	[15]	30%	25%			31%			
Composite tax rate	[16]					24%			
Expected inflation	[17]	2.27%	1.42%			1.70%	1.94%		
Rate of return									
Nominal vanilla WACC - as reported	[18]	4.73%			12.22%		4.57%		
Nominal vanilla WACC	[19]		3.53%				4.55%		
Real vanilla WACC - as reported	[20]							2.88%	2.96%
Real vanilla WACC	[21]	2.46%	2.08%			4.27%	2.56%	3.08%	2.90%
Real pre-tax WACC - as reported	[22]		3.00%			6.31%			
Nominal after-tax WACC - as reported	[23]		3.33%						
Nominal pre-tax WACC - as reported	[24]		4.44%						

Notes

Non-italized numbers come from the Appendix Tables corresponding to the individual regulators.

ACM: The latest method decision was issued in 2016 for for the regulatory period 2017 - 2021, in which the ACM determines a WACC for 2016 and 2021, then interpolates the WACC for each year of the regulatory period. The ACM also determines WACC for new and existing capital separately. This table shows the WACC determined for 2021 for new capital.

ARERA: Numbers shown are for gas distribution. Other factor is a tax adjustment factor. Risk-free rate is the 0.5% risk-free rate plus the 1.39% country risk premium.

*FERC: Uses three equally weighted methods to determine ROE. CAPM results are adjusted for size. Beta reflects median beta.

*STB: Uses two equally weighted methods to determine ROE.

NZCC: Equity beta and MRP are adjusted by the same factor to achieve a return on equity that would give the end 67th percentile nominal vanilla WACC

Ofgem: Equity beta and MRP are adjusted by the same factor to achieve a return on equity that would reflect the expected outperformance and uplift to cost of equity

AER real cost of debt, cost of equity and rf = nominal numbers minus inflation

[2][8]: cost of debt minus issuance cost.

[19]: $[2] \times [14] + (1 - [14]) \times [3]$

[21]: $[8] \times [14] + (1 - [14]) \times [9]$, except NZCC and ACM, where the real vanilla WACC is estimated from nominal vanilla WACC and inflation.

⁴⁰ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 57.

⁴¹ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 51.

⁴² Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 49.

4.1 Key Brattle conclusions

The Brattle report made four key suggestions.⁴³ We explore the first three options further in our *CAPM and alternative return on equity models* working paper, which was released at the same time as this paper. This paper focusses on Brattle's fourth suggestion.

1. Incorporate more forward looking evidence in the determination of the return on equity.
2. Use a multi-model approach for estimating the return on equity.
3. Apply an estimation window of 2–5 years using daily or weekly return data to estimate the equity beta; and to use international firms in the beta comparator set.
4. Increase the frequency of rate of return reviews and apply outcomes immediately to all businesses. In addition, update all return on equity parameters jointly (rather than one equity parameter in isolation) and apply this update immediately to all businesses.

While the Brattle report did not make explicit suggestions around the return on debt, there were a number of observations of international practice using actual cost of debt information. This will feed in to our *Energy networks debt data* final working paper.

⁴³ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 59–62. Note that we consider the use of forward-looking evidence, multi-model approaches, and beta methodology (beta estimation window, return observation frequency, and use of international beta comparators) in more detail in AER, *Rate of return, CAPM and alternative return on equity models*, Draft working paper, August 2020

5 Use in the 2022 rate of return review

The Brattle report has provided a useful survey of international regulatory approaches to rate of return. It presents those approaches together with context around the regulatory framework in which each international regulator operates.

It has highlighted similarities and differences in methodology and application in international regulators' approach to setting the rate of return in many areas, such as the frequency of review, implementation of the capital asset pricing model, use of forward looking indicators, decisions on averaging periods for market data, methodological choices around parameter inputs, use of cross checks, and method for making adjustments made to model outcomes.

Brattle found that the regulators it examined shared core regulatory objectives (setting the rate of return for monopoly infrastructure) and regulatory framework. The differences therefore indicate that a regulator's approach is a product of their judgement, economy, regulatory environment, and the underlying characteristics of the regulated businesses.

In comparing and contrasting the international approaches against our own approach, we need to be mindful of these differences—such as differences in regulated firms, markets, and interest rates. We need to carefully consider our own situation, the limitations of international regulators' approaches and assess information on its merit when setting the rate of return. We also need to consider all this in the context of contributing to the achievement of the NEO and NGO and the relevant obligations under the National Electricity Rules and National Gas Rules.

The Brattle report provides a useful survey of international rate of return outcomes. It presents those figures after making some adjustments to aid the comparability of the figures. However, it was not possible for Brattle to adjust for all of the relevant differences.

We are seeking submissions on international rate of return approaches that could lead to an improvement in our rate of return approach. This includes submissions informed by the international rate of return outcomes and how it differs from (or is similar to) our regulated rate of return. The Brattle report provides extensive detail for stakeholders to consider. However, there are some limitations to Brattle's analysis which needs to be taken into account:

- The sample regulatory decisions used to compare rate of return estimates are not matched in time.
- Ofgem's most recent decision (July 2020) was not released in time for the Brattle report.
- International estimates are not comparable to our domestic estimates without appropriate adjustment.
- As noted above, other regulators' estimates and approach is a product of many factors.

We discuss Brattle's observations on the frequency of reviews/updates and potential adjustments in this paper. We consider that Brattle's other findings are best dealt with in other processes:

- Our *CAPM and alternative return on equity models* working paper discusses the various approaches for estimating the return on equity. This will cover Brattle's observations on how the return on equity is estimated such as equity models, forward looking indicators and equity beta estimation.⁴⁴
- Our *Energy networks debt data* working paper explores possible uses for actual cost of debt data from regulated businesses.⁴⁵ The final working paper will cover Brattle's observations on the use of actual debt data.

5.1 Frequency of reviews and updates

5.1.1 Brattle preferences

The Brattle report suggests more frequent rate of return reviews, and that rate of return review outcomes are applied to all networks immediately. The strength of these suggestions is that rate of return information is more up-to-date. We agree that this is a desirable property.

The Brattle report also suggests that we should not update any return on equity parameters in isolation, but rather jointly review all equity parameters (i.e. CAPM inputs) and update all at the same time. In the 2018 instrument we specify a method for estimating the risk free rate, and we apply this method to get an updated risk free rate just before each regulatory control period.⁴⁶ Implementing this suggestion would instead mean that the Instrument specified a value for the risk free rate (as with equity beta and the market risk premium). The key benefit noted by Brattle is that this would allow consideration of interactions between the parameters. We agree that this would be a benefit.

However, we consider there are significant challenges to Brattle's suggestions that mean they are most likely impractical and undesirable:

- The current period between rate of return instruments (four years) was determined after extensive stakeholder consideration in 2018 by the Council of Australian Governments Energy Council. There would need to be extensive new information to consider changing frequency even before the first cycle is complete. We note that as the four year period is set in the National Electricity Law and National Gas

⁴⁴ Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 58–62.

⁴⁵ AER, *Rate of return, Energy networks debt data, Draft working paper*, 26 June 2020. The project page is <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/energy-network-debt-data-pathway-to-rate-of-return-2022>.

⁴⁶ Under our current approach, we fix the market risk premium and equity beta values when the Instrument is made. The method for setting the risk free rate is fixed in the Instrument, but it specifies that we will use the yield on 10 year commonwealth government securities (CGS) from a period close to the start of the regulatory control period.

Law, it would require legislative action (i.e. could not be changed by the Australian Energy Market Commission (AEMC) or the AER).⁴⁷

- The complex and inter-related nature of the rate of return review requires a lengthy review process with time for stakeholder consultation. For instance, we commenced preparation for the 2022 instrument in late 2019. More frequent reviews would risk inadequate consideration of issues and increase the resourcing burden on stakeholders (and the AER).
 - If we wanted to jointly update all return on equity parameters for each reset, we could attempt a focused return on equity review. While less complex than a full rate of return review, this would still be a substantial process. Allowing adequate consultation and consideration of issues would take much longer than the period between AER determinations (typically six months).
 - Alternatively, we could jointly update all return on equity parameters by applying an 'automatic' approach to estimate parameters such as the market risk premium and equity beta. The key question is whether a mechanistic process would be likely to lead to inaccurate estimates of these parameters. Most international regulators also do not update their equity beta or market risk premium estimates within a regulatory period.
- Increasing the frequency of reviews may reduce regulatory certainty, particularly where there is a risk that issues may not be adequately aired because of time constraints. Similarly, review outcomes immediately flowing through to all regulated networks (even those in the middle of a regulatory control period) would lead to greater uncertainty for businesses and consumers around revenue and prices.
- The risk of out-of-date rate of return outcomes is related to the extent to which fundamental rate of return relationships will hold across time. In developing the 2018 Instrument, our assessment was that the risk free rate should use market data at each regulatory determination, but that this could reasonably be combined with values for beta and the market risk premium that were set for four years. If this is the case, then updating input parameters using latest market data (but without a full review) helps prevent out-of-date rate of return outcomes, even if there are a number of years between reviews.
- Fixing values for all return on equity parameters in the Instrument (instead of allowing updates of selected suitable parameters) would mean that there was an even longer period between when the rate of return was estimated and when it was applied to networks. This is an interaction effect arising from the problems (listed above) with adopting a shorter period between reviews and/or apply review outcomes to all networks immediately. As Brattle notes, use of an out-of-date rate of return appears undesirable.

⁴⁷ AER, *Rate of return instrument, Explanatory statement*, December 2018, p. 23.

5.1.2 Annual update of the risk free rate

We have also given some consideration to annually updating the risk free rate used to determine the return on equity. The Brattle report notes that Ofgem proposes to do this in its upcoming resets.⁴⁸

There is general agreement that the yield on government securities represents a suitable proxy for the risk free rate. This can be readily observed over a short averaging period prior to the start of each year, as we do for the return on debt. This would feed in to the post-tax revenue model, required revenues would be updated, and the X factor for the upcoming year would be recalculated. In the *CAPM and alternative return on equity models* working paper, we also discuss the relationship between the risk free rate and total market return.⁴⁹

We are seeking submissions on this option because there are advantages:

- It could be an automatic update. There is no issue with the need for complex regulatory judgement (as there is for equity beta and the market risk premium).
- It might partially address Brattle's concerns about applying an out-of-date rate of return and the need for more forward looking information, which drove its suggestion for more frequent updates.

We are also mindful of the weaknesses of this option:

- The Brattle report did not support this idea (when discussing the Ofgem proposal), on the basis that it would not be correct to update one element of the return on equity in isolation.
- It would depart from the current incentive framework where all building blocks are set at the commencement of the regulatory control period, and we do not update these building blocks within the regulatory control period.⁵⁰
- It would be necessary to further consider implications for risk exposure for networks and consumers.

We invite stakeholder feedback on the frequency of rate of return reviews, the lag before these are implemented for each network, the necessity for updating all return on equity parameters and the option for annually updating the risk free rate.

5.2 Potential adjustments

Brattle noted several adjustments made by overseas regulators, either at the level of the overall rate of return, the return on equity or the return on debt. These adjustments were made after calculating base figures (for example, after implementing the primary return on equity model) to arrive at a different outcome.

⁴⁸ Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 29.

⁴⁹ AER, *CAPM and alternative return on equity models*, August 2020, p. 23.

⁵⁰ We already apply an annual update for the return on debt. However, this occurs because of particular characteristics of debt issuance—such as the need to manage refinancing risk and the observed practice of issuing longer term debt instruments. Neither applies to equity.

In some cases these were prompted by cross checks or other evidence:

- Ofgem made an adjustment to its CAPM-derived return on equity to reflect cross-checks and other evidence.
- Ofwat made an adjustment to its return on debt for expected increases in market rates and regulated companies being able to issue debt at a lower rate than the benchmark.
- Ofwat also made an adjustment to its overall rate of return to reflect differences in systematic risk between its comparator firms and the entities it regulates.
- NZCC provided an uplift over its central forecast (increasing to the 67th percentile of its probability distribution) because of uncertainty and risk asymmetry.
- FERC can make an adjustment (selecting a different percentile) to its multi-model derived return on equity to reflect the risk profile of the regulated entity.

For completeness, we note that FERC and the STB use multiple models to calculate the return on equity, which could be considered a form of cross check.⁵¹

When setting the 2018 Instrument, we included consideration of a number of cross checks. In that case, consideration of this evidence did not lead to a material change in our return on equity, return on debt or the overall rate of return. We invite stakeholder submissions on any of these adjustments, and the case for applying them in the Australian context.

5.2.1 Ofgem adjustment for expected outperformance

The Brattle report noted two other adjustments, which it classified as being different in nature to the adjustments above.

The FERC allows a number of adjustments to the return on equity to provide an incentive for certain types of investment.⁵² We note that implementation via the return on equity appears functionally identical to providing a direct dollar value incentive.

Ofgem has an expected outperformance deduction which differentiates between the expected return on equity and the allowed (or authorised) return on equity.⁵³ It reduces the return on equity it allows the regulated networks to recover because it expects that the networks will receive the equivalent amount through outperformance on incentive schemes. Across these two effects, Ofgem reasons that equity investors will still expect to recover its estimated return on equity.

⁵¹ FERC uses the DGM, CAPM (with a size adjustment) and a risk premium model; the STB uses the DGM and (standard) CAPM. The use of a multi-model approach, and the merits of the different return on equity models, are discussed in our third working paper: AER, *Rate of return, CAPM and alternative asset pricing models*, Draft working paper, August 2020.

⁵² Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 85.

⁵³ Ofgem, *RIO-2 Sector specific methodology decision- Finance*, May 2019, pp. 66–67.

We have a range of incentive schemes in place, and they appear to share the same core elements as Ofgem's incentive schemes. As such, we are seeking stakeholder views on this area.

There appear to be some challenges with such an adjustment. First, we would need to carefully consider whether the expected returns for debt and equity investors include incentive scheme outcomes. This also means considering the total package of incentive effects if such a change were to be adopted. As noted in the Brattle report, the Ofgem adjustment is made because they expect positive incentive payments on average. This raises questions around whether the correct response is to adjust the incentive schemes themselves, or the allowed rate of return. As a practical implementation matter, it can be difficult to calculate a fair and accurate value for the rate of return deduction.

6 Glossary

Below are accessible explanations of the more specialised financial terms used in this draft working paper.

- **Commonwealth Government Securities (CGS)** – Bonds and notes issued by the Australian federal government to borrow money from investors.
- **Arithmetic average/ mean** – This is calculated by adding a series of values and dividing it by the number of values in that series.
- **Averaging period** – The specified days (or weeks or even months) when we observe market data to inform our estimate of specific rate of return parameters.
- **Benchmark term** – This is the term to maturity of government bonds or debt we set that is used to calculate specific rate of return parameters. The term to maturity at issuance is the time between when an instrument is issued and its maturity date.
- **Capital Asset Pricing Model (CAPM)** – The CAPM is a model that estimates the required return on equity using three parameters: the risk free rate, beta and the market risk premium. It says that the required return on an investment will be related to the systematic risk of the investment. Here 'systematic risk' means risk that cannot be diversified away (by multiple investments in different companies across the market). An investment with higher risk will have a higher required return.
- **Comparator firms** – Comparator firms are firms considered to be sufficiently similar to the regulated energy businesses such that market data on the firm's performance (for example, movements in share prices) can be used to inform estimation of regulated rate of return parameters.
- **Cross checks** – This can be a role assigned to piece of information or a step in the estimation process. It involves comparing estimates against other relevant information sources. It may provide assurance that the calculated estimates are reasonable and consistent with other sources of information.
- **Debt raising costs** - These costs are the transaction costs incurred each time debt is raised or refinanced. These costs may include underwriting fees, legal fees, company credit rating fees and other transaction costs.
- **Dividend** – A sum of money paid (typically semi-annually or annually) by a company to its shareholders (equity investors) to compensate them for their ongoing investment of capital in the business.
- **Dividend Growth Model (DGM)** – The DGM is a valuation model which uses the share price, dividend (or cash flow) forecasts and the expected growth rate of the dividends to infer the required return on equity.
- **Equity beta** – This is a key parameter within the standard (Sharpe- Lintner) CAPM. It measures the 'riskiness' of a firm compared with that of the market and should only reflect the systematic risk. Systematic risk is risk that is inherent to the entire

market and cannot be eliminated through holding a well-diversified portfolio (i.e. diversified away).

- **Gearing** – the proportion of debt in total financing
- **Geometric mean/average** – The geometric mean incorporates the effect of compounding to arrive at an average value for series of data. All the numbers in the series are multiplied together before the n th root is taken, where n is the number of values in the series. If working with percentages (as with rates of return) it is necessary to add 1 to each value before multiplying, then subtract 1 at the end of the calculation.
- **Government securities** – Bonds and notes issued by governments to borrow money from investors.
- **Market risk premium (MRP)** – This is the difference between the expected return on a market portfolio and the return on the risk free asset. It compensates an investor for the systematic risk of investing in the market portfolio or the 'average firm' in the market.
- **Post-tax revenue model (PTRM)** – The post-tax revenue model is a model used by the AER to estimate the annual revenue requirement for each year of a regulatory control period. It brings together the various building block costs that make up the annual revenue requirement for each regulatory year, including the rate of return on capital.
- **Rate of return (or weighted average cost of capital)** – The rate of return on capital is a forecast of the additional return (above the initial investment amount) required to induce investment in its network. It is a combination of the return on debt and return on equity, weighted according to the proportions of debt and equity investment. In the current rate of return instrument, we estimate a make-up of 60% debt and 40% equity. As such, the weighted average cost of capital is formed of 60% return on debt and 40% return on equity. From the investor's perspective it is the return on the funds invested, but from the network's perspective this is the cost of obtaining the funds.
- **Rate of return instrument** – The Instrument is a binding document which sets out the way the AER will calculate the rate of return in regulatory determinations. Neither the AER nor the regulated businesses have the ability to depart from the instrument. The current instrument was published in December 2018 and its replacement is scheduled for December 2022.
- **Reference groups** – Reference groups are appointed by the AER and consist of representatives from various stakeholders including consumers, investors and retailers. Their role is to allow stakeholders to be involved in the rate of return process and contribute to our consultation.
- **Regulated network (or entity)** – a direct control network service for the purposes of the National Electricity Law or a reference service for the purposes of the National Gas Law. Essentially energy businesses that the AER sets revenue allowances for.

- **Regulated control period** – We set the revenues regulated businesses can earn over a certain timeframe in our regulatory determinations which is typically for a 5 year period. This period is called the 'regulatory control period' under the National Electricity Rules or an 'access arrangement period' under the National Gas Rules.
- **Regulatory determinations** – Regulatory determinations are decisions published by the AER and specify the amount of allowed revenue that network businesses can recover from customers during a regulatory control period.
- **Return on debt** – The return on debt is the AER's forecast of the interest costs of maintaining a debt portfolio for a regulated energy network.
- **Return on equity** – The return on equity is the AER's forecast of the return that equity investors (e.g. shareholders) require in order to induce them to invest in a regulated energy network.
- **Risk free rate** – This is a parameter within the CAPM which is a model for estimating the return on equity. The risk free rate measures the return an investor would expect from a 'riskless' investment where there is guaranteed return on the invested capital.
- **Total market return** – The total market return is the overall return expected by investors from investing in a diversified benchmark stock market index.
- **Trailing average** – The trailing average is calculated as the simple average of values over a specified number of estimation period which is updated overtime. For example, the 10 year trailing average for the return on debt for the forthcoming year would be calculated as the simple average of the annual return on debt for that year and the annual return on debt estimates for the 9 previous years.
- **Weighted average cost of capital (WACC)** – See rate of return.