Rate of return

Overall rate of return, equity and debt omnibus

Final working paper

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AUSTRALIAN ENERGY REGULATOR

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Amendment Record

Version	Date	Pages
1.0	9 December 2021	146

Contents

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
CMA	Competition and Markets Authority (UK)
CPI	Consumer Price Index
CPIH	Consumer Price Index including owner occupiers' housing costs
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
RFR	Risk free rate
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

The rate of return Instrument sets out 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 defines some inputs (fixed for the duration of the Instrument) and for others states 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. 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 funds to service the interest on its loans and give a return to shareholders.

In our Pathway to 2022, we set out the high-level process we will follow to develop the 2022 Instrument. As part of this process, we established a sequence of focused working papers. The aim of our working paper series is to explore the key issues relating to the rate of return and identify new theoretical and empirical evidence since the previous review. They are also a focal point for stakeholder consultation. The information in our working paper series will assist us to develop a 2022 Instrument that sets a rate of return that contributes to the achievement of the National Gas Objective (NEO) and National Electricity Objective (NGO).[1] These objectives focus on the long-term interests of consumers.[2]

This final working paper on the Overall rate of return, equity and debt is the last of our working papers. The draft working paper for consultation was published on 15 July 2021 as three separate working papers seeking submissions on key technical aspects. Those were also referred to as omnibus papers because they were at a higher level than the previous working papers which mainly focussed on specific issues. Based on stakeholder feedback, we consider it more efficient and practical to now combine these three working papers into one final omnibus paper.

1.1 Why does the rate of return matter?

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. In our view, the best possible estimate of the expected rate of return—neither upwardly biased nor downwardly biased—will promote efficient investment in, and efficient operation and use of, energy network services. We consider that the NEO, NGO, and the long-term interests of consumers are best served through this guiding principle. We consulted both the Consumer Reference Group (CRG) and Energy Networks Australia (ENA) and discussed their views on what the long-term interest of consumers means in the context of setting the expected rate of return before finalising the guiding principle.

If the rate of return is set upwardly (downwardly) biased:

1 NGL, s.23; NEL, s.7.

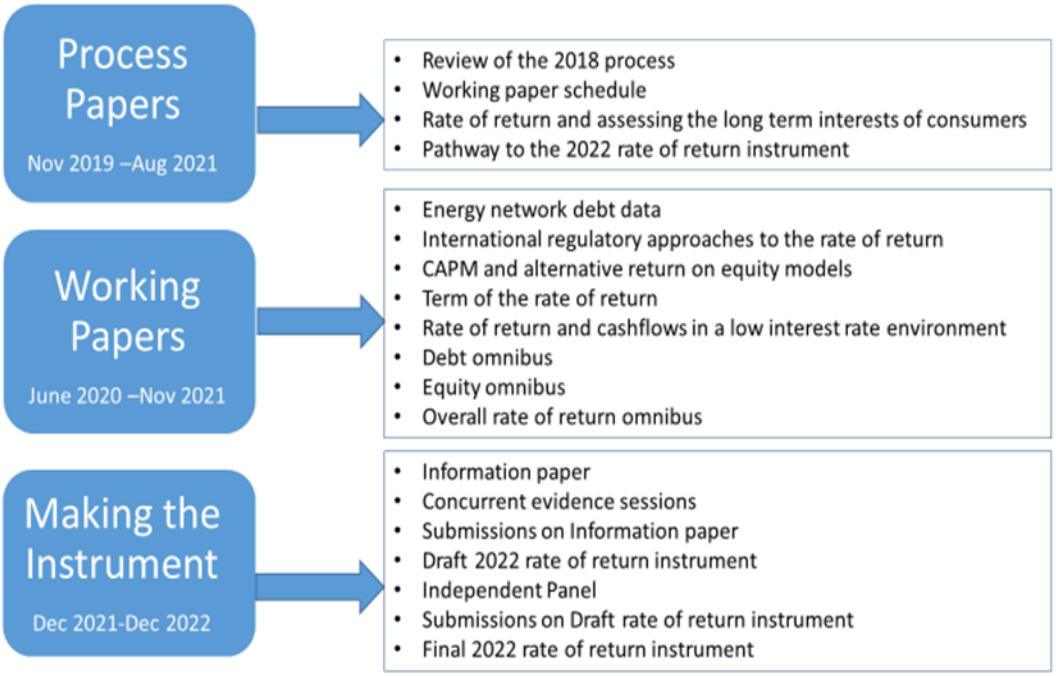
2 The NGO is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas. The NEO is to promote efficient investment in, and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

- Investors will be over (under) compensated for the risk involved in supplying capital to networks, so will show increased (decreased) willingness to invest in regulatory assets in comparison with other investments in the economy.
- Networks will have an incentive to over-invest in regulated assets over the longer term, increasing the regulatory asset base above the efficient level. (Networks will not be able to attract sufficient funds to be able to make the required investments in the network. Over the longer term there will be declines in quality, reliability, safety and/or security of supply of electricity or gas).
- Energy consumers will pay inefficiently higher prices, which will distort energy consumption decisions, and downstream investment decisions. This will result in efficiency losses where consumers use less energy network services than otherwise and non-monetary impacts such as disconnection of vulnerable consumers. (Consumers of energy will pay lower prices, at least in the short term; but will face the risk of adverse outcomes for quality, reliability, safety and/or security of supply of energy services. Lower prices will also distort energy consumption and downstream investment decisions (though in the opposite direction to the previous case). This new level of downstream investment will be inefficient for the Australian economy).

1.2 Pathway to 2022

The major elements of our 'Pathway to 2022' are illustrated in Figure 1.

Figure 1 Elements of the Pathway to 2022



The process papers were all completed by August 2021. The figure also sets out the eight separate papers done as part of our working paper series, and as noted above this final paper is the last of the series.

The 'Making the Instrument' papers and activities will take us from our positions set out in the individual working papers to the final 2022 Instrument. In doing so, our analysis will be subject to two detailed reviews from third parties (experts and the Independent Panel) and further stakeholder consultation.

The Information Paper, to be published in December 2021, will bring together our findings from the working paper series. It will identify subject matter where there is a reasonably settled view among stakeholders and those areas where there are still a number of open options and more work is required. In this context, it will guide submissions in advance of the publication of our Draft 2022 Instrument.

While the aim of our working paper series is to consider technical aspects of the rate of return ahead of the Instrument making stage, it is important for stakeholders and ourselves that we make progress toward settling positions through the working papers. Clearly, we cannot bind ourselves ahead of our decision on the 2022 Instrument, but we have an opportunity now to narrow and focus on the issues in play. Key issues covered in our working papers prior to this final working paper are:

1. *Energy network debt data* – This paper explored options for using the Energy Infrastructure Credit Spread Index (EICSI) in the Rate of Return Instrument and recommended a preferred approach.
2. *International regulatory approaches to the rate of return* – This paper analysed the decisions of international regulators and how they used different methods and data to set the rate of return. The paper outlined some ways this might influence the rate of return in our decisions.
3. *CAPM and alternative return on equity models* – This paper identified our current understanding of various equity models and our preferred options for how they could be used to determine the rate of return.
4. *Term of the rate of return* – This paper investigated the appropriate term for the return on equity and return on debt. The paper also considered whether the terms for equity, debt and expected inflation should be aligned.
5. *Rate of return and cashflows in a low interest rate environment* – This paper considered the consequences of lower interest rates and investigated whether we need to adjust our approach to the rate of return.
6. *Overall rate of return* – This draft paper provided an overview of our rate of return framework, our decision-making process, and our positions to date. It also explored a number of discrete topics that were not captured in the other working papers.
7. *Equity Omnibus* – This draft paper explored a number of technical aspects of estimating the expected return on equity. In particular, we wanted to check that the approach we employ is robust in a range of market conditions.
8. *Debt Omnibus* – This draft paper discussed the data that is available to allow us to set a return on debt that aligns with the debt costs that network businesses experience.

This final working paper which combines the overall rate of return, equity and debt focusses on five key issues.

1.3 Focus of this paper

In our draft working paper on the *Overall rate of return* we set out the issues we have considered through our working papers series.[3]

Our approach is to transparently set out our thinking on the specific issues discussed in the working papers, as the papers progress through stakeholder engagement. In some instances, we are satisfied to put forward preferred or preliminary positions on our thinking.

3 Available here.

A preferred position is one that we have taken after having considered extensive evidence and the results of consultation but where we are open to considering additional evidence. A preliminary position only indicates our initial thoughts on the issue.

Where we consider an issue needs more analysis and wider input, we indicate an open position. Whilst our working papers traversed a large number of issues, we have managed to narrow the issues to a small number of matters of methodology. Stakeholders largely agreed with our consultative open engagement approach to the narrowing of issues.

The CRG acknowledged the AER's open and consultative approach. It submitted that our draft omnibus papers were responding to rehashed arguments that were rejected in the AER's previous reviews going back to 2009. It also noted that many of the arguments were also rejected by the Australian Competition Tribunal (before 2018).[4] Nevertheless, the CRG provided a comprehensive submission covering the questions and issues raised in our draft omnibus paper. In making its draft positions and recommendations, the CRG also set out why and how it believes the 2022 Instrument needs to incorporate consumer views gathered through its consumer engagement activities.[5]

1.3.1 Decision making framework

Estimating the rate of return is a complex task. We estimate the returns required by investors in view of the risks associated with regulated 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. The legislative framework does not prescribe methodologies or lock in specific benchmark characteristics for the estimation of the various components of the rate of return. Rather, it provides discretion and requires us to exercise judgement about the analytical techniques and evidence to use to make an estimate that is commensurate with efficient financing costs.

Generally, most stakeholders expressed the need for an objective and transparent assessment framework. To this end, we use a set of assessment criteria to evaluate the information before us. These are the same criteria we have used since our 2013 Rate of return guideline. However, we have adopted two new criteria for the 2022 Instrument: the materiality of any proposed change; and the longevity or sustainability of new arrangements (see appendix A). Our assessment criteria in summary are:

1. Reflective of economic and finance principles and market information
2. Fit for purpose
3. Implemented in accordance with good practice
4. Models are based on quantitative modelling that is sufficiently robust and avoids arbitrary filtering
5. Market data is credible, verifiable, comparable, timely and clearly sourced
6. Flexible to allow changing market conditions and new information
7. Materiality
8. Longevity or sustainability of new arrangements.

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4 CRG, *Advice to the Australian Energy Regulator, Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1,* 3 September 2021, p.8.

5 CRG, *Advice to the Australian Energy Regulator, Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1,* 3 September 2021, chapter 6. Also see Volume 2.

The CRG submitted that we should take into account its five principles before proposing a change to an established regime and considers its criteria are the minimum required of the AER to engender consumer confidence in regulatory processes and outcomes.[6] The five principles are:

1. Promote behaviours that engender consumer confidence in the regulatory framework
2. Test against consumer impacts on prices
3. Test against impacts on service standards
4. Risks are borne by those best placed to manage them; and
5. There should be a high bar to change.

We agree with the CRG that we should use a principled approach to assessing new information before making a change and as noted above our assessment criteria is for that purpose. However, it must be noted that we have legislated objectives that guide our decision making. Whilst our legislative objectives must take primacy, additional principles can be useful in helping us apply the primary objectives. We are required to assess our decisions against the NEO and NGO and must have regard to the Revenue and Pricing Principles (RPPs)[7] when setting the rate of return Instrument.

We have previously noted that it is important that the regulatory framework remains contemporary to circumstances and changing evidence, and where we think changes are needed to protect the long-term interest of consumers then we should make those changes. We have also stated that we see overlap between the CRG's consumer principles and the way we currently look to implement the NEO and NGO and RPPs. As such, we consider our assessment criteria capture the CRG's criteria.[8] This overlap between the CRG's principles, with our assessment criteria and our regulatory framework is set out in Table 1.

Table 1 Overlap between CRG principles and AER assessment criteria and regulatory framework

Consumer principles	AER assessment criteria & regulatory framework	AER considerations
• Promote behaviours that engender consumer confidence in the regulatory framework	Reflective of economic and finance principles and market information: • this will also contribute to achieving our guiding principle on the long term interest of consumers — an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing	We believe that our regulatory framework including the application of our criteria and the long term interest of consumers guiding principle will create consumer confidence because: • we are looking for a rate that is high enough to get the investment consumers want, but not so high as to cause prices higher than necessary and

6 CRG, *Advice to the Australian Energy Regulator, Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1,* 3 September 2021, p.21.

7 NEL, s.7. (2).

8 See, AER, *Term of the rate of return, and Rate of return and cashflows in a low interest rate environment, Final working paper*, Table 5, p.70; and AER, *Final position, Regulatory treatment of inflation*, December 2020, p. 21.

	regulated network services. Fit for purpose Implemented in accordance with good practice Models are based on quantitative modelling that is sufficiently robust and avoids arbitrary filtering Market data is credible, verifiable, comparable, timely and clearly sourced Flexible to allow changing market conditions and new information	promoting efficient investment behind the meter • we adopt a principles based approach to assess (new) evidence in front of us through our assessment criteria which provides transparency to all stakeholders • assessing evidence in terms of theoretical foundation, good practice, and appropriate data contributes to making an estimate that is commensurate with efficient financing costs • takes a holistic view of our return on equity estimate and overall rate of return before settling on the overall rate of return, to 'sense check' whether our Instrument contributes to the achievement of the long-term interests of consumers • scenario testing and sensitivity modelling will assess the impacts on price levels.
• There should be a high bar to change	Materiality Longevity or sustainability of new arrangements	Hight bar for change will be met by us: • achieving the legislative requirements • applying our criteria of materiality, longevity, or sustainability. Applying all of our criteria will also lead to an approach that is stable and robust to changing circumstance.

• Test against consumer impacts on prices AND • Test against impacts on service standards	Fit for purpose Materiality Longevity or sustainability of new arrangements	As noted above, the rate return, or cost of capital, is one component of a network's overall cost. Our approach allows for scenario testing and sensitivity modelling by which we will assess impacts on price levels.
Risks are borne by those best placed to manage them	Reflective of economic and finance principles and market information	We aim to set an efficient rate of return that contributes to the achieving of the NEO/NGO and have regard to the RPPs. Regulated businesses bear any cost (or benefit) of exceeding (or beating) this value. This is consistent with the CRG's principle.

1.3.2 Issues covered in this paper

Our working paper series has allowed us to explore a large number of issues across the breadth of rate of return and has provided an important check that we have not missed any key aspects requiring consideration and potential change. Through our working papers, we were genuinely looking for issues that might be impacted by new theoretical and empirical evidence since the previous review.

At this stage of the process, we are transparently putting forward positions on our preliminary thinking. It is important to note that whilst topics are being explored in consultation with all stakeholders, inclusion in a working paper and indication of our thinking on the current evidence does not equate to having achieved an evidentiary threshold to change that particular rate of return parameter.

We are committed to ensuring confidence in regulatory processes. While we assess each individual rate of return input parameter in detail to determine the best possible estimate of the expected rate of return, our approach also allows us to take a holistic view of our return on equity estimate and overall rate of return. That is, we will do a 'sense check' on whether our 2022 Instrument as a whole contributes to the achievement of the long-term interests of consumers before settling on the overall rate of return.

Having considered the submissions and relative importance of specific issues, we consider that the most efficient and effective way forward is to narrow down the issues to six focus areas. Of these areas, this final paper will cover five issues. The Concurrent Evidence Sessions will focus on the six priority issues so we can hear expert views to assist our decision making.

We acknowledge that our three draft omnibus papers on the rate of return, cost of equity and cost debt raised a number of important but relatively smaller issues for discussion. At this stage, we are not advancing these beyond our draft papers. We consider they are of lesser value compared to the six focus issues and therefore do not intend the experts to spend time on these. Table 2 includes those issues and the positions we set out in the draft working papers.

Our six focus issues are:

1. Market risk premium — see section 2.
2. Debt and use of the AER's industry index (EICSI) — see section 3.
3. Weighted trailing average return on debt — see section 4.
4. Term of the rate of return — covered in final Term paper published on 22 September and therefore will not be revisited in this final omnibus paper.[9]
5. Equity beta — see section 5.
6. Cross checks of the overall rate of return — see section 6.

The ENA submitted that already there was very broad agreement between them and us on the issues identified and that it broadly agrees with our preliminary position on 32 of the 40 issues.[10] The ENA's list of remaining issues for consultation are:

1. Term of the risk-free rate.
2. Role of EICSI data.
3. Use of EICSI to estimate outperformance.
4. Use of government bonds to estimate the CAPM risk-free rate.
5. Exclusive reliance on domestic comparators when estimating beta.
6. Exclusive reliance on historical excess returns when estimating MRP.
7. Role of subordinated debt.
8. Consistent treatment of debt instruments.[11]

We note that our list of focus issues captures most of ENA's remaining issues, and we have an additional issue relating to weighting the trailing average return on debt. The Term of the risk-free rate and use of government bonds to estimate the CAPM risk free rate was covered in our final working paper on *Term of the rate of return, and Rate of return and cashflows in a low interest rate environment*.[12] The role of subordinated debt and consistent treatment of debt instruments are discussed in our consideration of debt and use of the AER's industry index, but to the extent those relate to interactions with gearing, then their consistent treatment will be considered where relevant.

Our Information Paper due in December 2021 will bring together our findings from the working paper series. Moreover, the Information Paper will also provide a guide for the expert conclave and be a basis for the discussions at the Concurrent Evidence Sessions in February 2022. All these together, will allow stakeholder views and expert opinion to be heard and considered before we make the draft 2022 Instrument.

1.3.3 Our considerations for the 2022 Instrument

Having considered a range of evidence including academic work, expert reports, other regulators' practice, and stakeholder submissions we set out our preliminary views on the five priority issues covered in this paper. Each of these issues are discussed in detail in sections two to six of this paper.

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9 Available here.

10 ENA, *Overall rate of return, Response to AER's Pathway to 2022 Rate of Return Instrument, Draft Overall Rate of Return Omnibus Working Paper*, 3 September 2021, p.8.

11 ENA, *Overall rate of return, Response to AER's Pathway to 2022 Rate of Return Instrument, Draft Overall Rate of Return Omnibus Working Paper*, 3 September 2021, pp.11-12.

12 AER, *Term of the rate of return, and Rate of return and cashflows in a low interest rate environment*, September 2022.

Market risk premium (MRP)

The market risk premium (MRP) is the difference between the expected return on a market portfolio and the return on the risk-free asset. The expected MRP is not directly observable. As a result, several different methods have been put forward to us by stakeholders to estimate the expected/forward looking MRP. These methods largely fall into four categories: using dividend growth models (DGMs); the Wright approach (one for one negative relationship between the MRP and the risk-free rate); historical excess returns (HER); and survey evidence.

Our current approach uses HER as the main source of evidence to estimate the expected MRP. We recognise that the MRP may vary over time, however, it is unclear whether an appropriate method to determine changes (if any) and its direction is available for use in our regulatory task. In 2018 we gave more weight to the HER estimates when selecting a point estimate within our established MRP range and gave less weight to other evidence, such as DGM's, surveys and conditioning variables.

In both our previous rate of return reviews (2013 Guideline and 2018 Instrument) we considered DGM evidence in estimating the MRP. Compared to the 2013 Guideline, we gave less weight to DGMs in 2018 because we had diminished confidence in these estimates.[13] The networks and the Network Shareholder Group (NSG) submitted in 2021 that more weight should be given to estimates from DGMs. In contrast, the CRG submitted the DGM should play no role in estimating the MRP.

Having considered stakeholder submissions and expert reports submitted to us since the 2018 Instrument, we propose to keep an open position on the best method to estimate a forward-looking MRP and explore three potential options:

- Maintain our current approach to inform our estimates of the MRP (consistent with our 2018 Instrument). Under this approach, the HER method (using both arithmetic and geometric averages) plays a primary role in developing our MRP estimation range. We give less weight to other evidence such as DGM's, surveys and conditioning variables to inform our point estimate from within the HER range.
- Use estimates from the DGM to inform our point estimates of the MRP, within the range observed by our current approach (similar to our 2013 Rate of return guideline approach). That is, in exercising our judgement to pick a point estimate from the HER range, we will use the information from the DGMs in a directional sense. Where there is an increasing/decreasing trend in DGM estimates relative to their long-term averages, we may pick a point estimate that is higher or lower within the range of HER estimates, respectively. Alternatively, we could set a value for the MRP having considered both MRP and DGM estimates and any other relevant evidence.
- Provide more weight to the DGM alongside our current approach (a mechanical approach). This would require us to determine how the HER estimate(s) and DGM(s) are weighted as well as the specifications of the DGM(s) inputs. Further, given the 2022 Instrument must be applied without exercising any discretion, we will also have to decide whether this method will be used to set a MRP point estimate in the 2022 Instrument or set a method that will mechanically update throughout the life of the Instrument.

At this stage, we have not evaluated these open positions against our assessment criteria but will do so when making our draft decision. We encourage stakeholders to consider these three options against our assessment criteria when making submissions and also set out how any change from our current position is in the long-term interest of consumers.

13 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 200 & p. 216.

In relation to a negative relationship between the MRP and risk-free rate, our preferred position is to not recognise a relationship consistent with our current position. We evaluated the new information before us extensively against our assessment criteria and are not persuaded we should recognise a negative relationship between the MRP and the risk-free rate. In reaching this view we have found there are limited theoretical underpinnings for a relationship and significant practical issues in estimating any such relationship. We recognise that other regulators employ a variety of approaches on this issue including some that employ a total market return approach. However, we are not persuaded that a change to recognise a relationship would be an improvement over our current approach. Further, in practical terms, to the extent that a change to our current approach is warranted we think this can be better and more directly addressed through the open options we are considering for setting the MRP including the role of the DGM.

Stakeholders also submitted further options. These were using a long-term historical average of the risk-free rate instead of the current approach of using the on-the-day risk free rate and placing a floor on the risk-free rate. We consider both these options have low theoretical support and therefore have decided not to pursue these further.

Use of Energy Infrastructure Credit Spread Index (EICSI)

The EICSI is a simple index constructed from actual debt information collected from privately owned (i.e., non-government owned) service providers. The primary EICSI metric is the spread over the swap rate (credit spread—broadly equivalent to the debt risk premium), which allows us to monitor the performance of our benchmark return on debt against networks' actual cost of debt.

In the 2018 Instrument, we did not rely on the EICSI or an alternative historical index directly to estimate the return on debt. We considered at the time it was best used as a 'sense check' on our benchmark characteristics. Over the period observed (Since 2014), the EICSI has generally remained below our cost of debt. On average the 'outperformance' gap between the EICSI and our approach has been about 18 basis points.

On advice from our consultant Dr Lally, we have conducted further analysis since the draft working paper to determine what is driving the overall observed outperformance, to determine if there is outperformance that should be adjusted for in setting the return on debt. We have broken this impact down by the term of debt issuances, credit rating of debt, and residual outperformance. The residual outperformance refers to the ability of the regulated networks to raise debt at a lower rate (for a given term and credit rating) than the broader market that is represented in the third-party debt yield curves we use in determining our return on debt benchmark.

Our analysis suggests that there may be residual outperformance, but it appears to exist only when credit spreads observed from the third-party debt series are above a certain level. If this residual outperformance is considered material and persistent in these circumstances, we consider a cap on the debt risk premium may be appropriate. Our preliminary decision is that further analysis and consultation is required regarding whether we should adjust for this type of residual outperformance, and what form such adjustment would take.

Even though conceptually we think we ought to use the EICSI to adjust our return on debt approach to remove any material and persistent residual outperformance, our analysis indicates that the quantum of the residual outperformance is small on average. As such, it is not clear that introducing an adjustment would be a material improvement over our current approach. We will consider any further material from the concurrent evidence sessions and submissions.

We considered further options of additionally adjusting the benchmark term or the benchmark blend of credit curves as well as removing any observed residual

outperformance. While we acknowledge that term appears to be a key driver of the observed outperformance of the EICSI there are significant practical limitations on implementing this adjustment, we will consider the issue of term further in future consultation on the 2022 Instrument. Credit rating of debt issuance does not appear to be a key driver of the observed outperformance and adjusting the benchmark blend of credit curves may create issues with the ability of networks to match the benchmark.

Weighted trailing average return on debt

Our current approach to estimating the return on debt is a trailing average portfolio approach. Under this approach, we set the return on debt allowance normally as an average of (up to) ten annual return on debt estimates, which we then update annually.[14] Each year in the 10-year trailing average is given equal weighting. We call this a simple (unweighted) trailing average.

The integrated system plan (ISP) developed by the Australian Energy Market Operator (AEMO) has raised the prospect of large projects being undertaken over the next ten to fifteen years.[15] These projects could result in the Regulatory Asset Bases (RABs) over several transmission network service providers (TNSPs) increasing significantly over a short period. As a result, there could be large debt raising requirements in some years beyond the 10 per cent level built into our current trailing average return on debt. This in turn could create a mismatch between our return on debt and the capital requirements (and its cost) of the firms we regulate and may also affect incentives to invest in large capital-intensive projects.

We are concerned that if we do not make adjustments to mitigate these material mismatches, we could see pressure for policy changes to address the mismatch from either consumers or networks. Any such policy intervention would upset the balance of the trailing average and undermine NPV neutrality. We therefore think it is prudent to consider addressing the potential mismatch in the upcoming rate of return Instrument and have set out some options for doing so.

At this point, we propose to maintain an open position on whether and how our current 2018 approach needs to be modified in response to large regulatory asset base growth beyond 10 per cent a year. We will continue to explore and analyse the available options:

- Option 1: Maintain the current (simple trailing average) approach.
- Option 2: Weighted trailing average that applies to every regulated business. Weights are based on the debt issuance assumptions in the Post Tax Revenue Model (PTRM).
- Option 3: Weighted trailing average only starts to apply when a large increase in the RAB (and therefore debt issuances) is forecast. We would need to set a threshold for the shift to a weighted trailing average. Once the weighted trailing average is triggered, weights are based on the debt issuance assumptions in the PTRM.
- Option 4: Weighted trailing average that applies to all TNSPs. Weights are based on the debt issuance assumptions in the PTRM.

Our preliminary position is that if a weighted trailing average (using any of the above options) was to be adopted, it should be based on the debt issuance assumptions in the PTRM, that is, forecasts rather than actual data.

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14 The number of components in the trailing average depends on how far along a regulated business is in the 10- year transition from the on the day approach. Once the transition is completed, the trailing average will have ten annual components. For the Victorian electricity and gas DNSPs, due to their movement to financial year regulatory years, we will have 11 regulatory years in the trailing average for ten regulatory years to facilitate this change.

15 AEMO, *2020 Integrated System Plan*, July 2020, p. 64.

Equity beta

Equity beta is a key parameter in our current approach for determining the return on equity under the SL-CAPM. In particular, beta measures an asset's systematic risk. Under the current approach, we use a comparator set of nine Australian energy firms for estimating the equity beta for the benchmark business that provides the Australian regulated energy network services. Currently there are three live comparator firms remaining (i.e. Spark Infrastructure, AusNet, APA).

The submissions to our 'Equity omnibus draft working paper' considered following key issues:

- Given the small number of live firms in the comparator set, should the AER take into account other information, in particular estimates of international energy firms, to inform its decision?
- Should the AER place more weight on contemporary data and shorter-term estimates, and less weight on de-listed firms (or remove them from the comparator set)?
- Should the AER determine a separate beta for gas networks to account for any differences in their characteristics when compared with the electricity networks (e.g. potential stranding risk)?
- Should the AER take into account low beta bias in its decision?

These issues are broadly consistent with the range of issues we have considered in our previous rate of return reviews. Having considered the range of information before us, we do not think there is sufficient evidence to support a change from the approach we adopted in the 2018 Instrument.

Our preliminary position is therefore we should maintain the 2018 Instrument approach to determining equity beta in the 2022 Instrument. This includes:

- Placing most weight on the longest period estimates as this can lead to a more robust and statistically reliable equity beta estimate and better account for the cyclicality in factors affecting empirical equity beta estimates.
- Retaining the existing comparator set and not using international energy firms, domestic infrastructure firms or other regulators' decision to inform our estimate range for beta. We acknowledge that it is possible that the number of the live firms may decline further in future, and it may be useful to lay the foundation by considering how we may address this issue in the context of future reviews.
- Continuing to set a single rate of return for gas and electricity network businesses. There is no clear evidence of a material difference in overall systematic risks between electricity and gas networks. There is also no robust empirical evidence suggesting part of the asset stranding risk facing the regulated Australian gas networks is systematic in nature and thus should be considered in the beta parameter.
- Not adjusting equity beta or the rate of return for a 'low beta bias'. We consider that the SL-CAPM remains the standard and most widely used model and investors and market practitioners do not appear to consider low beta bias on an ex-ante basis.

We acknowledge that it is likely that the number of live comparator firms may decline further in future and we need to consider suitable approaches to lay the foundation for future reviews. In that context, we would be open to considering:

- Appropriate approaches that gradually place less weight on the de-listed firms.
- Ways in which other available information such as international energy firms and domestic infrastructure firms, may be used to inform our decision on beta.

Further, to the extent that regulated gas networks may face material stranding risks, which would lead to outcomes that are inconsistent with the NEO and NGO, we consider that it may be appropriate to consider this issue under the broader regulatory framework (e.g. through cash flow and/or depreciation).

Use of cross checks to sense check overall rate of return

Cross checks involve comparing estimates of the rate of return against other relevant information sources.

We have considered what role to assign to overall cross checks after reviewing stakeholder submissions and expert reports submitted to us since the 2018 Instrument. Our preliminary position is to use overall cross checks as a sense check on our overall allowed rate of return (section 6). There is no new evidence that would support elevating any of the cross checks to a higher level. Stakeholders' submissions also did not support using a formulaic approach.

We have further considered what information we can infer about our rate of return estimate based on each cross check, particularly in response to stakeholder submissions.

Our preliminary positions are as follows:

- We propose to review RAB multiples, scenario testing and financeability tests as a sense check on our overall rate of return. These measures have limitations but also have some informational value.
- We think historical profitability, investment trends, other regulators' rate of return and other practitioners' discount rates have greater limitations and are of less value than RAB multiples, scenario testing and financeability.
- Subject to the limitations of the cross checks we examined, at the moment, they do not appear to suggest major concerns with our current approach to the rate of return (the 2018 Instrument) in the context of the total compensation provided to investors.

1.3.4 How is our 2018 Instrument tracking?

We observe there is a high level of consistency between the present and 2018 values of the component inputs used to estimate our expected rate of return. This is largely supported by:

- Equity beta – our longest estimates have remained largely stable, and we observe a decrease in shorter term data.
- Historical excess returns – our estimates have remained largely stable. Over the last 4 years across all sampling periods the HER range (arithmetic average) is 5.8–6.6 per cent. Looking at the last 30 years sampling window it ranges from 5.8–6.3 per cent.[16] The HER range inclusive of the geometric average over the last 30 years sampling window ranges from 4.3–6.3 per cent. Our current MRP estimate (2018 Instrument) is 6.1 per cent.
- Our most current update (August 2021) of our Dividend Growth Models show that risk premiums are about the same compared to the end of 2018.
- The 2020 Annual Update on the value of gamma (imputation credits) is slightly lower than in 2018.
- Our return on debt estimate, based on our trailing average cost of debt approach remains slightly above the cost of debt incurred by the networks.
- Estimates of gearing in the 2020 Annual Update are a few percentage points below the 60 per cent gearing used in the 2018 Instrument.

16 See AER, Rate of return annual updates, 2019,2020 and 2021.

Our approach on equity and debt, as intended, does capture and closely follows the variability of the risk-free rate and cost of debt over the period as applied at the time of each regulatory determination. Cost of debt also varies over the regulatory control period due to our trailing average approach.

However, our approach to allowing the risk-free rate to reflect the prevailing market conditions raised questions about our return on equity moving one for one with changes in the risk-free rate. The risk-free rate has declined from 2.70 per cent at the time we made our 2018 Instrument[17] to a low of 0.90 per cent adopted in a regulatory determination we made in April 2020.[18] The decline in the risk-free rate has motivated a large number of industry/investor submissions on the implications for our rate of return, particularly for the return on equity. This was a major theme of our working paper on the low interest rate environment.

Recently, the risk-free rate has trended higher and as at 1 November 2021 the rate is close to 2.0 per cent. This movement shows that the risk-free rate varies over business cycles and is related to the level of the underlying economic activity. We note the CRG's submission that the AER should focus on long-term outcomes and look past the cyclical movements in economic, business and investment variables.[19]

A report done for us by the Brattle Group on international regulatory approaches to the rate of return, whilst recognising a large amount of commonality between other regulators and us on core features, identified some differences in approach.[20] It also indicated that our returns were not as stable as others. One such difference was the method for estimating the equity market risk premium.

Some industry/investor stakeholders have submitted that our return on equity is too low, and our approach is an outlier relative to other regulators.[21] While our return on equity is comparatively lower, we do not consider that the differences at the overall rate of return (weighted average cost of capital) indicate a significant concern. Our comparative analysis of other regulators rates of return was set out in our final working paper on *International regulatory approaches to rate of return, December 2020*. Recent takeover bids for Spark Infrastructure and AusNet Services suggest that global investment funds find Australian energy infrastructure assets an attractive investment, at this stage.[22]

We note that equity and debt are alternative sources of capital and debt costs can inform required returns on equity. Debt costs have decreased along with the decline in interest rates and our return on equity (equity risk premium) remains comfortably above current debt costs (debt risk premium). This is borne out by our published annual rate of return updates.[23]

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17 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p.15.

18 AER, *Final decision, SA Power Networks Distribution Determination 2020 to 2025*, April 2020.

19 CRG, *Advice to the Australian Energy Regulator, Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1,* 3 September 2021, p.89.

20 The Brattle Group, *A review of international approaches to regulated rates of return: Prepared for the AER*, 1 June 2020.

21 NSG, *Response to AER RORI Omnibus papers*, September 2021, p.13; TransGrid, *Response to the AER Rate of Return Omnibus papers*, 2 September 2021, p.1; GIIA, *AER 2022 Rate of Return Instrument Consultation Response*, 2 September 2021, p.3; Jemena, *Submission on the rate of return omnibus papers,* 3 September 2021, pp.1-2; *APGA Submission to the AER: Draft working papers on return on equity models and international approaches to the rate of return*, 9 October 2020, p.1; SAPN, CitiPower, Powercor, United Energy, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p.1.

22 E Fowler, 'Investors cheer Spark Infrastructure's $5.2 billion takeover', *The Australian Financial Review,* 23 August 2021, accessed 16 November 2021; H Brumpton, 'Brookfield Wins Australia's AusNet with $7.7 Billion Deal', *Bloomberg,* 1 November 2021, accessed 16 November 2021.

23 Available here.

Setting the best possible estimate of the expected rate of return is important for achieving the national electricity and gas objective. Whilst we acknowledge the inherent uncertainty of estimating an expected rate of return, at this stage of our 2018 Instrument, we cautiously express the view that the outcomes from the 2018 Instrument remain broadly appropriate.[24] This view is supported by our initial review of cross checks.

Network businesses are consistently trading at a price range that represents regulated asset base (RAB) multiples of 1.2 to 1.6 since the 2018 Instrument and recent takeover offers indicate RAB multiples of 1.5–1.7.[25] This suggests that our 2018 Instrument, at this stage of its application, appears sufficient (as part of the overall compensation received by investors) to warrant investment. We are careful in drawing any stronger conclusions, particularly in setting the rate of return for our 2022 Instrument. See section 6 of this paper for the role of RAB multiples as a 'cross check' on our overall rate of return.

We are cognisant that TransGrid and others have questioned whether large projects such as Project Energy Connect can be undertaken under the settings of our 2018 Instrument because its financeability metrics (cashflows to achieve stated debt rating) could deteriorate with the decline in interest rates and the allowed return on equity. Our rate of return Instrument targets an unbiased estimate of the expected efficient return on a benchmark basis. Individual networks and/or specific projects may approach finance costs and cash flow issues on a case-by-case basis as they are best placed to manage such risks. In the context of our 2022 Instrument, we are intending to review financeability metrics as a cross check. However, they carry some limitations that hinder their use as a cross check on the overall rate of return. Our update of the 2018 FFO/net debt analysis shows that most firms are operating under the 2018 Instrument and there appears to be no material deterioration in financeability since the application of the 2018 Instrument (see section 6.5.1.1).

We have also discussed financeability issues in our draft and final working papers on Term of the rate of return, and Rate of return and cashflows in a low interest rate environment.[26]

We have considered the possible use of scenario testing. We consider that a proper implementation of scenario testing could be complex and there are a range of practical questions. At this stage, we think scenario testing can be used as a tool to illustrate the potential effect of the rate of return on revenue requirements. It allows stakeholders to vary different inputs (and conditions) to better understand how the rate of return affect the regulated revenue received by businesses. The CRG submitted that since our 2018 Instrument no breakthrough theoretical insights have emerged. It also submitted that the 2018 Instrument has a special place given its enactment after the removal of merits review and special process such as the Independent Panel review. Hence, it considers that any change to the 2018 Instrument must be subject to a high bar for change and consumers expect rigorous evidentiary standards such as persuasive evidence, compelling reasoning and broad consensus before changing the framework.[27]

The Network Shareholders Group (NSG) also support a high bar for change but consider that the 2018 Instrument is an outlier and does not provide the right starting point.[28] They consider that change is required to address shortcomings in the 2018 approach.[29]

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24 That is, it is within the range of reasonable values for the rate of return.

25 AER, *Electricity network performance report*, September 2021, p.33; A Macdonald-Smith, 'AusNet joins deal frenzy', *The Australian Financial Review,* 20 September 2021, accessed 16 November 2021

26 Available here.

27 CRG, *Advice to the Australian Energy Regulator, Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1,* 3 September 2021, p.7.

28 NSG, *Response to AER RORI Omnibus papers*, September 2021, p.13

29 NSG, *Response to AER RORI Omnibus papers*, September 2021, pp. 12-14.

Whilst we note that our approach and methods in the 2018 Instrument are an appropriate starting point and apply our assessment criteria to the information before us, this does not mean that the 2018 Instrument takes precedence over our regulatory objective. Nevertheless, we are mindful that stability of approach and predictability of our rate of return framework is a feature that is valued. This is also a feature of best practice regulation. We acknowledge that consumers' and all stakeholders' confidence in the regulatory framework is important, and as noted above, addressing our assessment criteria will contribute to achieving their confidence.

1.3.5 Rate of return positions and issues canvassed

Generally, in developing our working papers, we put forth a proposed position where possible and categorise our position as either preferred, preliminary or an open position. Importantly however, the positions in the final working papers, as incorporated in the Information Paper, will not necessarily reflect the corresponding positions that we adopt in the draft 2022 Instrument. In particular, evidence in submissions to the Information Paper and opinions of experts that participate at our experts Concurrent Evidence Session will also be considered by us before making the draft 2022 Instrument, as will the impact of potential individual decisions 'in the round'. While we have focussed on six priority issues at this stage, we welcome receiving further evidence and submissions on all the positions and issues canvassed via our working paper series as well as any other issue related to the rate of return.

Our current positions are set out in Table 2 below:

- those where we have a preferred position (blue highlight)
- those where we have a preliminary position (yellow highlight)
- those where we have taken no position and are seeking views (green highlight).

Table 2 Rate of return positions and issues canvassed

Working Paper	2018 Instrument position	Positions published as at July 2021	Proposed positions on the 6 focus issues
Energy network debt data	Use the EICSI as a cross-check for benchmark credit rating	EICSI is to be used directly to determine the benchmark blend of A and BBB bonds	Preliminary position is to further analyse and consult on whether the residual outperformance identified, or departures on term should be adjusted for, and what form such an adjustment may take.
	Use the weighted average term to maturity at issuance (WATMI) as the floor of possible options for the benchmark term	An updated WATMI, combined with the more detailed drawdown data, may be useful in determining a benchmark term	Preliminary position that the WATMI can be useful in determining the benchmark term. Open to considering change to the benchmark term further but note the practical difficulties and further analysis required.
International regulatory approaches to the rate of return	Review of Instrument to be held every five years consistent with legislation. Annual updates to be undertaken annually.	Review of Instrument to be held every four years consistent with legislation. Annual data updates published.	
	Set the risk-free rate only at the beginning of each reset period	Set the risk-free rate only at the beginning of each reset period	
	Make no adjustments for expected incentive scheme outcomes	Make no adjustments for expected incentive scheme outcomes	
CAPM and alternative return on equity models	Standard Sharpe-Lintner CAPM model used as the basis for determining the return on equity	Standard Sharpe-Lintner CAPM model used as the basis for determining the return on equity	
Term of the rate of return*	The term of equity and debt were of ten-year duration	It is unnecessary to align the term of equity, debt and expected inflation	Preferred position is that the terms of equity, debt and inflation do not have to be of the same value.
	10-year term for return on equity, consistent with life of underlying asset	Ten-year term consistent with existing practice or five-year term for return on equity, consistent with length of the regulatory period	This topic remains open and will continue to consult on this topic as part of our 2022 review including at the concurrent expert evidence sessions.

			We still considered that there are merits with matching the equity term to the length of the regulatory period despite not receiving strong stakeholder support.
	Return on debt determined through a trailing average approach	Return on debt determined through a trailing average approach	Preferred position is to estimate the return on debt through a trailing average approach.
	Ten-year term for return of debt	Match the term of the return on debt to that of an efficient firm's borrowing	Preferred position is to match the term of the return on debt to that of an efficient firm's borrowing based on Dr Lally's advice. Preliminary position is that the WATMI can be useful in determining the benchmark term but note the practical difficulties of change and further analysis required.
Rate of return and cashflows in a low interest rate environment		We are currently in a low interest rate environment.	
		The reduction in our return on debt has been in line with movements in the broader market for debt and the costs the regulated businesses face.	
	Commonwealth Government Securities are an appropriate proxy for the riskless investment for our purposes.	Commonwealth Government Securities are an appropriate proxy for the riskless investment for our purposes.	
	Measures of financeability are not used directly when setting the rate of return	Measures of financeability are not used directly when setting the rate of return	Consistent with our preliminary position on overall cross checks, our preliminary position is that we intend to review financeability tests as a sense check on our overall allowed rate of return.
Equity Omnibus*	Use comparator set of nine Australian firms to estimate equity beta	Use comparator set of nine Australian firms to estimate equity beta	Our preliminary position is to maintain the current approach for estimating beta. This includes retaining the current comparator set. We need to lay the foundation for future reviews to consider approaches which may involve being informed by international energy firms and domestic infrastructure firms.
	Give the greatest weight to equity beta estimates from the longest estimation period	Give the greatest weight to equity beta estimates from the longest estimation period	Our preliminary position is to continue to place most weight on the longest period estimates
	Set a forward-looking market risk premium	Set a forward-looking market risk premium	

	Diminished confidence in the use of dividend growth models	Consider if the dividend growth model might be used to inform the relationship between the MRP and risk-free rate	Open to considering the use of estimates from the dividend growth model to inform our point estimate of the MRP within the range observed from the evidence we look at.
			Open to considering the use of estimates from the dividend growth model estimate(s) alongside the HER estimate by applying a method to give weight to both sets of estimates.
	In determining the MRP, have regard to the historical excess return, both the arithmetic and geometric mean MRP, and MRP surveys and conditioning variables	In determining the MRP, have regard to the historical excess return, both the arithmetic and geometric mean MRP, and MRP surveys and conditioning variables.	Open to considering the historical excess return, both the arithmetic and geometric mean MRP, and MRP surveys and conditioning variables
	No reliance placed on the Wright approach	Consider the potential for a relationship between the MRP and risk-free rate, and whether an appropriate implementation method is available	Not pursue the potential for a relationship between the MRP and risk-free rate, and whether an appropriate implementation method is available
	Allow networks flexibility in nominating the averaging period for the risk-free rate	Allow networks flexibility in nominating the averaging period for the risk-free rate	
	Averaging period was between 20 and 60 consecutive business days within a window running from between three and seven months prior to the commencement of the regulatory control period	Shift the allowed nomination period window for the risk-free rate forward in time by one month to lessen timing issues	
	Use cross checks to inform our overall return on equity point estimates	Use cross checks to inform our overall return on equity point estimates	
	Adopt a single benchmark for electricity and gas businesses.	Adopt a single benchmark for electricity and gas businesses.	Our preliminary position is to continue to adopt a single benchmark for electricity and gas business and to consider gas network stranding risk under the broader regulatory framework. We are open to considering further evidence on this matter.
	Do not adjust for 'low beta bias'.		Our preliminary position is to not adjust for 'low beta bias'.

Debt Omnibus*	Application of a simple trailing average approach to determine the return on debt, with a 10 per cent weighting for each of the 10 years	Seek views on weighting trailing average approach by capex spending	We will continue to explore and analyse the available options: • Option 1: Maintain the current (simple trailing average) approach. • Option 2: Weighted trailing average that applies to every regulated business. Weights are based on the debt issuance assumptions in the PTRM. • Option 3: Weighted trailing average only starts to apply when a large increase in the RAB (and therefore debt issuances) is forecast. We would need to set a threshold for the shift to a weighted trailing average. Once the weighted trailing average is triggered, weights are based on the debt issuance assumptions in the PTRM. • Option 4: Weighted trailing average that applies to all TNSPs. Weights are based on the debt issuance assumptions in the PTRM. Our preliminary position is that if a weighted trailing average (using any of the above options) was to be adopted, it should be based on the debt issuance assumptions in the PTRM.
	The debt averaging period must start no more than 16 months before the regulatory period, and finish no less than four months prior to the commencement of the regulatory period	Change timing so the debt averaging period must start no more than 17 months before the regulatory period, and finish no less than five months prior to the commencement of a regulatory year.	
	Included only pure debt instruments in the EICSI, excluding hybrids, working capital and bridging loans, any instrument with a term under 12 months, and any instrument not used to finance the RAB	Included only pure debt instruments in the EICSI, excluding hybrids, working capital and bridging loans, any instrument with a term under 12 months, and any instrument not used to finance the RAB	
	Used the EICSI purely as a cross-check for benchmark credit rating	Implement the EICSI by adjusting the weights of A and BBB data to match network cost of debt over the past four years	Preliminary position is to further analyse and consult on whether the residual outperformance identified, or departures on term should be adjusted for, and what form such an adjustment may take.

	Instrument set out a number of contingencies to ensure that the formulaic application of the instrument could be applied in instances where all relevant debt data was not available	Continuation of 2018 approach	
	Debt raising costs collected on the basis of historical criteria	Debt raising costs collected through a Debt RIN to be issued in 2021	
	Continued use of the RBA and Bloomberg data providers, while adding Thomson Reuters	Continued use of the RBA, Bloomberg, and Thomson Reuters data providers.	
		Consider the merits of any additional debt data providers	
	Debt averaging periods must be between 10 days and a year in length and not overlap with each other.	Debt averaging periods must be between 10 days and a year in length and not overlap with each other.	
	Nominal vanilla WACC, estimated as a weighted average of the return on equity and return on debt	Nominal vanilla WACC, estimated as a weighted average of the return on equity and return on debt	
Overall Rate of Return Omnibus*	Place primary reliance on market value estimates and the continued use of existing observation periods when estimating gearing	Place primary reliance on market value estimates and the continued use of existing observation periods when estimating gearing	
	In calculating gearing, hybrid securities excluded from Envestra and Spark Infrastructure, but included for AusNet services	Seek views on the inclusion of hybrid securities for gearing.	
	After reviewing data, consistency with previous use of 60 percent gearing	Consider adjusting gearing to more closely align with market data	
	Distribution rate for imputation credits obtained through the use of ASX50 firms, utilisation rate from ABS wealth data	Distribution rate for imputation credits obtained through the use of ASX50 firms, utilisation rate from ABS wealth data, pending investigation of ATO data	
	Assume that non-resident investors assign no value to imputation credits	Assume that foreign non-resident investors assign no value to imputation credits	

	Cross checks have limitation but can provide contextual information. However, they are not useful in informing the rate of return directly	Seeking views on the use of cross checks	Our preliminary position is to use overall cross checks as a sense check on our overall allowed rate of return. That is, gauge whether the regulatory allowance is likely to be sufficient; alternatively, evidence is used to assist with identifying potential issues with our regulatory regime and areas of further research and inquiry. We intend to review RAB multiples, scenario testing and financeability tests. To the extent any information can be drawn, RAB multiples may act as a trigger for investigation and indicate if the total compensation (inclusive of the rate of return) provided to investors is sufficient. We think historical profitability, investment trends, other regulators' rate of return and other practitioners' discount rates have greater limitations and are of less value than RAB multiples, scenario testing and financeability

1.4 Next steps

This working paper marks the end of our working paper series. We note that stakeholders will have further opportunities to provide submissions during the 2022 Rate of return Instrument Review. The consultation period on the Information Paper will close shortly after the conclusion of the Concurrent expert evidence sessions. Hence, stakeholders will have an opportunity to include their views on the expert sessions in their submission. Should stakeholders wish to make a submission to the Independent Panel, this submission can also be included as part of their response to the Information Paper. There will be a final opportunity for stakeholders to make a submission on the Draft Instrument in September 2022.

An indicative timeline for Making the Instrument stage of our Pathway to 2022 is below.

Table 3 Making the Instrument timeline

	Date
Information paper	December 2021
Experts conclave	27 January 2022
Concurrent expert evidence sessions	10 and 17 February 2022
Submissions on Information Paper close	11 March 2022
Draft 2022 Rate of Return Instrument released	June 2022
Release of Independent Panel's report	August 2022
Submissions on Draft Instrument close	September 2022

2 Market risk premium

2.1 Overview

The market risk premium (MRP) is the difference between the expected return on a market portfolio and the return on the risk-free asset. The MRP compensates an investor for the systematic risk of investing in the market portfolio, or the 'average firm' in the market. Systematic risk is risk that affects all firms in the market (such as macroeconomic conditions and interest rate risk) and cannot be eliminated or diversified away through investing in a wide pool of firms.

Our regulatory task is to determine an overall rate of return (or WACC) for an efficient firm that is in the supply of regulated energy network services commensurate with its efficient financing costs. Because we use an Australian domestic Sharpe-Lintner capital asset pricing model (CAPM), the relevant MRP is the expected Australian dollar return on the Australian market portfolio less the return on the Australian dollar risk free asset.

The MRP estimate we use in the CAPM needs to be a good estimate of the expected Australian domestic MRP. However, the expected MRP is not directly observable. As a result, several different methods have been put forward to us by stakeholders to estimate the expected MRP. These include using dividend growth models (DGMs), the Wright approach, and historical excess returns (HER).

2.2 What is the issue?

In 2018, we stated that MRP is not stationary and is likely to vary under different economic conditions. However, there was no theoretical basis for determining how the MRP might vary with the risk-free rate (RFR).[30] In addition, we did not consider we had a sufficiently robust method to estimate genuine variations in the MRP through time.[31] We therefore considered the best regulatory approach was to fix the MRP and have the return on equity vary with the risk-free rate.[32]

Networks and investors raised concerns over our 2018 approach to estimating the MRP and proposed that a more forward-looking approach such as the DGM should be considered.[33] However, consumer groups submitted that our current approach to MRP estimation remained appropriate.[34] Additionally, the retailer reference group suggested that we consider surveys and historical excess returns.[35]

We have engaged consultants for expert advice on this issue. These consultants were:[36]

- The Brattle Group

30 AER, *Rate of Return Instrument Explanatory Statement*, Dec 2018, p. 61.

31 AER, *Draft rate of return guidelines explanatory statement,* July 2018, p. 130.

32 AER, *Rate of Return Instrument Explanatory Statement*, Dec 2018, p. 61.

33 ENA, *Best practice framework for setting the allowed return on equity,* 9 October 2020, pp.35, 43; APGA, *APGA Submission to the AER: Draft working papers on return on equity models and international approaches to the rate of return*, 9 October 2020, p.9; NSG, *Response to the 2022 Rate of return instrument working paper on return on equity*, 9 October 2020, pp.3–5; QTC, *Pathway to the 2022 rate of return instrument*, 12 October 2020, pp.2–9; APA, *APA submission on CAPM and alternative return on equity models*, 12 October 2020, p.4.

34 CRG, *Submission to AER: Return on equity*, 9 October 2020, pp.39–45; EUAA, *Submission, CAPM and alternative return on equity models*, 9 October 2020, p.2.

35 AEC, *Presentation: AER Retailer reference group, International approaches and equity models*, 16 September 2020, p.3.

36 The Brattle Group, *A review of international approaches to regulated rates of return: Prepared for the AER*, 1 June 2020; G Partington and S Satchell, *Report to the AER: Alternative asset pricing models*, 30 June 2020; CEPA, *Relationship between RFR and MRP*, 16 June 2021.

- Professor Graham Partington and Stephen Satchell
- Cambridge Economic Policy Associates (CEPA)

The consultants offered contrasting views on the role of the DGM to estimate an MRP and the existence of a relationship between the risk-free rate and the MRP.

The Brattle Group's report recommended the use of a DGM to estimate a 'forward-looking' MRP, as this was done by some international regulators.

The CEPA report suggested that the AER consider three options for calculating the MRP from historical data:

- Fixed MRP approach
- Fixed total market return (TMR) approach
- Hybrid approach[37]

In contrast, the Partington and Satchell report did not recommend any use of the DGM, primarily because of problems in implementation, nor did the report support using the fixed total market return (TMR) approach.[38]

2.3 Proposed position

At this stage we have an open position to estimate a forward-looking MRP.

In keeping with our open position, our approach will be to explore three potential options:

- Option 1 – Maintain our current approach to inform our estimates of the MRP (consistent with our 2018 Instrument).
    - Under this approach, the HER method plays a primary role, and we look at both arithmetic and geometric averages to develop our MRP estimates range.
    - When exercising our regulatory judgment, we rank the utility of different types of evidence at the time and then qualitatively consider whether to move our initial MRP estimates up or down.
    - We give most weight to the HER results and less weight to other relevant evidence (such as DGM's, surveys and conditioning variables).
- Option 2 – Use estimates from the DGM to inform our point estimates of the MRP, within the range observed by our current approach (similar to our 2013 approach).
    - That is, exercising our judgement to pick a point estimate from the HER range using the information from the DGMs in a directional sense.
    - Where there is an increasing/decreasing trend in DGM estimates relative to their long-term averages, we may pick a point estimate that is higher or lower within the range of HER estimates, respectively.
    - Alternatively, we could set a value for the MRP having considered both MRP and DGM estimates and any other relevant evidence.

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37 This approach would place weight on both of the above approaches. It relies on an assumption that there is a negative correlation between the RfR and the MRP but this correlation is not perfect, so that a fall (/rise) in the risk- free rate would lead to a rise (/fall) in the MRP, but the change in the MRP would be smaller than that of the risk- free rate. Analysis of historical data or alternative approaches could be used to calibrate the model.

38 G Partington and S Satchell, *Report to the AER: Alternative Asset Pricing Models*, 30 June 2020, p.23.

- Option 3 – Provide more weight to the DGM alongside our current approach (a mechanical approach).
    - This would require us to determine how the HER estimate(s) and DGM(s) are weighted as well as the specification of the DGM(s) inputs.
    - Further, given the 2022 Instrument must be applied without exercising any discretion, we will also have to decide whether this method will be used to set a MRP point estimate in the 2022 Instrument or set a method that will mechanically update throughout the life of the Instrument.

We also considered some other options but at this point we are not intending to pursue those options after assessing them. These options are:

- Estimating and employing a relationship between the MRP and the risk-free rate.
- Giving weight to the historical commonwealth Government Securities (CGS) yield when estimating the risk-free rate.
- Set a floor to the risk-free rate to ensure the real risk-free rate does not become negative.

These options are discussed in section 2.4.2 as alternative approaches.

2.4 Reasons for proposed position

In the context of using an Australian domestic SLCAPM, we consider our MRP estimate should be a good estimate of the expected Australian domestic MRP.[39] The MRP is forward looking and not directly observable; therefore, we need to evaluate different pieces of evidence to inform its estimate. Potential information sources include dividend growth models (DGMs), the Wright approach, historical excess returns (HER), surveys, conditioning variables and approaches adopted by other regulators. In taking this information into account we aim to analyse the strengths and weakness of each piece of information and what they may imply about the MRP statically (currently and at the time of making the 2022 Instrument) and through time. We will use our assessment criteria to evaluate the information before us. Further, given the 2022 Instrument must be applied without exercising any discretion, we will have to decide whether the MRP should be fixed, or should vary formulaically through the period the 2022 Instrument applies.

At this stage we have chosen to keep an open position on the three-options highlighted above as stakeholders and experts have provided differing opinions on the underlying factors related to setting a forward looking MRP in a regulatory framework. These opinions raised a number of questions that we considered in forming our position, including:

- Is the HER backward looking, and irrespective is it a likely to be good estimator of the forward looking MRP?
- Is the DGM likely to be a better estimator of a forward looking MRP than the HER approach and is it suited to regulatory application?
- Is there a reliable way to estimate changes in the market risk premium through time?
- Can we use predictive variables to predict excess returns?
- Is there a relationship between the risk-free rate and market risk premium?
- What are the approaches adopted by other regulators?
- Should the MRP be fixed, or should it vary through the 2022 Instrument period?

The first four questions above are considered in the following sections on:

[39] AER, *Rate of Return Instrument Explanatory Statement*, Dec 2018, p. 220.

- time variation in the MRP,
- the potential use of the DGM to estimate a forward looking MRP, and
- whether time variation in the MRP is likely to be predictable.

The next two questions, on whether there is a relationship between the risk-free rate and the MRP and the approach of other regulators are covered in sections 2.4.1.3 and 2.4.2.1. The answer to the final question depends, to a degree, on the answers to the first four questions.

Time-varying MRP

Partington and Satchell's report to the AER stated that allowing for any changes in the risk premium is, in principle, desirable. However, there is no reliable method to detect changes in the risk premium, and hence determine whether any adjustment and in what direction is necessary for the long run average.

Dr Martin Lally also shared a similar view to the Partington and Satchel report. He stated that the true value of the MRP is likely to fluctuate over time. Therefore, the AER's MRP would be likely to be overestimated during favourable economic conditions and underestimated during unfavourable conditions. However, this does not imply that the AER's MRP estimates should be more variable over time, because it is impossible to reliably estimate short-term variations in this parameter even if one can be confident that a stable estimate will be too low (by an unknown amount) during unfavourable economic conditions and too high (by an unknown amount) in favourable economic conditions.[40]

CEPA's report to the AER noted that recent academic literature overwhelmingly uses a time varying MRP, and there are many recent examples of the use of DGM and related models to estimate how the MRP changes. Recent approaches include work by the European Central Bank and Federal Reserve Bank of New York.[41]

CEPA stated that in the past, the academic literature relied on or at least was consistent with the assumption that the MRP was stable. This is no longer the case, and the MRP is now seen as a variable to be estimated. However, the academic literature does not provide a firm guide as to whether the MRP should vary with the risk-free rate. Therefore, a decision on what assumption to make about the MRP should rely on empirical evidence.

To date, our approach has been to rely on HER as the best indicator of future values of the MRP. We explain the reasons for this view under option 1. However, we accept that the HER method is unlikely to pick up short run variations quickly. This inability to pick up short run variations and the use of a fixed MRP in the rate of return Instrument is considered by some stakeholders as a key weakness in the HER method. Some stakeholders have argued that the HER method is backward looking. We don't accept the criticism. However, in view of this criticism of the HER method we are open to exploring whether there is a better alternative. We set out our initial views on alternative approaches in our discussion of option 2 and option 3. Both of these options provide for greater weight to evidence in addition to the HER method.

40 M Lally, *The appropriate term for the allowed cost of capital*, 9 April 2021, p.33.

41 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.13; D Kapp and K Kristiansen, *Euro area equity risk premia and monetary policy: a longer-term perspective*, 2021; F Duarte and C Rosa, *The equity risk premium: a review of models*, 2015, New York Federal Reserve Board.

The DGM as a forward-looking estimate

The Brattle and CEPA report to the AER highlighted that international regulators such as the New Zealand Commerce Commission (NZCC) and the US Federal Energy Regulator Commission (FERC) use the DGM to estimate a forward-looking MRP.[42]

The Brattle report referred to the CAPM as a model that relies on backward-looking information (particularly when populated with a historical MRP) and the DGM as a model that uses forward-looking information. The report suggested that the implementation of the CAPM could be improved by the use of forward-looking evidence when estimating inputs such as the MRP. Using the DGM to estimate the MRP would provide more contemporaneous information, and this is particularly important during periods of change in financial markets.

The CEPA report considered two approaches (the DGM and the earnings yield model) to investigate whether the MRP moves through time, and whether there is any relationship with the risk-free rate. However, in relation to whether the models can accurately predict MRP, CEPA states:

> "As part of these analyses, we are not claiming that the DGM and earnings yield model produce accurate measures of the MRP, but merely that they can be used to provide a consistent estimate of the directional changes in MRP".

CEPA also highlighted that these two approaches produce negative MRP estimates for some years, notably in the 1980s and 1990s. The period of negative MRPs coincide with unusually high bond rates, both in nominal and real terms. CEPA stated that others have also found that negative MRP estimates are not unusual for these types of models.[43]

We also note that Campbell and Thomson (2008), argued that the MRP is the reward for bearing risk and this reward must be positive and not negative. The predictive relations between any predictor variable must be constrained to be such that MRP is never negative.[44] At this stage we are not aware of any DGM that is consistent with this theoretical underpinning, although it is possible that a variable growth rate DGM with the appropriate construction may not result in a negative MRP.

The Partington and Satchell report also commented on the estimation of a negative MRP. It stated that in the most elementary models of investor behaviour, negative risk premiums are not possible for risk averse investors.[45] However, in an earlier report to the Partington and Satchell stated that they are not completely dismissive of the DGM approach but found it to be more useful as a conceptual tool than a forecasting model.[46]

The challenges with the application of the DGM, unless they can be adequately dealt with, arguably support the use of option 1 (over option 2 or option 3). Even though an option 1 (heavily HER based) approach to estimating the MRP may not pick up short run variations in the MRP, a stable MRP may be more desirable than an unstable MRP estimate with the potential for material and uncertain volatility.

Return predictability

We recognise that the literature on return predictability is extensive and complex. In a working paper that explored return predictability, Dr Gibbard (2013) suggested that some studies conclude that returns are predictable, while others conclude they are not. If excess

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42 CEPA, *Relationship between RFR and MRP*, 16 June 2021, pp. 5,20-21.

43 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.38.

44 J Campbell and SB Thompson, 'Predicting excess stock returns out of sample: Can anything beat the historical average?', *Review of Financial Studies*, 2008, 21:1509–31.

45 G Partington and S Satchell, Report to the AER: Alternative Asset Pricing Models, 30 June 2020, p.23.

46 G Partington and S Satchell, *Report to the AER: Discussion of submissions on the cost of equity*, 8 June 2017, p.25.

returns are predictable, we can estimate the MRP using predictive variables (such as dividend yields or implied volatility) or a valuation model. If excess returns are not predictable, historical excess returns are the best estimate of the MRP.[47]

For example, Welch and Goyal examined the performance of variables that academic literature suggested as good predictors of the equity premium. These variables include dividend yields, the earnings price ratio, corporate bond returns and volatility. Welch and Goyal found that of the variables that have been proposed to predict excess returns, many produced poor in-sample forecasts. Moreover, they found that most variables that performed well in-sample performed poorly out of sample.[48]

The conclusion of Welch and Goyal is stated below:

> "Most models are no longer significant even in sample (IS), and the few models that still are usually fail simple regression diagnostics…Most models have poor out-of-sample (OOS) performance, but not in a way that merely suggests lower power than IS tests. They predict poorly late in the sample, not early in the sample…Therefore, although it is possible to search for, to occasionally stumble upon, and then to defend some seemingly statistically significant models, we interpret our results to suggest that a healthy scepticism is appropriate when it comes to predicting the equity premium, at least as of early 2006. The models do not seem robust…, most models not only fail to beat the unconditional benchmark (the prevailing mean) in a statistically or economically significant manner but underperform it outright".

In contrast, Campbell and Thompson consider a variety of different valuation models and reach the conclusion that excess returns are predictable.[49]

> "We have shown that most of these predictor variables perform better out-of-sample than the historical average return forecast, once weak restrictions are imposed on the signs of coefficients and return forecasts. The out-of-sample explanatory power is small, but nonetheless is economically meaningful for investors"

Dr Gibbard also suggested that even if the MRP changes over time, regulators face a number of practical problems in conditioning the estimate of the MRP on current information, namely:[50]

- The diversity and complexity of contemporary predictive models
    - Dr Gibbard identified a range of articles in the 'third phase' of literature which explore claims of predictability through more complex models.
    - As a result of this literature, there is a considerable range of novel and complex models of excess returns in the academic literature.
    - In this literature, there is no consensus — or anything approaching consensus — on the appropriate set of methodologies for modelling future excess returns.
    - If a regulator were considering conditional models of the MRP, it would be difficult for the regulator to select and implement such a model, not only because of the diversity of models, but also their increasing complexity.
- The instability of return predictability

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47 P Gibbard, *Estimating the Market Risk Premium in Regulatory Decisions: Conditional versus Unconditional Estimates*, September 2013; AER, *Explanatory Statement: Rate of Return Guideline (Appendices)* December 2013, p.110.

48 Welch and A Goyal, *'*A Comprehensive Look at the Empirical Performance of Equity Premium Prediction'*, Review of Financial Studies*, 2008, 21(4):1455–1508.

49 Campbell, John and Samuel B. Thompson, 2008, *Predicting excess stock returns out of sample: Can anything beat the historical average?*. Review of Financial Studies 21, p. 14.

50 P Gibbard, *Estimating the Market Risk Premium in Regulatory Decisions: Conditional versus Unconditional Estimates*, September 2013, pp.24–29.

- A number of studies have found instability in models of return predictability; that is, the models tend to change over time. As a result, it is not clear whether a predictive model that appears reliable today will perform well in future.
- If parameters in the model are unstable over time, it is difficult, if not impossible, for the regulator to measure accurately how the MRP should be adjusted in response to changes in the conditioning variables.

- The potential for data mining
  - Data mining may be intentional or unintentional.[51]
  - Unintentional data mining is exemplified by multiple econometricians testing the same data set against different variables. As the number of tests increases, a statistically significant result becomes more and more likely, even though there may not be any relationship between the variables.
  - Intentional data mining typically involves conducting analysis with the intention of establishing a desired relationship. This may be where an econometrician interrogates a data set using a number of different variables until one variable produces a statistically significant relationship.

In summary, we consider that the debate about return predictability is not settled.

There is some uncertainty about the ability of conditioning variables or valuation models to predict excess returns. At the same time, there is support for predictability in the academic literature. Accordingly, we should express caution when predicting excess returns.

To the extent that excess returns over the risk-free rate can be modelled and are sufficiently predictable, it would support the use of option 2 or option 3 over option 1. In relation to the use of DGM models to estimate the MRP, a key question is can they more accurately model and predict the MRP through time than HER based approaches.

We are therefore interested in hearing the views of the experts at the concurrent evidence session on the three options we have proposed for estimating a forward-looking MRP.

2.4.1 Options proposed

In this section we outline the three options we are actively considering for the 2022 Instrument before turning in the next section to three alternative options we are not proposing to advance at this stage.

2.4.1.1 Option 1 – Maintain our current approach to inform our estimates of the MRP

This option recognises that MRP does vary over time, however excess returns are difficult to predict. In recognition of this view, we have proposed to give primary weight to the HER as they indicate the excess returns investors required in the past and are likely to expect in the future. Empirical evidence suggests that the HER moves slowly through time and therefore, can be used to inform future return expectations. This option is also based on the view that it is not clear that there are better predictors that can be used in a regulatory setting.

In the sections below we discuss our view around the HER, the arithmetic & geometric averages, surveys, conditioning variables.

We also consider the DGM under this approach but place less weight on its use. We have discussed our views on the DGM in section 2.4.1.2.

51 Data mining can also be referred to as ‘data dredging’ and ‘data snooping’

Historical excess returns

In response to our *Equity Omnibus Draft working paper*, the ENA stated that the HER method does not reflect the prevailing market conditions at a point in time. It noted that the estimates are computed using data through to the end of the previous year. That estimate is the same whether the current year is in an economic boom or a financial crisis.[52]

In contrast consumer groups submitted that the AER should continue to rely primarily on long run HERs. The CRG submitted that the AER should focus on long-term trends in the MRP and avoid being lured into chasing market expectation of the economic cycle using questionable methodologies.[53] MEU stated that longer term averages are essential as it limits the impact of volatility.[54]

In our view, the historical excess returns method has several desirable characteristics for estimating the MRP in a regulatory setting. The method is observable, easily replicable, transparent, and widely used in both regulation and by market practitioners.

We note that some market practitioners adjust the risk-free rate when using a MRP derived from the HER method.

We also note that various experts have noted that the HER may be subject to certain biases. Such as:

- Survivorship bias
    - Survivorship bias is created by estimating historical returns on only stocks that have survived. Historical data excludes negative return stocks that no longer exist, which naturally results in higher return estimates. This upward bias is a relevant consideration because the various Australian stock indexes exclude failed stocks.[55]
- Unanticipated inflation
    - Dr Lally noted that Siegel (1999) considered unanticipated inflation means historical returns underestimate real returns on risk free assets.[56]
- Transaction costs
    - Mckenzie and Partington noted that Siegel stated that historical returns on equity overstate returns actually realised, given historically high transaction costs and the historical lack of low-cost opportunities for diversification.[57]
- Bias due to inclusion of historical data which contains periods of a major recession

52 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p. 50.

53 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p. 72

54 MEU, *Rate of return Omnibus papers on 2022 RoRI: Response to draft working papers*, 3 September 2021, p. 15.

55 AER, *Explanatory Statement: Rate of Return Guideline (Appendices)* December 2013, pp. 79–80; Damodoran, A. *Equity risk premiums: determinants, estimation and implications—the 2012 edition*, March 2012, p. 24; McKenzie and Partington, *Equity market risk premium*, December 2011, pp. 6–8.

56 AER, *Explanatory Statement: Rate of Return Guideline (Appendices)* December 2013, p. 80; Lally, *Cost of equity and the MRP*, July 2012, p. 28; Siegel, J. 1999, *'The Shrinking Equity Premium', Journal of Portfolio Management*, vol. 26, pp. 10–17.

57 AER, *Explanatory Statement: Rate of Return Guideline (Appendices)* December 2013, p. 80; McKenzie and Partington, *Equity market risk premium*, December 2011, p. 7; Siegel, J. 1999, *'The Shrinking Equity Premium', Journal of Portfolio Management*, vol. 26, pp. 10–17.

- Dr Lally stated that historical excess returns may underestimate the forward looking 10-year MRP when an economy has entered a major recession. However, Dr Lally has noted that this downward bias is unlikely to be very large.[58]

We are aware of these issues but have been advised by Mckenzie and Partington in the past to not make any adjustments as the precise magnitude of these biases are not clear.[59]

We also note that average historical excess returns over long periods are by their nature relatively stable. Consistent with ENA's observation, the true (non-observable) prevailing MRP may vary more through time than these averages. The key question, however, is if an adjustment for this variation can be sufficiently reliably estimated to be appropriate in our regulatory framework.

Finally, related to the above point it has been proposed that both the total market return is more stable than the risk-free rate, and that there is an inverse relationship between the risk-free rate and the MRP.[60] In the past, networks have also proposed we should combine a long term estimate of the risk free rate with a long term estimate of the MRP for internal consistency within the CAPM, an approach we have rejected. [61] The stability and predictability of total market returns, the MRP, and any relationship between the MRP and the risk-free rate have been considered by the AER in prior work and are ongoing areas of consideration.[62]

Is the HER backward looking?

Using historical excess returns does not mean a MRP estimate is backward-looking. Historical excess returns data is commonly used by both regulators, and by market practitioners to inform their estimates of the market risk premium within a forward-looking rate of return. This view was recognised by the Tribunal in the Dampier to Bunbury Natural Gas Pipeline (DBNGP) matter.[63] This could suggest that an average of historical realised excess returns may be the best available predictor of the current MRP.

The table below shows five sampling results for HER as suggested by Brailsford, Handley and Maheswaran (BHM).[64] It shows that the estimates of the historical excess returns are relatively stable over time.

Table 4 Historical excess returns estimates

Sampling Period	Arithmetic average	Geometric Average
1883-2020	6.4	5.0
1937-2020	6.1	4.3

58 AER, *Explanatory Statement: Rate of Return Guideline (Appendices)* December 2013, p. 80; Lally, *Cost of equity and the MRP*, July 2012, p. 24.

59 AER, *Explanatory Statement: Rate of Return Guideline (Appendices)* December 2013, p. 81.

60 Ausgrid, *Overall rate of return, Equity and Debt*, 3 September 2021, p.4; ENA, *Estimating the cost of equity*, 3 September 2021, p.39; Endeavour Energy, *Overall rate of return, Equity and Debt*, 3 September 2021, pp. 7-8; NSG, *Response to AER RORI Omnibus papers*, 3 September 2021, p.13; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.11.

61 AER, *Better Regulation Explanatory Statement Rate of Return Guideline (Appendices)*, Dec 2013, pp. 108–110.

62 AER, *Equity Omnibus Draft working paper*, July 2021, pp 56-58; AER, *Rate of return instrument Explanatory Statement*, Dec 2018, pp.230–235.

63 The Tribunal recognised this view in the Dampier to Bunbury Natural Gas Pipeline (DBNGP) matter. Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraph 153.

64 T Brailsford, JC Handley and K Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, 2008, 48:85–6.

1958-2020	6.6	4.4
1980-2020	6.6	4.5
1988-2020	6.3	4.8

Notes: Calculated using an assumed imputation utilisation value (or theta value) of 0.65.

Source: Handley, An estimate of the historical equity risk premium for the period 1883 to 2011, April 2012, p.6; AER Analysis.

Although these estimate changes slowly over time, we consider it is likely to reflect prevailing market conditions if investor expectations are guided by historical excess returns.

Brailsford, Handley and Maheswaran stressed that these estimation periods are not arbitrary, but rather are determined by clearly identifiable and material changes in the underlying data.[65]

The rationale for each of the estimation periods are listed below:

- 1883 – The first (calendar) year for which data is available.
- 1937 – The first year for which data is available on both a broad stock index – the Sydney All Ordinary Shares price index – and on marketable "short" term government securities.
- 1958 – the first year for which the Sydney All Ordinary Shares price index was calculated on a daily, rather than a retrospective, basis and (approximately) the first year for which marketable short-term government securities – seasonal securities/treasury notes – were issued.
- 1980 – the first year for which the ASX All Ordinaries accumulation index was calculated on a daily, rather than a retrospective basis.
- 1988 – the first (full) year of operation of the dividend imputation tax system in Australia.

However, the historic realised returns over short periods are quite sensitive to the starting points. For example:

- if we changed our starting point to 1990, the HER arithmetic average produces an estimate of 6.1 per cent.
- If we changed our starting point to 1993, the HER arithmetic average produces an estimate of 7.3 per cent.

We also note that CEPA considered evidence on the approaches to MRP used by financial market practitioners and concluded that while there is acceptance that MRP may change, in practice, the MRP has been relatively stable.[66] They drew reference to Grant Samuel (an independent advisory firm) who made the following comment:[67]

> "The market risk premium is not constant and changes over time. At various stages of the market cycle investors perceive that equities are more risky than at other times and will increase or decrease their expected premium. Indeed prior to 2008, there were arguments being put forward that the risk premium was lower than it had been historically while today there is evidence to indicate that current market risk premiums are above historical averages. However, there is no accepted approach to deal with changes in market risk premium for current conditions."

The report also drew reference to BDO and Lonergan Edward who shared a similar view on the MRP. However, in terms of the risk-free rate, BDO & Grant Samuel take the spot rate of

65 AER, *Better Regulation: Explanatory Statement Rate of Return Guideline (Appendices)*, December 2013, p.82.

66 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.5.

67 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.19.

10-year government bonds to calculate the risk-free rate, whilst Lonergan Edwards took a risk-free rate based on a long-term average.[68]

CEPA stated that independent experts tended to rely on a mixture of historical data, academic literature, and regulatory precedent when setting the MRP. They also observed that over the entire period (2013 to 2021), the MRP applied was commonly 6.0 per cent, with no adjustment for the falling risk-free rate over this period. [69]

We acknowledge the concerns regulated businesses have over an MRP estimate based on a historical average. There are questions whether the use of a historical average of excess returns is consistent with a forward-looking CAPM framework. However, historical averages can be appropriate forward-looking predictors of future excess returns because they both may indicate excess returns investors required in the past and inform future excess returns expectations, and because it is not clear that there are better predictors that can be used in a regulatory setting.

We also would like to highlight that in a recent discussion paper by Mathews (and reported in the RBA's June 2019 Bulletin), evidence was presented to show that historical returns on Australian equity — and therefore the historical excess returns— were lower than previously estimated by Lamberton.[70] We currently use a downwardly-adjusted Lamberton approach to estimated returns before 1980, which are used to estimate the historical excess returns.

The unadjusted Lamberton approach tends to overstate the actual dividends shareholders would have received because it uses a simple average, and excludes firms not paying dividends. The RBA's new series used in the discussion paper for estimated returns before 1980 appears more consistent with the post-1980 historical returns data series used by the AER.[71] Unlike the Lamberton approach, this approach weighs dividends by market capitalisation, and includes firms not paying dividends.[72]

We are therefore considering the use of this new RBA series (as opposed to the current series we use that reflects the adjusted Lamberton series in the work by Handley and co-authors). In response to our proposal in the *Equity Omnibus Draft working paper*, the ENA submitted a 2021 consulting report by HoustonKemp Economists, *A new MRP estimate? A review of RBA discussion paper 2019-04.*

The HoustonKemp consulting report raised a number of challenges with the RBA data sets including:

- The price series constructed by Matthews will be systematically biased downwards due to the incorrect classification of capital changes associated with bonus issues as issuance of new shares.[73]
- The dividend series constructed by Matthews should not be combined with the price series based on Lamberton's work, absent adjustment to account for the difference, because the composition differed.[74]

68 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.19.

69 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.18.

70 RBA, *Bulletin*, June 2019, p. 97.

71 RBA, *Bulletin*, June 2019, p. 171.

72 RBA, *Bulletin*, June 2019, p. 171.

73 HoustonKemp Economists, *A New MRP Estimate? A review of RBA discussion paper 2019-04 – A report for Energy Networks Australia, August* 2021, p3.

74 HoustonKemp Economists, *A New MRP Estimate? A review of RBA discussion paper 2019-04 – A report for Energy Networks Australia, August* 2021, pp8-9.

We spoke to Matthews, the author of the RBA discussion paper, and he indicated with respect to the paper:[75]

- It sets out the way the price series has been constructed given the data used and limitations of the price series relative to other series available
- He understood the AER had requested access to the raw data to enable us to consider what could be done with it. He indicated the paper was clear on the data sources.

In order to evaluate the RBA's data series published with the discussion paper, and consider the comments raised in the HoustonKemp report, we asked the ASX to provide access to this data and have recently received the requested data. At this point of time, we are working through the data to see how it can be used in our process and will publish our findings once completed. Our initial views are:

- We consider there are limitations with the price series as noted by both the RBA discussion paper and the HoustonKemp report and this likely prevents us relying on it.
- We are considering if the dividend series constructed by Matthews can be used with our existing price series based on Lamberton's data, even if an adjustment is required to the dividend series for composition differences. We will consider the raw RBA data and determine if this would be consistent with our assessment criteria and likely to provide a better overall estimate of the historical MRP.

Arithmetic vs Geometric averages

The arithmetic average return is the simple average annual return, whereas the geometric average return is the average compounded annual return.

Due to the mathematical principles underpinning the two methods, we give more weight to the arithmetic average than the geometric. However, we use the geometric average to highlight when high returns over certain periods may be driven primarily by high volatility and to set a floor when viewing the range of potential results from the HER. As shown by academic work, giving weight to both, with more weight on the arithmetic average, is more likely to arrive at an unbiased estimate than exclusively using one.[76]

We note that in response to our draft working paper, the CRG suggested that the debate regarding the appropriate approach (Arithmetic vs Geometric) remains in dispute. They suggested that given the inconclusive nature of the academic literature, the AER should explore the option of placing more weight on the geometric returns but select value from the upper end of the geometric range to account for higher estimates produced by arithmetic averaging.[77]

In contrast, several network businesses proposed that only arithmetic averages should be considered when calculating the HER as it is consistent with finance practice and literature.[78] ENA stated that it is mathematically and conceptually incorrect to use the geometric mean when using historical data to estimate a forward-looking expected return.[79] APGA further submitted that since there is no compounding there is no case for using a geometric mean.[80]

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75 AER staff discussion with T Matthews on 19 10 2021

76 AER, *Rate of Return Instrument: explanatory statement*, December 2018, p.250.

77 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, pp.78–79

78 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, pp.43–4; Ausgrid, *Submission: Equity Omnibus,* September 2021, p.5; APGA, *APGA Submission to the AER: Rate of return omnibus papers,* 3 September 2021, pp.47–9.

79 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, pp.43–44.

80 APGA, *APGA Submission to the AER: Rate of return omnibus papers,* 3 September 2021, pp.47–50.

However, we remain of the view that geometric averages have value, and should be considered because:[81]

- There remains uncertainty over whether an arithmetic or geometric average (or some combination of the two) provides a better estimate of the expected excess returns due to the variability of returns from year to year.
- There are studies and academic examples showing there are periods in which the geometric average is the best estimator. Others show that the arithmetic could be superior.
- Over periods of changing volatility, the arithmetic average can be upwardly biased whereas the geometric average is not impacted as much by volatility changes over time in a long series.

We therefore consider that both the arithmetic and geometric mean are relevant to consider when estimating a 10 year forward looking market risk premium using the HER. The Tribunal has found no error with this approach.[82]

The best of estimate of historical excess returns over a 10-year period is therefore likely to be somewhere between the geometric and arithmetic mean of annual excess returns.

Surveys

Survey evidence provides an expectation of a forward-looking MRP from market participants. Raw results are very rarely produced; however, in published results, modes, means and medians are often included, and it is from here that we draw our observations.

In response to our draft working paper, network businesses stated that survey evidence should not be used in the estimation of MRP.[83] APGA submitted that data is available for the direct estimation of MRP. Endeavour Energy submitted that survey data is incompatible with the AER's assessment criteria, theory, and market practice.[84] QTC and ENA further submitted that if the AER continues to give weight to surveys, the focus should be on the TMR responses rather than MRP responses.[85]

We recognise that surveys have limitations and are not at a level of reliability to give weight as direct estimation method of the MRP. However, we consider that they have some value and use as they inform us of investor expectations. The table below demonstrates the results from various surveys.

Table 5 MRP survey results (2012 to 2021)

Survey	Number of responses	Mean (per cent)	Median (per cent)	Mode (per cent)
Fernandez et al (2012)	73	5.9	6.0	N/A
Fernandez et al (2013)	17	6.8	5.8	N/A
Fernandez et al (2014)	93	5.9	6.0	N/A
Fernandez et al (2015)	40	6.0	5.1	N/A

81 Example, AER, *Attachment 3 – Rate of return – SA Power Networks determination 2015–20*, pp. 371-375.

82 Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT4, 11 January 2012*, paragraph 157.

83 APGA, *APGA Submission to the AER: Rate of return omnibus papers,* 3 September 2021, pp.47–50.

84 Endeavour Energy, *Draft working omnibus papers: Overall rate of return, equity and debt,* 3 September 2021, p.7.

85 QTC, *Submission to the Equity Omnibus draft working paper,* 3 September 2021, p.20; ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.59.

Fernandez et al (2016)	87	6.0	6.0	N/A
Fernandez et al (2017)	26	7.3	7.6	N/A
Fernandez et al (2018)	74	6.6	7.1	N/A
Fernandez et al (2019)	54	6.5	6.1	N/A
Fernandez et al (2020)	37	7.9	6.2	N/A
Fernandez et al (2021)	31	6.4	6.3	N/A
KPMG (2013)	19	N/A	6.0	6.0
KPMG (2015)	~27	N/A	6.0	6.0
KPMG (2017)	45	N/A	6.0	6.0
KPMG (2018)	56	5.5	6.0	6.0
KPMG (2019)	59	5.9	6.0	6.0
Asher and Hickling (2013)	46	4.8	5.0	6.0
Asher and Hickling (2014)	27	4.4	4.6	6.0
Asher and Carruther (2015)	29	4.9	N/A	N/A
Carruther (2016)	24	5.3	N/A	N/A

Comparator: Table 10 (page 16) of the 2020 Rate of Return Annual Update.

Source: Fernandez, Ortiz, Acín, Survey: Market Risk Premium and Risk-Free Rate used for 88 countries in 2021, Jun 2021. All other data is the same as published with the 2020 Rate of Return Annual Update.

CEPA stated that there are some limitations to the Fernandez survey as the number of observations changes significantly from year to year. There is no way to assess whether changes in the MRP are due to changes in the rate used by practitioners or changes in the practitioners who responded to the survey. They also stated that they prefer to use the median result for each year as the mean is impacted by some extraordinarily large responses. For example, in 2013 a practitioner responded with a MRP of 25% and in 2015 a response of 19% was received.

CEPA also looked at the KPMG Valuation Practices Survey and noted that there are limitations to the conclusions that can be drawn from the surveys as there is no consistency reported in the mix of respondents.

In addition to CEPA's work we reviewed the Fernandez survey estimates for the risk-free rate and observed that the mean ranged from 2.4 to 3.3 per cent over the same time frame. This suggests that there may be a preference in the marketplace to modify the risk-free rate rather than the MRP. However, there are limitations to the estimates derived from surveys and we do not regard them as conclusive. This view was expressed by CEPA as well.[86]

86 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.5.

Conditioning variables

Conditioning variables (implied volatility, dividend yields and credit spreads) are market data and indicators that provide information on the potential risk in the market.

In the 2018 Instrument, we used conditioning variables to inform our point estimate derived from HER because they can indicate changes in market conditions which may then indicate expectations of risk premium movement.[87]

We refer to dividend yields, credit spreads and implied volatility as conditioning variables:

- Dividend yields: Dividend yields are represented by the average dividend yield of the ASX 200, which can change in times of high market risk, as seen during the 2008 financial crisis. We compare current dividend yields with the average dividend yield through time.[88]
- Implied volatility: The implied volatility approach assumes that the MRP is the price of risk multiplied by the volume of risk (volatility).[89] Volatility can indicate the degree of risk in the market. Low volatility is more likely to signal lower risk in the market.
- Credit spreads: Credit spreads are the spreads between the risk-free rate (the yield on Australian government securities, or CGS) and the return on debt for different debt instruments. We look at whether the spreads are widening, stabilising, or narrowing as an indicator of changes in market conditions.

In response to our draft working paper, ENA and APGA stated no consideration should be given to using conditioning variables to inform the estimate of the MRP. APGA submitted there is a better way to bring forward-looking information into the MRP, such as using DGM evidence.[90] ENA stated that consultation would be required before stakeholders could have confidence in using conditioning variables to inform the estimation of MRP.[91]

In our view, conditioning variables can be used to provide directional information because their main strength is their ability to detect changing market conditions, which may indicate expectations of risk premium movement. However, they should not be used on a stand-alone basis to inform our point estimate derived from HER, as there are difficulties in defining a robust estimation method.

Conclusion

Our analysis to date suggests there remains a case for fixing the MRP consistent with our current approach. However, we would like to hear the experts view at the concurrent evidence session on this topic.

For illustrative purposes we see this option working as follows:

- Under this approach, the HER method (using both the arithmetic and geometric averages) plays a primary role in developing our MRP estimation range.
- We give most weight to the HER estimates when selecting a point estimate within the range.
- We give less weight to other evidence (such as DGMs, surveys and conditioning variables).

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87 AER, *Rate of return instrument: Explanatory Statement*, December 2018, p.238.

88 For a similar approach, see SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, p.13

89 This was based on RC Merton, 'On estimating the expected return on the market: An explanatory investigation', *Journal of Financial Economics*, 1980, 8:323–361.

90 APGA, *APGA Submission to the AER: Rate of return omnibus papers,* 3 September 2021, p.41.

91 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, pp.59–60.

2.4.1.2 Option 2 – Use estimates from the DGM to inform our point estimates of the MRP, within the range observed by our current approach

This option recognises that the DGM may be a reasonable predictor of future excess returns and can be used to capture variability of the MRP. In recognition of this view, we propose to give greater weight to the DGM when selecting our point estimate within our MRP range.

In the section below we recognise the views expressed by the consultants, financial institutions, and stakeholders regarding the use of the DGM to set a forward looking MRP. We are also currently evaluating the calibrated DGM model which has been proposed by the ENA to address key concerns we have expressed in the past.

Dividend Growth Models

The DGM method is a theoretically-sound estimation method for the MRP. As DGM estimates incorporate prevailing market prices, they are more likely to reflect prevailing market conditions. DGM estimates are also clearly forward-looking as they estimate expectations of future cash flows and equate them with current market prices through the discount rate.

However, there are practical limitations with using this evidence. In particular, these estimates are highly sensitive to the assumptions used. It is necessary that all assumptions used have a sound basis; otherwise, estimated results from DGM analysis may be inaccurate and lead analysts into error. We have highlighted these issues in detail in the past.[92]

The table below shows MRP estimates using dividend growth rates from 3.78 per cent to 5.1 per cent.

Table 6 Dividend Growth Model Results with Sensitivity Analysis

Sensitivity	Two stage model (2021)	Three stage model (2021)
Baseline 4.6% long-term growth rate Average over recent 2 months* unadjusted analysts' forecasts	7.68	7.06
5.1% long-term growth rate	8.16	7.49
3.78% long-term growth rate	6.89	6.36
Average over recent 6 months*	7.66	7.06
Average over recent 12 months*	7.81	7.78
Analysts' forecast + 10%	8.15	7.48
Analysts' forecast - 10%	7.21	6.65
Combined - low	6.42	5.94

92 AER, *Rate of return instrument Explanatory Statement*, December 2018, pp.253–267.

Combined - high	8.76	8.65

Comparator: Table 21 (page 269) of the 2018 explanatory statement.

Notes: All market risk premium estimates are based on an assumed theta of 0.65. The estimates above are updated as of the end of October 2021. Combined - low is based on 3.78% growth, 2 month averaging, analysts' forecasts - 10%. Combined - high is based on 5.1% growth, 12 month averaging, analysts' forecasts + 10%.

Source: Bloomberg, AER analysis.

In response to our *Equity Omnibus Draft working paper*, the consumer groups rejected giving weight to the DGM in the estimation of a forward-looking MRP. The CRG proposed that the AER should uphold its decision from 2018 to reject using the DGM to estimate the market risk premium as no new or conclusive evidence has been presented to support its use.[93]

The MEU submitted that the DGM has major drawbacks and questioned if it is even possible for the DGM to inform the AER about the cost of equity.[94] SACOSS opposed the DGM being used as one of the sources of evidence to inform the estimation of MRP as it would result in a much higher and more variable estimate compared with HER calculations.[95]

We also note that the Partington and Satchell report evaluated the DGM as an asset pricing model and recommended that we should not use it for estimating the regulated rate of return. They stated that:[96]

> "The theoretical foundation of the dividend growth model is solid, and the model is clearly based on economic and financial principles. The issues lie in implementation. There is plenty that can go wrong in the implementation and the empirical evidence is consistent with this view. On the basis of our analysis, we conclude that the risk of error and bias in the use of the DGM are substantial.
>
> The choice of appropriate inputs to the model is also an issue. The use of analysts' forecast is likely to result in an upward biased estimate of the cost of equity, but it is not clear what the alternative to analysts' forecasts should be.
>
> Depending on its implementation, the use of the DGM can be transparent and replicable but given the range of choices available it is wide open to gaming. The DGM can be relatively simple, but how simple depends on which variant of the model is implemented.
>
> The DGM has in its favour that it has had empirical use in the practice of estimating the cost of equity. However, as the survey evidence shows it has fallen out of favour. Given our analysis, this is entirely understandable. On the basis of that analysis, we cannot recommend the DGM for use in estimating the regulated rate of return for individual firms."

To address our concerns, the ENA constructed and submitted a version of the DGM (the "calibrated DGM"), that uses our past decisions and specifications to solve for the long run growth rate that equates the mean DGM estimates with our estimate of the historical average MRP.[97]

The ENA consider that this approach addresses the key concerns expressed by the AER; that

93 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.84

94 MEU, *Rate of return Omnibus papers on 2022 RoRI: Response to draft working papers*, 3 September 2021, p. 18.

95 SACOSS, *AER Consultation on the Rate of Return – Omnibus Papers,* September 2021, p. 5.

96 G Partington and S Satchell, *Report to the AER: Alternative Asset Pricing Models*, 30 June 2020, p.64.

97 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.55.

- There is no single objective way to determine the long-run growth rate, and estimates are sensitive to the choice of growth rate.
- There are concerns that the DGM approach might produce estimates that are systematically upwardly biased.

The ENA proposed that the calibrated DGM would only be estimated at the time of the 2022 Instrument and it will be used to inform the selection of an MRP figure. It would not be re-estimated at the time of each determination during the 2022 Instrument period. The ENA would use the calibrated DGM to produce a range that is supported by the DGM evidence – in the same way that the AER has regard to a range of different historical excess returns estimates.

The ENA stated that the benefit of the calibrated DGM approach is that, not only does it produce the same average MRP as the historical excess returns approach, it provides an indication of whether the current MRP is above or below that long-run average.

The calibrated DGM is constructed as follows:

1. Establish the base MRP
    - estimate the average excess return over some historical period.
        - In 2018 the AER estimated that the average historical MRP over the 1988-2017 period was 6.1%
2. Populating the market level DGM
    - obtain values for the current market index and consensus dividend forecasts (for the market as a whole) from Bloomberg for the next 3 years.
    - assume a constant value for growth (any figure will do).
    - Use these inputs to solve the implied required return on the market.
3. Applying the model to reach month MRP estimates
    - Repeat the process every month over the historical period used to establish the base MRP.
        - At this point of the time ENA has run this process from 1996 to 2021
4. Calibrating the model back to the AER's historical MRP estimates
    - Alter the assumed long-run growth rate, until the average estimate of the MRP matches the average excess return over some historical period.

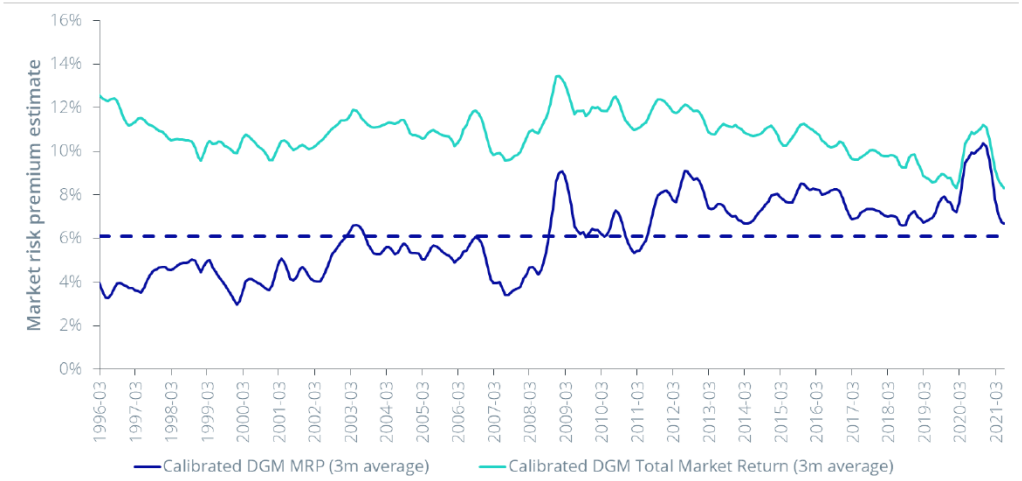
This model was endorsed by the network businesses and investor groups.[98] We plan to engage with the ENA to discuss the suitability of the calibrated DGM for regulatory purposes. We are also interested in hearing the expert's views on the calibrated DGM and its underlying methodology to addresses the concerns we have raised in the past.

The table below shows the MRP estimates using the calibrated DGM.[99]

98 Ausgrid, *Submission: Equity Omnibus,* September 2021, pp.4–5; *APGA Submission to the AER: Draft working papers on return on equity models and international approaches to the rate of return*, 9 October 2020, p.40; Jemena, *Submission on the rate of return omnibus papers,* 3 September 2021, p.10; Transgrid, *Response to the AER Rate of Return Omnibus papers*, 2 September 2020, p.4; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.21.

99 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p. 56.

Figure 2 Preliminary results from the calibrated DGM



At this point we note that ENA's calibrated DGM is a fixed growth rate DGM which result in a negative relationship between the MRP and risk-free rate. In section 2.4.2 we discuss our views on the relationship between the risk-free rate and MRP.

The ENA also highlight that financial institutions such as the Bank of England (BOE) uses the DGM to make public policy decisions.[100]

We are aware that the BOE uses the DGM to monitor equity prices and has recently made improvements to the specification of its model in a number of ways. For instance:[101]

- the modelling of dividend expectations has been made more sophisticated in order to capture changes over time in the rate at which dividends are expected to grow in the long run
- the model incorporates share buybacks, an alternative channel through which firms can return cash to shareholders, alongside dividend payments.
- the model better captures the variation in risk-free interest rates across maturities

The BOE state that these changes should improve the accuracy of the model's decompositions and MRP estimates, aiding the BOE's monitoring of equity price moves in support of its policy objectives.

However, in terms of estimating an accurate MRP, the BOE states that MRP cannot be observed and any estimate of it is necessarily subjective. Part of the uncertainty associated with model-based estimates of the MRP reflects uncertainty about the measurement of the model's input. This inherent uncertainty about the true value of the MRP is reflected in the wide dispersion of MRP estimates in the literature. Given the uncertainty associated with measuring the MRP, the BOE's analysis tends to focus less on the precise levels of the MRP and more on changes in the MRP over time or on the level of the MRP relative to historical averages.[102]

In a recent report to the Civil Aviation Authority (CAA), PwC stated that the BOE DGM has been created to help monitor equity price moves in support of its policy objectives. It is interested in whether risk premia are rising, or whether analysts are cutting their forecasts of

100 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.106.

101 Bank of England, *Topical article: An improved model for understanding equity prices*, 2017, p.86.

102 Bank of England, *Topical article: An improved model for understanding equity prices*, 2017, p.93.

earnings and dividends, and this is instructive for both managing monetary policy and financial stability. It is less concerned with the absolute level of the equity return predicted in its model. For the regulatory purpose of setting the level of equity returns, the potential for analyst optimism is more problematic. Therefore, using analyst forecasts of dividend growth is not well suited to a regulator's purposes.[103]

The UK Regulators Network (UKRN) report also agrees with this assessment, noting that the BOE's most recent application used the model as an accounting procedure to explain the shifts in the stock market after the event, not predict returns.[104]

We are also aware that the RBA uses a DGM to generate information on the Australian MRP and we requested assistance from the RBA to better understand how it was being implemented.[105]

The RBA stated that the DGM is used informally and sometimes used to consider the market's attitude toward risk. In their view, the DGM is particularly sensitive to assumptions about the long run rate of growth, which is even more relevant now, as interest rates are low (Dr Lally also advised the AER on this issue in the past).[106] The RBA stated that the assumptions about the long run rate of growth and long run payout ratios can have an important bearing on the level of the implied equity risk premium.[107] As a result, the RBA does not necessarily pay too much attention to the level but pays more attention to changes in the MRP over time.

We have also generated a model that varies the growth rate with the risk-free rate, which is consistent with an approach used by Damodaran.[108] The risk-free rate is not necessarily the correct growth rate, but this analysis shows the effect of varying the growth rate with the risk-free rate. This analysis shows that if the growth rate varies with and matches our risk-free rate proxy, it changes the negative correlation between the MRP and the risk-free rate to a positive correlation. This demonstrates that the relationship found between the risk-free rate and the MRP in outputs from DGMs can change materially depending on assumptions about the growth rate and how it evolves through time. We do not claim that this is the correct relationship, but it highlights the sensitivity of the model to input assumptions.

The chart below highlights that any relationship (either a positive or negative relationship between the MRP and the risk-free rate) generated by the DGM, is to a large degree driven by the input assumptions.

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103 PwC Economics, *Estimating the cost of capital for H7 - Response to stakeholder views, A report prepared for the Civil Aviation Authority (CAA),* February 2019, p.10.

104 UK Regulators Network, *Estimating the cost of capital for implementation of price controls by UK Regulators*: *An update on Mason Miles and Wright (2003),* March 2018, p.42

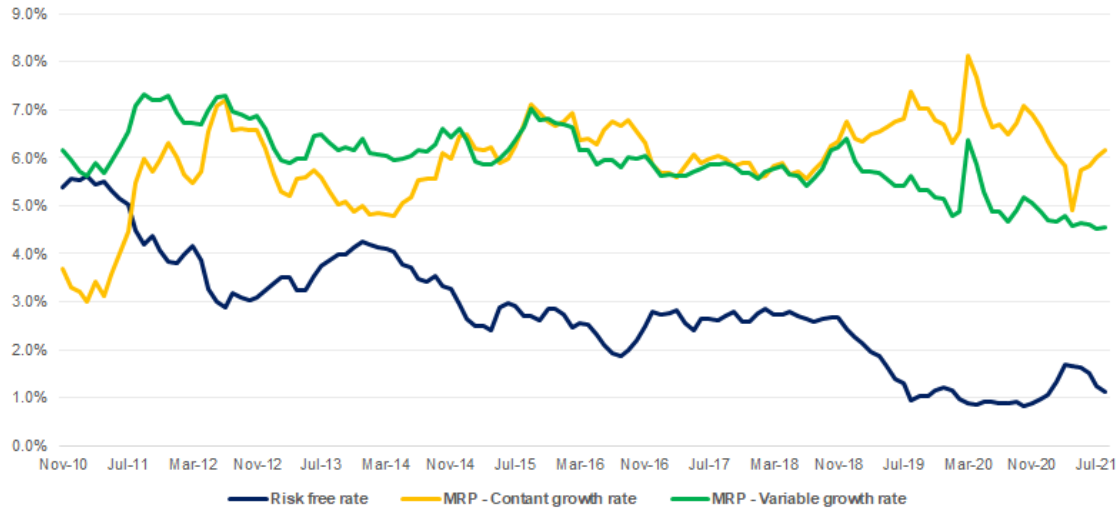
105 RBA, Letter to the AER in response to questions re: *RBA Research Discussion Paper RDP 2019-04 and Dividend Discount Models*, 1 October 2021, p.2.

106 RBA, Letter to the AER in response to questions re: *RBA Research Discussion Paper RDP 2019-04 and Dividend Discount Models*, 1 October 2021, p. 2; Dr Lally noted that in times of low interest rates the DGM can produce upwardly biased results; Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

107 RBA, Letter to the AER in response to questions re: *RBA Research Discussion Paper RDP 2019-04 and Dividend Discount Models*, 1 October 2021, p.2.

108 Damodoran suggested a growth rate equal to that of the 10-year government yield which is therefore dynamic and updated month to month.

Figure 3 Time varying DGM



Notes: The constant growth rate used is 2.79% (The average CGS yield for time series analysed)

Source: Bloomberg; RBA interest rate statistics F16; AER analysis.

The outputs from our variable growth rate DGM demonstrate:

- the outputs of a DGM model are sensitive to the terminal growth rate assumption and if and how this is assumed to vary through time.
- to the extent that the growth rate parameter is correlated with the risk-free rate it can materially change the relationship between the risk-free rate and the market risk premium seen in the outputs from the model.
- to the extent that there is a material correlation between the risk-free rate and the growth rate, the use of a constant growth rate may generate MRP estimates through time that are materially biased.

We also note that growth assumptions in analysts' forecasts used in the first three years may be biased and these biases may not be constant. We are interested to hear experts' views on how the analysts' forecasts may interact with the varying growth rates and what effect this might have on the model results.

We are interested in experts' views on the above analysis and concerns, and if and how both calibration of the growth rate, and variations in the growth rate through time, might be taken into account in DGM modelling to produce an estimate that could be used for our regulatory purposes.

Conclusion

For illustrative purposes we see this approach working like this:

- The HER method (using both the arithmetic and geometric averages) will be used to develop our MRP estimates range.
- Relevant evidence such as the most recent HER data, DGM's, surveys and conditioning variables will be used to inform our point estimate from within the HER range.
    - In exercising our judgement to pick a point estimate from the HER range, we will use the information from the DGMs in a directional sense.

- Where there is an increasing/decreasing trend in DGM estimates relative to their long-term averages, we may pick a point estimate that is higher or lower within the range of HER estimates, respectively.

- Alternatively, we could set a value for the MRP having considered both MRP and DGM estimates and any other relevant evidence.

If we were to choose either of these two options, we propose to use the 2 stage and 3 stage DGM's which we have used in past.[109] However, we would like to hear the expert's views on also using estimates from any or all (including our fixed growth rate 2 stage and 3 stage) of the following DGM models to inform our MRP estimate:

- the ENA's calibrated DGM
- variable growth rate DGM.

2.4.1.3 Option 3 – Provide more weight to the DGM alongside our current approach

This option also recognises that the DGM may be a reasonable predictor of future excess returns and can be used to capture variability of the MRP. This option recognises that the 2022 Instrument must be applied without exercising any discretion. We have to decide whether the MRP should be fixed, or should it vary formulaically through the period the 2022 Instrument applies. If we were to vary the MRP through the 2022 Instrument period, we need to setup a mechanical approach, which require us to consider this option. Under this option we will provide weight to both the HER and DGM estimates.

In the section below we review that approaches adopted by other regulators and draw reference to the mechanical approaches they have adopted in setting a forward-looking market risk premium. We have also discussed how we see this approach working and raised key issues that we would have to work through to apply this approach.

Mechanical approach

Network businesses noted that it is important to consider how the CAPM is implemented in practice, as other regulators and market participants do not implement the CAPM in the way it was implemented in the 2018 Instrument. Evidence of how other regulators and market practitioners exercise judgment is relevant evidence that should be considered.[110]

To better understand the approaches adopted by international regulators, the AER commissioned advice from The Brattle Group (Brattle).

The Brattle report examined seven overseas regulators, from the UK (Ofgem and Ofwat), US (US Surface Transportation Board and US Federal Energy Regulator Commission), the Netherlands (ACM), Italy (ARERA) and New Zealand (NZCC). One of the key suggestions the Brattle report recommended was to incorporate more forward-looking evidence into the determination of the return on equity.

The Brattle report stated that[111]

> "The AER, like most the reviewed regulators, relies on a MRP that is essentially backwards looking. The advantage of the approach is that it makes the parameter

109 AER, *Rate of return instrument: Explanatory Statement*, December 2018, p.255.

110 ENA, Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper, 3 September 2021, p.14; SA Power Networks, United Energy, CitiPower and Powercor, *Response to AER Rate of Return Omnibus papers*, p.4.

111 The Brattle Group, *A review of international approaches to regulated rates of return: Prepared for the AER*, 1 June 2020, pp. 35, 58–59.

> stable and predictable, but it fails to capture recent developments in the market. For example, recent international evidence indicates the MRP one year out (including that of Australia) increase by a non-trivial amount in March 2020 as Covid-19 became a concern.
>
> In contrast, some regulators incorporate at least some forward-looking evidence into their MRP estimates. For example, the NZCC incorporates both historical and forward-looking evidence into its MRP assessment, and the FERC uses a purely forward looking MRP estimate based on a DCF approach.
>
> The CAPM using an historical MRP relies on backward-looking information, while the Dividend Growth Model uses forward-looking information. During periods of changes in financial markets, it becomes important to consider both historical (stable) and forward-looking (contemporaneous) information."

We note that some international regulators have adopted different methods to estimate a value for the MRP.[112]

For instance, the New Zealand Commerce Commission (NZCC) uses three approaches in estimating the MRP.[113] The three approaches are based on the studies of historical returns on shares relative to the risk-free rate, surveys of investors' views on the MRP and the DGM (empirical estimates of the MRP from share prices and expected dividends).

However, we also note that regulators such as the Dutch Authority for Consumers and Markets (ACM) and The US Surface Transportation Board (STB) have adopted historical excess returns as the primary approach to estimating the MRP:[114]

- The ACM uses the DGM as a sanity check to the MRP estimate.
- The STB provides equal weight to the CAPM and the DGM to estimates the overall return of equity.
    - The MRP estimate used in the CAPM is based on the historical excess returns.

The US Federal Energy Regulator Commission (FERC) provides equal weight to the CAPM, DGM and the risk premium model to estimate the overall return on equity for electricity businesses.[115] For natural gas businesses, FERC provides equal weight to the CAPM and the DGM.[116]

- The FERC also uses the DGM to estimate the MRP used in the CAPM.

AERA, Ofgem and Ofwat calculates the MRP based on a Total Market Returns (TMR) methodology.[117]

In our view, other regulators can provide a point of reference for our estimates, and at times it may be prudent to monitor other regulators and the methods they use when estimating the MRP. However, international regulators often have different regulatory objectives and regimes, which can make direct comparison of approaches to rate of return parameters such as MRP difficult without a comprehensive evaluation of the drivers of each decision.

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112 The Brattle Group, *A review of international approaches to regulated rates of return: Prepared for the AER*, 1 June 2020, pp.63–134; CEPA, *Relationship between RFR and MRP*, 16 June 2021, pp.20–36.

113 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.13.

114 The Brattle Group, *A review of international approaches to regulated rates of return: Prepared for the AER*, 1 June 2020, pp. 79, 100.

115 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.34.

116 The Brattle Group, *A review of international approaches to regulated rates of return: Prepared for the AER*, 1 June 2020, pp.25–26.

117 CEPA, *Relationship between RFR and MRP*, 16 June 2021, pp.109, 124, 131.

For instance, the FERC has no predetermined term for the regulatory period. If the rate of return no longer provides a reasonable opportunity to recover costs, a regulated entity can file a dispute with the FERC for a determination of new rates.[118]

We are also aware that with respect to US regulators, Partington and Satchell stated that:

> "They have made considerable use of the discounted dividend model. We suggest that some of this use was probably a continuation of regulatory practices established prior to the development of the CAPM. It would be interesting to conduct a systematic survey of current US regulatory practices in order to establish the contemporary usage of the discounted dividend model relative to usage of the CAPM and possibly other models"

We also note that in some jurisdictions, other regulators have deliberately targeted a higher rather than lower number in estimating the expected rate of return, to make sure they get the right level of investment.[119] We have stated in the past that we do not consider this approach would be in the long-term interests of Australian consumers.[120]

Our position is that we should not make a decision with a conscious bias toward a higher or lower expected rate of return. This means aiming for the best possible estimate in an environment of uncertainty, based on the best available information.[121]

We exercise judgement by placing our emphasis on market data and avoiding choices that are influenced by any material bias in either promoting or discouraging investments.

When evaluating regulators, it may be more appropriate to give greater consideration to the approaches adopted by domestic regulators. However, we still need to express a degree of caution when comparing approaches across other regulators.

In order to understand the approaches adopted by other regulators in Australia, we refer to a report published by NERA in 2020.[122] The table below highlight's the approaches Australian regulators have adopted when estimating the market risk premium.

Table 7 Regulatory approaches to MRP adopted by Australian regulators

Regulator	Sector	Approach
AER	Electricity & Gas	HER approach
ERA	Electricity, Gas & Railway	HER approach, and some weight on DDM. Greatest weight to HER[123]
IPART	Water	Equal weighting on "historical" MRP (HER) and "current" MRP (2/3 DDM, 1/3 market indicator)

118 The Brattle Group, *A review of international approaches to regulated rates of return: Prepared for the AER*, 1 June 2020, p. 82.

119 See for example: New Zealand Commerce Commission, *Input Methodologies (Electricity Distribution and Gas Pipeline Services) - Reasons Paper*, December 2010, paragraphs H11.1–H11.67 and H13.44.

120 AER, *Rate of return: Assessing the long-term interests of consumers Position paper*, 30 June 2021, p. 10.

121 AER, *Rate of return: Assessing the long-term interests of consumers Position paper*, 30 June 2021, p. 10.

122 NERA, *Review of Regulators' Approaches to Determination of the Market Risk Premium*, May 2020.

123 The ERA places more weight on the historical approach relative to the forward-looking approach, as it considers that the forward-looking approach suffers from weaknesses including the form of its underlying model, its input assumptions, its sensitivity to assumptions and its upward bias. The ERA historically essentially placed equal weight on the DGM and HER methods when estimating the MRP. However, in its most recent decision for electricity it has placed less weight on the DGM.

QCA	Rail, DBCT, Water	Ibbotson (25%), DDM (25%), Surveys (20%), Siegel (15%) and Wright (15%)
ESCOSA	Water	HER approach
ICRC	Water	HER approach
OTTER	Water	Greatest weight to HER
ACCC	Rail, Telecom, Post, Ports	Greatest weight to HER

Source: NERA Economic Consulting, Review of Regulator Approaches to MRP.

We note that since the publication of the NERA report, QCA published its 2021 rate of return guideline and stated that they are moving away from a mechanical, complex weighting scheme of various methods. They instead opted for a simpler estimation approach to set the MRP. They stated they will use the Ibbotson method as the basis for setting the MRP as part of their future reviews.[124]

The QCA also stated that having reviewed each of the MRP estimation methods from their previous approach, they consider that particular aspects of the Siegel, Wright and surveys are unsuitable for their purposes at present and therefore no longer use them to directly estimate the MRP. The noted that the DGM estimates are relevant, however given the limitations of the model, they have decided to use these estimates to provide directional guidance when considering the overall cost of equity. They will not use the DGM or the Wright approach for directly estimating the MRP.[125]

However, when exercising their judgement on the overall WACC they apply at each pricing decision, the QCA will perform a top-down assessment of reasonableness to determine if the bottom-up WACC value (input parameters) provides an overall rate of return that is appropriate in the circumstance. To identify instances where market circumstances require adjustments to the bottom up WACC estimates, QCA stated that they may consider factors such as the Australian S&P 200 Volatility Index (VIX), the current level of the risk-free rate relative to historical risk-free rates, and the output of their dividend growth model.[126]

The NERA report has also examined several other overseas regulators. To avoid duplication, we have excluded the regulators examined by Brattle.

Table 8 Regulatory approaches to MRP adopted by overseas regulators

Regulator	Sector	Approach
CAA (UK)	Airports	Wright approach, cross-checked by DDM

124 QCA, *Rate of return review,* November 2021, p. 55.

125 QCA, *Rate of return review,* November 2021, p. 55.

126 QCA stated that they do not intend to automatically adjust their bottom-up value in each review. Rather, they would consider adjusting it if there were circumstances that deem this necessary for providing an overall reasonable WACC value. In this way, the top-down approach allows them to exercise their judgement to determine an overall rate of return for a regulated entity that they consider is reasonable; QCA, *Rate of return review,* November 2021, p. 18.

CMA (UK)	Air Traffic Control	Wright approach, cross-checked by DDM
CAR (Ireland)	Airports	Wright approach and DDM
ART (Italy)	Airports	HER approach
California, New York, Pennsylvania (US)	Electricity, Gas & Water	DDM used directly to estimate RoE
Ontario (Canada)	Electricity & Gas	Bespoke "formula approach" with no clearly defined ERP/MRP
CRE (France)	Electricity & Gas	HER approach, surveys
BNetzA (Germany)	Electricity & Gas	HER approach
CNMC (Spain)	Electricity & Gas	HER approach
EI (Sweden)	Electricity & Gas	Electricity: Survey Gas: HER
SFOE (Switzerland)	Electricity & Gas	HER approach, but bounded values

Note: NERA used the alternative term DDM (Dividend Discount Model) for the DGM.

Source: NERA Economic Consulting, Review of Regulator Approaches to MRP.

In our view the DGM is a theoretically-sound estimation method for the MRP and has value as a forward-looking measure. However, whether it can be used in regulatory practice is a concern due to limitations we have highlighted in the past.

To overcome these concerns, we note that IPART has used a multi-model approach and would like to hear from the experts if such an approach could help address the issues we have raised.

IPART considers two approaches to estimating MRP:

- The historical approach
    - For this approach, IPART draws on long run historical excess returns matched to a long-term average for the risk-free rate.
- The forward-looking approach (current MRP) matched to the current market value for the risk-free rate.
    - For this approach IPART relies on the following six methods:
        - Damodaran 2013 method
        - Bank of England 2002 method
        - Bank of England 2010 method
        - Bloomberg method

- SFG (Frontier Economics) analysts forecast method
- SFG (Frontier Economics) market indicator method.

The first five methods are variations of the DGM. The sixth method uses three economic indicators to derive an indirect estimate of the MRP.[127]

IPART applies equal weighting to the historical approach and the forward-looking approach. Under the forward-looking approach, IPART applies 2/3 weight to median DGM MRP (median of the first 5 methods) and 1/3 weight to the market indicator method.[128]

At this point in time, we have not evaluated the DGMs adopted by IPART in detail but draw reference to the method they have adopted to assess its suitability for use in the AER's regulatory framework.

Conclusion

For illustrative purposes we see this approach working like this:

- The HER and the DGM's will play a primary role in our MRP estimation.
  - Under the HER approach we will look at both arithmetic and geometric averages to develop our MRP estimates range. We will then use the relevant evidence to inform our point estimate from within the HER range.
  - Under the DGM approach we will estimate either the median or mean across multiple models.
  - We would then need to determine how the HER and DGM estimates are weighted.

If we were to choose this option, we would like to hear the expert's views on how to incorporate multiple model estimates from any or all of the following DGM models to inform our MRP estimate:

- our current (fixed growth rate) two stage and three stage DGMs
- the ENA's calibrated DGM
- variable growth rate DGMs.

We also note that the DGM, applied using a fixed growth rate over a number of time periods including the period since the early 1990s, results in MRP outputs that show a negative relationship between the MRP and the risk-free rate. This is in contrast to our findings in section 2.4.2.1 where we state that given the lack of theoretical basis, and issues with quantifying the relationship, our preferred position is not to recognise and implement a negative relationship between the MRP and risk-free rate in making the rate of return Instrument.

Given the lack of a theoretical basis for the empirical relationship between the risk-free rate and MRP being generated by DGMs, and model input uncertainties, we would like to hear from the experts on the appropriate weight that should be applied to the MRP estimates derived from the DGMs.

Further, given the 2022 Instrument must be applied without exercising any discretion, we will also have to decide whether this method will be used to set a MRP point estimate in the 2022 Instrument, or set a method that will mechanically update throughout the life of the Instrument.

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127 IPART, *IPART Review of our WACC Methodology*, February 2018, pp.52–56.

128 NERA, Review of Regulators' Approaches to Determination of the Market Risk Premium, May 2020, pp. 37–38.

In a recent discussion with the AER staff, the ENA indicated the possible use of the information from the calibrated DGM to adjust the MRP relative to the movement in the risk-free rate during the 2022 Instrument period.[129] Our understanding of this approach is that the calibrated DGM would not be re-estimated at the time of each determination, rather the information about the relationship between the MRP and risk-free rate at the start of the 2022 Instrument will be applied at each determination during the Instrument period. This would mean that a mechanical approach would need to be set up to apply this relationship.

We also note that some market practitioners modify the risk-free rate and use that estimate with a long term MRP (see section 2.4.1.1 more details).

Given the binding nature of our Instrument, if we were to consider using the market practitioners approach, we have one of two options. One is to uplift the risk-free rate and the other is to set up a mechanical/formulaic approach to capture the required uplift to the risk-free rate at each reset. At this stage, we have not found a method to base such an uplift and would like to hear from the experts on this approach. We note that an uplift factor need not be based on a DGM.

2.4.2 Alternative approaches

2.4.2.1 MRP and risk-free rate negative relationship

Our preferred position is not to recognise a relationship between the MRP and the risk-free rate when making the 2022 Instrument.

In relation to this issue, our *Equity Omnibus Draft working paper* asked three questions[130]:

- Does any relationship exist in real or nominal terms?
- What is the validity, stability, or direction of the relationship, if any exists?
- Is the relationship suitable or practical for implementing in the regulatory context, including in the 2022 rate of return Instrument?

Stakeholders were divided on whether there is a relationship between the MRP and the risk-free rate. NSPs and investors submitted that there is an imperfect negative relationship (not one to one) between the MRP and risk-free rate.[131] Some of our consultants argued that we should recognise a negative relationship between the MRP and risk-free rate.[132] However, we note previously other consultants we have engaged considered we should not recognise such a relationship, that there is no well accepted theoretical support for such a relationship, and it is not used much in practice.[133] Consumers groups also did not consider that there is evidence of a relationship between the MRP and risk-free.[134]

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129 Meeting between AER staff and ENA.

130 AER, *Rate of return: Equity Omnibus draft working paper*, July 2021, p.5-28.

131 Ausgrid, *Overall rate of return, Equity and Debt*, 3 September 2021, p.4; ENA, *Estimating the cost of equity*, 3 September 2021, p.39; Endeavour Energy, *Overall rate of return, Equity and Debt*, 3 September 2021, pp. 7-8; NSG, *Response to AER RORI Omnibus papers*, 3 September 2021, p.13; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.11.

132 Brattle, *A review of international approaches to regulated rates of return,* June 2020, p.60; CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.7

133 McKenzie and Partington, *Review of the AER's Overall Approach to the risk-free rate and MRP*, February 2013, p28; Partington and Satchell, *Cost of Equity issues 2016 Electricity and Gas Determinations*, April 2016, pp 30-31.

134 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.13; MEU, *Rate of return Omnibus papers on 2022 RoRI: Response to draft working papers*, 3 September 2021, pp.13-14.

This is not the first time we have considered such a relationship, as we had submissions on this in prior regulatory processes.[135]

In this working paper, we assess the proposal to recognise and implement a negative relationship between the MRP and risk-free rate against our assessment criteria.[136] Overall, this proposal fails for the following reasons (AER criteria shown in brackets):

- There is no widely accepted theoretical basis for a negative relationship between the MRP and risk-free rate. (Where applicable, reflective of economic and finance principles and market information).
- It is not fit for purpose because the relationship between the MRP and risk-free rate is likely to be time-varying, may change signs overtime (from positive to negative or negative to positive), and cannot be reliably quantified. (Fit for purpose).
- It is not supported by robust, transparent, and replicable analysis that is derived from available credible datasets. The relationship from empirical studies depends on the sample period, and assumptions used. (Implemented in accordance with good practice).
- The empirical evidence for a negative relationship typically relies on the DGM results. The DGM is not based on quantitative modelling that is sufficiently robust. It is unduly sensitive to errors in inputs estimation, especially the growth rate. Also, it is subjected to arbitrary filtering or adjustment of data, which does not have a sound rationale. (Where models of the return on equity are used).

Below, we examine whether there is a theoretical basis for a negative relationship, and whether any relationship could be quantified and implemented in our rate of return Instrument.

Is there a theoretical basis for a negative relationship?

Networks and investors submitted that there is a theoretical basis for the negative relationship identified in CEPA's empirical studies (the section below lists our concerns with CEPA's methodology).[137] Our research found that there was no widely accepted theoretical basis for a negative relationship.

In the 2018 Instrument, we agreed while the MRP may vary over time, there is no predictable inverse relationship between the MRP and risk-free rate.[138] There is neither strong theoretical reasons, nor strong empirical evidence, to support an ongoing and consistent inverse relationship.[139] We have also received advice that a negative correlation between the risk-free rate and the MRP does not have theoretical support and is generally not used in practice.[140]

Both the ENA and QTC submissions to our draft working paper provided possible theoretical explanations to support CEPA's findings that there may be a negative relationship between the MRP and risk-free rate.[141] We also note NSPs, and investors made a number of observations in their submissions to support a negative relationship between the MRP and

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135 AER, *Better Regulation: Explanatory Statement Rate of Return Guideline (Appendices)*, December 2013, pp.104-107; AER, *2018 Rate of Return Instrument: Explanatory Statement*, December 2018, pp.230-235.

136 AER, *Rate of return: Overall rate of return draft working paper*, July 2021, p.19.

137 ENA, *Estimating the cost of equity*, 3 September 2021, p. 39; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.39

138 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p.204.

139 AER, *Draft Rate of Return Guidelines: Explanatory Statement*, July 2018, p.204.

140 G Partington and S Satchell, *Cost of Equity issues 2016 Electricity and Gas Determinations,* April 2016, pp.30-31; G Partington and S Satchell, *Report to the AER: Allowed rate of return 2018 guideline review*, May 2018, pp.34-35.

141 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.6.

risk-free rate. For example, it was brought to our attention that investors' return expectations may not have fallen with the risk-free rate.[142]However, these observations do not necessarily provide theoretical underpinnings to support a negative relationship.[143]

A key theoretical basis put forward by the ENA and QTC relies on the relationship between inflation and output gap.[144] Campbell et al. found a positive correlation between inflation and output gap in the 2001-2011 period.[145] This contrasts with the negative correlation found in an earlier period (1979-2001).

QTC explained the change in correlation identified by Campbell et al. has resulted in nominal bonds switching from being risky to hedging assets.[146] Thus, the correlation between nominal bond-stock returns will also change from positive to negative, implying a negative relationship between the MRP and risk-free rate. [147] The ENA also raised a similar point to QTC as a theoretical basis for a negative relationship. They submitted a paper by Li et al. for our consideration.[148]

However, Baele et al., who looked at the bond-stock return correlation in a sample period similar to Campbell et al. found that liquidity proxies play an important role in explaining the bond-stock co-movements, while economic variables such as inflation and output gap have little explanatory power.[149] They conclude that:

> "These liquidity factors may be correlated with the "flight-to-safety" effects that have been documented in the literature (see especially Connolly, Stivers, and Sun (2005)). In the end our fundamental model does not seem to produce an entirely satisfactory fit of the "flight-to-safety" effects that are likely at the heart of the negative correlations observed post 2000".

Therefore, we consider there is no widely accepted theoretical basis to support a negative relationship between the MRP and risk-free rate.

Furthermore, our research finds that co-movements between bond and stock returns depend on the sample period used. Baele et al. note the substantial time variation in bond-stock return correlations (based on the US data).[150] They found that the correlation had a mean of about 19% during the post-1968 period, was as high as 60% during the mid-1990s, and was as low as –60% by the early 2000s.[151]

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142 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, pp.37-38; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.3.

143 Energy Queensland, *Overall rate of return, Equity and Debt*, 3 September 2021, p.2; GIIA, *AER 2022 Rate of Return Instrument Consultation Response*, 2 September 2021, p.3.

144 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.39; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.1.

145 Campbell, Pflueger and Viceira (2020). Macroeconomic Drivers of Bond and Equity Risks. Journal of Political Economy 128(8), 3148-3185.

146 QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.4.

147 QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, pp.4-5.

148 ENA, *Estimating the cost of equity*, 3 September 2021, p. 39; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, pp. 33-34.

149 L Baele, G Bekaert and K Inghelbrecht, 'The Determinants of Stock and Bond Return Comovements'. *The Review of Financial Studies*, 2010, 23(6): 2374–2428.

150 L Baele, G Bekaert and K Inghelbrecht, 'The Determinants of Stock and Bond Return Comovements'. *The Review of Financial Studies*, 2010, 23(6): 2374–2428.

151 L Baele, G Bekaert and K Inghelbrecht, 'The Determinants of Stock and Bond Return Comovements'. *The Review of Financial Studies*, 2010, 23(6): 2374–2428.

We also note the findings in Campbell et al. may no longer be relevant as they only examine data up until 2011.[152] There is growing evidence that the correlation between bond and stock returns may have switched sign from negative to positive since 2015.[153] Thus, it is possible there is currently a positive rather than a negative relationship between the MRP and risk-free rate. At the very least, this raises questions about whether any stable or predictable relationship exists.

The ENA also submitted that a rise in the relative wealth of more risk-averse investors is a theoretical explanation for a negative relationship between the MRP and the risk-free rate, as noted in Daly (2016).[154] We note that Daly's article does not provide any evidence that investors are, on average, more risk averse.

Furthermore, it is not clear that Daly supports a negative relationship between the MRP and risk-free rate. Daly does not discuss any possible relationship between the MRP and risk-free rate. Rather Daly (2016) commentary relates to the size of the MRP. We therefore disagree with the ENA that Daly's article provides a sound theoretical underpinning for a negative relationship.

After reviewing stakeholder submissions, we found no conclusive theoretical underpinning for a negative relationship. This is a view shared by the CRG. The CRG noted for each piece of evidence that supported the existence of a relationship, there was also evidence that did not support the existence of a relationship.[155] CEPA also noted it had not undertaken a comprehensive review of the literature on this issue, but the evidence from the examples appeared inconclusive.[156]

Can we quantify the relationship, and is it implementable?

Another difficulty is estimating the strength and the sign (positive or negative) of the relationship in an ex-ante sense. Based on the information before us, we do not consider there is a method to robustly estimate any relationship between the MRP and risk-free rate.

In the 2018 Instrument, we concluded that there was no proper model to robustly estimate a relationship between the MRP and risk-free rate. Most experts in the 2018 concurrent evidence session shared the same view.[157]

McKenzie and Partington have also previously advised that any relationship between the MRP and risk-free rate is an open question, and any relationship that may exist is not sufficiently well established to form the basis for regulatory adjustment to the MRP.[158]

In QTC's submission to our draft paper, it considers that DGM estimates can be used to measure the relationship between the MRP and risk-free rate, and to determine if the

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152 Campbell, Pflueger and Viceira (2020). Macroeconomic Drivers of Bond and Equity Risks. Journal of Political Economy 128(8), 3148-3185.

153 S Klingler and S Sundaresan, 'Diminishing Treasury Convenience Premiums: Effects of Dealers' Excess Demand at Auctions', 23 October 2020; Z He, S Nagel and Z Song, 'Treasury inconvenience yields during the COVID-19 crisis', NBER, Working Paper No 27416, 2020; M Fleckenstein and F Longstaff, ''Treasury Richness', NBER, Working Paper 29081, 2021.

154 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.28.

155 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.84.

156 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.14.

157 CEPA, *Joint Expert Report, RORG review: Facilitation of concurrent evidence sessions*, 21 April 2018, p. 64.

158 M McKenzie and G Partington, *Report to the AER: Review of the AER's overall approach to the risk-free rate and market risk premium*, 28 February 2013, p.28.

relationship has changed over time.[159] The QTC submitted it is appropriate to use a DGM to quantify the relationship, because it does not assume or impose any relationship between expected market returns and the prevailing risk-free rate.[160]

We do not consider DGMs are an appropriate method to quantify and to test for a relationship between the MRP and risk-free rate. As noted in section 2.4.1.2, DGMs are sensitive to inputs. Thus, the strength of the negative relationship is dependent on the assumptions used to construct the DGM — as seen in CEPA's report.

In its report, CEPA stated that while the level of the MRP might be inappropriate for direct regulatory use, the change in estimated MRP may provide a useful indicator of direction. [161] This supposes, however, that any error is unchanging through time. We are not convinced that this is likely. CEPA noted that their work could be more robust.[162] However, given the concerns around how best to construct the DGM and its sensitivity to inputs, we have not proceeded to undertake further quantification.

Dr Martin Lally has previously demonstrated that under a variant of the Gordon DGM, expected returns can exhibit more stability than the true return process. [163] However, such stability is driven by the construction of the DGM, in particular the assumption of a constant expected return in the model. Below is a hypothetical example.

The empirical result observed in CEPA's report may be driven by the construction of the DGM. The assumption of a constant expected return in the DGM can result in expected return exhibiting more stability than the true return process. Dr Martin Lally has previously demonstrated this mathematically — see below. [164] It shows little variation in the DGM estimate of cost of equity (from 10.2% to 11.9%) whilst the true market cost of equity has varied from 9% to 13%.

Below are examples from Dr Martin Lally.[165]

Example 1.

Assumptions.

- Constant dividend growth $\mathrm{g} = 5\%$.
- Current risk-free rate $\mathrm{r_f} = 7\%$, mean reverting to its long run average of 5% in 10 years' time.
- Constant market risk premium $\mathrm{MRP} = 6\%$.
- Normalize current dividend yield D to 1.

Thus, current expected market return is 13% and will revert to its long run average of 11% in 10 years' time. The current share price is

$$P_0 = \sum_{t=1}^{10} \frac{(1.05)^t}{(1.13)^t} + \frac{\frac{(1.05)^{11}}{0.11 - 0.05}}{(1.13)^{11}} = 15.22$$

159 QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.8.
160 QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.8.
161 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.36.
162 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.44.
163 M Lally, *Review of the AER's methodology for the risk-free rate and the market risk premium*, March 2013, pp.8-12; Lally, *The cost of equity and the market risk premium. A report to the AER*, July 2012, pp. 9-11.
164 Lally, *The cost of equity and the market risk premium. A report to the AER*, July 2012, pp. 9-11.
165 Lally, *The cost of equity and the market risk premium. A report to the AER*, July 2012, pp. 9-11.

Using a Gordon DGM to back out implied expected market return:

$$15.22 = \frac{1.05}{k - 0.05} \Rightarrow k = 11.9\%$$

Example 2.

Assumptions: All remain the same as in Example 1, except that the current risk-free rate is 3%.

The current share price is

$$P_0 = \sum_{t=1}^{10} \frac{(1.05)^t}{(1.09)^t} + \frac{\frac{(1.05)^{11}}{0.11 - 0.05}}{(1.09)^{11}} = 20.23$$

The DGM implied expected market return is

$$20.23 = \frac{1.05}{k - 0.05} \Rightarrow k = 10.2\%$$

Despite the implied MRP being derived using observed empirical data (share prices and dividend yields), the negative relationship is largely model (assumption) driven.

Given this, we do not agree with the ENA that the relationship between the risk-free rate and the MRP is a question that can only be addressed by empirical estimation.[166] We consider that an empirical estimation should be underpinned by a good theoretical basis. We acknowledge that stakeholders have put forward a theoretical basis, but it is not at a sufficient level for us to recognise a negative relationship.[167]

NSPs and investors made several suggestions on how we can implement a negative relationship between the MRP and risk-free rate in our rate of return Instrument. The most common suggestion was to use the hybrid approach recommended in the CEPA report. That is, apply weighting to both the fixed MRP and the Wright approach.

The Wright approach is also known as the total market return approach. It assumes there is a perfect negative relationship between the MRP and risk-free. In the 2018 Instrument, we did not place any reliance on the Wright approach. [168] We noted that there is no theoretical basis for the Wright approach in Australia, and it is not used by market practitioners.[169]

We also engaged Partington and Satchell to provide expert advice on return on equity models specifically as part of the Sharpe-Lintner CAPM and alternative return on equity models working paper.[170] They found the Wright approach assumptions implausible — for example, where the risk-free rate was above the historical average return (as has been the case) it would lead to a negative market risk premium.[171]

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166 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.9.

167 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.39; QTC, *Submission to the Equity Omnibus draft working paper*, 3 September 2021, p.1.

168 AER, *Rate of Return Instrument: explanatory statement*, December 2018, p.84.

169 AER, *Rate of Return Instrument: explanatory statement*, December 2018, p.84.

170 Partington and Satchell, *Report to the AER: Alternative Asset Pricing Models*, June 2020.

171 Partington and Satchell, *Report to the AER: Alternative Asset Pricing Models*, June 2020, p. 23.

Our view on the Wright approach has not changed. Stakeholders also submitted that it is unlikely that there is a perfect, negative correlation between the risk-free rate and MRP.[172]

ENA submitted that the Wright approach should receive at least as much weight as the fixed MRP.[173] However, they did not provide a theoretical underpinning to support giving the Wright approach at least as much weight as the fixed MRP. Similarly, the QTC and the NSG proposed approaches to implement a negative relationship without providing any theoretical underpinning to support their approaches.[174]

We are aware that the DGM is a common methodology used to estimate the relationship between the MRP and risk-free rate. However, as noted above, DGMs have several limitations that make it not suitable to estimate the relationship between the MRP and risk-free rate. To be suitable for regulatory purposes, the approach should be capable of being implemented in a manner that is sufficiently robust, transparent and evidence based.

Given the lack of theoretical basis, and issues with quantifying the relationship, our preferred position is not to recognise and implement a negative relationship between the MRP and risk-free rate in making the rate of return Instrument.

2.4.2.2 Give weight to the historical CGS yield when estimating the risk-free rate

In response to our draft working paper, Network businesses submitted that the AER should have regard to the historical Commonwealth Government Securities (CGS) yield when estimating the risk-free rate.[175] This change would have the effect of providing some uplift to the current risk-free rate while interest rates are low, noting that the risk-free rate could also decrease in high interest rate environments. The Network businesses proposed giving weight to the historical CGS yield and uplifting the risk-free rate for the following interrelated reasons:[176]

- It would create a more stable return on equity.
- It is more flexible, and accordingly more suitable for changing market condition.
- Uplifting the risk-free rate when estimating the market risk premium (MRP) is a common industry practice.

However, the Consumer Reference Group (CRG) were not supportive of using historical CGS yields to estimate the risk-free rate. They considered that low CGS yields are not a problem requiring regulatory redress, and therefore the AER's existing method of using current CGS yields for the risk-free rate is the better practice.[177]

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172 Ausgrid, *Overall rate of return, Equity and Debt*, 3 September 2021, p.4; ENA, *Estimating the cost of equity*, 3 September 2021, p. 9; Endeavour Energy, *Overall rate of return, Equity and Debt*, 3 September 2021, pp. 7-8.

173 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.9.

174 QTC, *Submission to the Equity Omnibus draft working paper,* 3 September 2021, p. 22; NSG, *Response to AER RORI Omnibus papers*, 3 September 2021, p.14.

175 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021, p.18; APGA, *APGA Submission to the AER: rate of return omnibus papers*, 3 September 2021, pp.8, 19-20, 30; Jemena, *Submission on the rate of return omnibus papers,* 3 September 2021, p.11; Transgrid, *Response to the AER Rate of Return Omnibus papers*, 2 September 2021, p.4

176 APGA, *APGA Submission to the AER: rate of return omnibus papers*, 3 September 2021, pp.19-20; GIIA, *AER 2022 Rate of Return Instrument Consultation Response*, 2 September 2021, p.3; Jemena, *Submission on the rate of return omnibus papers,* 3 September 2021, p.11; Transgrid, *Response to the AER Rate of Return Omnibus papers*, 2 September 2020, p.4.

177 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.86.

We consider that some of the potential underlying rationales for giving weight to the historical CGS yields may be that:

- The AER could better achieve our legislative requirements by moving to a trailing average return on equity and smoothing prices over time.
- Future interest rates will increase from the current spot rates, and therefore to estimate the best forward-looking required return on equity, this expected mean reversion needs to be accounted for.
- Giving some weight to the historical risk-free rate effectively picks up on a relationship between the risk-free rate and the market risk premium, as the required return on equity is more stable than the risk-free rate through time.

Our legislative requirements require that the AER set the Rate of Return via a prescriptive methodology, based on evidence.[178] We consider that giving weight to the historical CGS yield would have several fundamental issues that could prevent us from meeting these requirements, which are outlined below. Ultimately, we do not consider any of the above rationales to have provided sufficient reason for weighting historical CGS yields because:

- Under a risk-free rate trailing average approach, the cost of equity would no longer reflect the cost of equity capital in the market at a given point in time and is therefore unlikely to best achieve the NEO.
    - We recognise that we have a trailing average cost of debt and the reason for that was clearly set out in our 2013 Guideline.[179] However, a key rational for using a trailing average for debt, the reduction of refinancing risk and costs, does not apply to equity capital that is issued in perpetuity.
- The valuation problem facing a regulator with a five-year regulatory cycle is different from that of valuing an unregulated business.[180] We set components of expected cash flows for a regulated business. We are also only concerned with estimating efficient costs attributable to a single regulatory period rather than over the entire asset life. This is because we reset the revenue allowance every regulatory period.[181]
    - Should interest rates change in the future, the allowed return on equity would be adjusted accordingly in future regulatory control periods (assuming our current approach continues).
    - This is distinct from asset valuers who are valuing cash flows that go for many regulatory control periods and may be estimating a risk-free rate that will apply over multiple regulatory control periods.
- Not all valuers provide an uplift, and there is accordingly not consensus among valuers about how the decision to use an uplift is made.
- We have not seen compelling evidence to support a stable or predictable relationship between the risk-free rate and the market risk premium, or to support the proposition that the required return on equity is more stable than the risk-free rate.
- We consider a change in our methodology to provide an uplift in the current relatively low interest rate environment would need to be well-justified and reasoned to prevent regulatory uncertainty and risk. Strong evidence in support of the change would ensure that the change is not seen as an ad hoc adjustment. However, we have not seen sufficient evidence to support such a change.

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178 *National Electricity (South Australia) Act 1996*, s18J(2); *National Electricity (South Australia) Act 1996*, s18I and s18L.

179 AER, *Better Regulation: Explanatory Statement Rate of Return Guideline,* December 2013*,* pp.78-125.

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

181 AER, *Term of the rate of return & Rate of return and cashflows in a low interest rate environment: Final working paper*, September 2021, p. 18.

Accordingly, we do not propose to give weight to the historical CGS yields when estimating the risk-free rate. We have previously considered the issue of including an uplift to the risk-free rate and found that the evidence was not convincing enough to depart from our current method.[182] We do not see any new evidence or theoretical background that justifies why the AER should make an adjustment to the risk-free rate. We also consider 10-year CGS yields to be a good and widely accepted proxy for the risk-free rate, which reflect current market conditions.[183]

However, even if we were minded to make an adjustment to the risk-free rate, we would need a consistently good method of adjusting the CGS yield before we would be able to take this step. The table below is a summary of the approaches adopted by regulators in Australia.

Table 9 Regulatory approaches to RFR adopted by Australian regulators

Regulator	Sector	Approach
AER	Electricity & Gas	Average yield on 10-year Commonwealth Government Securities 20 - 60 day averaging period
ERA	Electricity, Gas & Railway	Electricity and Gas: Yield of five-year Commonwealth Government securities, averaged over a period of 20 consecutive trading days, which are as close as possible to the expected access arrangement final decision for regulatory period Railway: the yield of the 10-year Commonwealth Government bonds, averaged over a 40-day period
IPART	Water	Estimates a historic as well as current RFR, drawing on Australian Government bond yields with a maturity of 10 years. For the historic RFR estimate, IPART averages over 10 annual observations. It estimates each annual observation as an average across a 40-day observation window, of which it will inform the regulated entity on a confidential basis in advance. For the current RFR estimate, IPART averages daily bond yields over a 40-day observation window. It informs the regulated entity about the exact timing of the observation window on a confidential basis.
QCA	Rail, DBCT, Water	RFR calculated using 10-year Commonwealth Government Securities and a 20-day averaging period
ESCOSA	Water	ESCOSA uses an annually updated RFR, based on 10-year Commonwealth Government Securities and using a 60-day averaging period.
ICRC	Water	Follows Water and Sewerage Industry Panel (a 10-year Commonwealth Government Securities and a 40-day averaging period)

182 AER, *Better Regulation: Explanatory Statement Rate of Return Guideline,* December 2013, p.10, 28-29; AER, *Better Regulation: Explanatory statement Draft rate of return guideline,* August 2013, p.210.

183 AER, *Term of the rate of return & Rate of return and cashflows in a low interest rate environment: Final working paper*, September 2021, pp.102-107.

OTTER	Water	Average of 10-year Commonwealth Government bonds using a 40-trading day average and the time weighted historical average of yields on the same bonds over the last 10 years
ACCC	Rail, Telecom, Post, Ports	10-year Commonwealth Government Securities and uses an averaging period of 20 business days for rail and telecom, unclear for post, and proposed rate for ports.

Source: NERA Economic Consulting, Review of Regulator Approaches to MRP.

Set a floor to the risk-free rate to ensure the real risk-free rate does not become negative

An additional option for changing the formula is to place a floor on the risk-free rate. This approach has been proposed in response to declining CGS yields, and the prospect of negative interest rates potentially arising if the risk-free rate dropped too low.[184]

CRG and MEU proposed in their submission that if negative real interest rates are considered a problem, placing a floor under the nominal risk-free rate would help to ensure that the risk-free rate does not drop below expected inflation.[185] However, both also noted that they did not consider that the current formula for CAPM needed to be changed.[186] Incorporating a risk-free rate floor into the model was widely supported across the submissions we received from networks.[187]

The proposed benefits to this approach are that it would not require the AER to perform a discretionary change to implement and could be built into the existing formula.[188] Additionally, the floor would provide some stability and robustness to the RORI and prevent short term market movements from having an effect on the networks and investors.[189]

A floor to the nominal risk-free rate may be relevant if the cost of equity is not expected to fall with the nominal risk-free rate at negative rates.

Negative nominal risk-free rates are possible and could become more probable in the longer term on the basis of evidence of the long run trend decline in interest rates in advanced economies.[190] The RBA also observes that since the Global Financial Crisis (GFC), negative nominal interest rates became the reality for several countries. As a result, there is a consideration by central bankers of an effective lower bound of nominal interest rates which

184 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.86.

185 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.86; MEU, *Rate of return Omnibus papers on 2022 RoRI: Response to draft working papers*, 3 September 2021, p.23.

186 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.87, CRG 2021 submission volume 1; MEU, *Rate of return Omnibus papers on 2022 RoRI: Response to draft working papers*, 3 September 2021, p.23.

187 Jemena, *Submission on the rate of return omnibus papers,* 3 September 2021, p.9; Endeavour Energy, *Draft working omnibus papers: Overall rate of return, equity and debt,* 3 September 2021, p.8; ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021.

188 CRG, *The Overall Rate of Return, Debt Omnibus and Equity Omnibus paper — Volume 1: Technical*, 3 September 2021, p.87.

189 Jemena, *Submission on the rate of return omnibus papers,* 3 September 2021, p.9; Endeavour Energy, *Draft working omnibus papers: Overall rate of return, equity and debt,* 3 September 2021, p.8; ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument Draft Equity Omnibus Working Paper*, 3 September 2021.

190 Bank of England, *Eight centuries of global real interest rates, R-G, and the 'suprasecular' decline, 1311–2018,* January 2020.

may be below zero.[191] The Australian Prudential Regulation Authority (APRA) in July 2021 has also instructed deposit taking institutions to prepare for the contingency of negative nominal interest rates.[192]

Nevertheless, for Australia, the RBA has considered that negative nominal interest rates are improbable in the future.[193] On the basis of the RBA's recent consideration of this improbability, we have decided not to contemplate a floor to the nominal risk-free rate, including a basis for such, for the estimate of the cost of equity.

191 RBA, *Unconventional Monetary Policy,* 2021.

192 APRA, *Consultation on zero and negative interest rates,* July 2021, p.1.

193 *Monetary Policy During COVID* – speech by RBA Deputy Governor Guy Debelle, May 2021; *Unconventional Monetary Policy: Some Lessons From Overseas* – speech by RBA Governor Philip Lowe, November 2019.

3 Use of Energy Infrastructure Credit Spread Index

3.1 Overview

We developed the Energy Infrastructure Credit Spread Index (EICSI) in 2018 with assistance from Chairmont using actual debt data obtained from regulated networks. It reports a rolling 12-month historical average of all new debt instruments issued by privately owned energy networks.[194]

The EICSI provides an indication of the cost of network-issued debt to compare with our estimate of the cost of debt. The primary EICSI metric is the spread over the swap rate (credit spread—broadly equivalent to the debt risk premium), which allows us to monitor the performance of our benchmark return on debt against networks' actual cost of debt. However, the dataset also provides detail on the average debt term and credit rating providing a 'sense check' on our proposed regulated return on debt approach.

Since its introduction, we have sought to improve and refine the EICSI to obtain the best value from the information as part of our estimation methodology.

3.2 What is the issue?

In the 2018 Instrument, we did not rely on the EICSI or an alternative historical index directly to estimate the return on debt. We considered at the time that it was best used as a 'sense check' on our benchmark characteristics. This is because the dataset was relatively new and using the EICSI as a sense check allowed us to monitor changes over time before we placed any more weight on the index.

Since the 2018 Instrument we have received updated data from the regulated networks through our information gathering powers for the period 2013–21 allowing us to update the EICSI dataset. We have also refined the dataset since 2018 and consulted on and evaluated various options for how our EICSI could be used in estimating the regulated return on debt, credit rating and term.[195]

As illustrated in Figure 4, the EICSI (weighted by tenor) has generally tracked below our benchmark approach. On average the EICSI has been around 18 basis points lower than our benchmark since January 2014. Following advice from our expert consultant we consider that further investigation on what may be driving this difference is useful in determining whether the gap implies that our benchmark approach can and should be adjusted to narrow the gap between our historic estimation of return on debt and the observed cost of debt incurred by networks.[196] This paper sets out our preliminary position on the use of the EICSI in estimating networks' return on debt, the reasons for this position, and other options considered.

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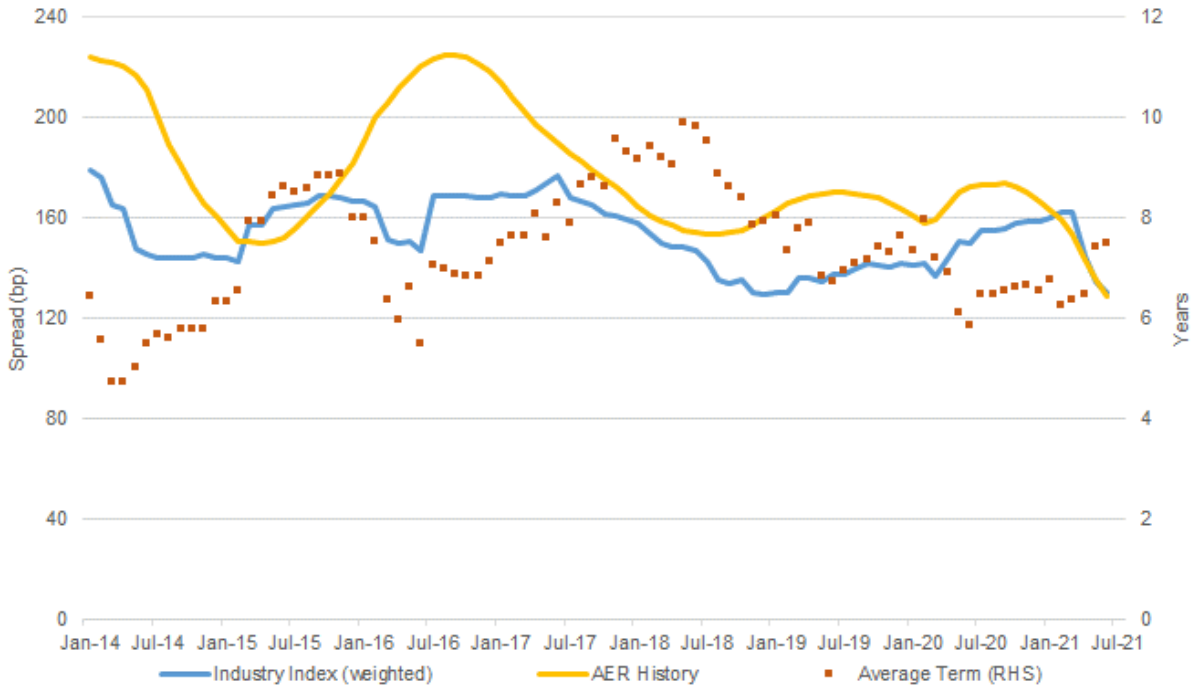
194 See AER, *Discussion paper, Estimating the allowed return on debt*, May 2018, pp. 27–35.

195 AER, *Rate of Return - Draft Debt Omnibus Paper*, July 2021; AER, *Energy Network Debt Data*, November 2020.

196 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, pp. 47–48.

Figure 4 Comparison of EICSI weighted by tenor against AER A/BBB 10 year estimate, 12 month rolling average and average EICSI term (January 2014 to June 2021)



Source: AER analysis; Chairmont, Aggregation of debt data for portfolio term to maturity, 28 June 2019.

3.3 Preliminary position

In the *Energy Network Debt Data working paper* and the draft Debt omnibus paper, we proposed that our preferred approach was to use the EICSI to directly determine the benchmark credit rating blend of A and BBB bonds.[197] Since publishing these papers, on the advice of our expert consultant, we have undertaken additional analysis of the drivers of outperformance in EICSI and developed a new preliminary position.[198]

Our preliminary position is to further analyse and consult on any adjustments required to our return on debt approach to remove the residual outperformance if the effect is material and persistent.

Conceptually, we think we ought to use the EICSI to adjust our return on debt approach to remove any residual outperformance that is material and persistent. In this context 'residual outperformance' refers to the ability of the regulated networks to raise debt at a lower rate (for a given term and credit rating) than the broader market that is represented in the third-party debt yield curves we use in determining our return on debt benchmark.

Such outperformance may occur due to the actual cost of the regulated service providers' debt fundamentally differing from the debt costs evident in the broader third-party debt series used to estimate the benchmark allowance. The regulated energy networks might be able to raise debt at a lower rate than what the third-party credit curve would indicate for debt with the same credit rating and other characteristics. This residual outperformance reflects the

197 AER, *Energy Network Debt Data*, November 2020, pp. 35-36; AER, *Rate of Return - Draft Debt Omnibus Paper*, July 2021, p. 14.

198 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, pp. 47–48.

margin that is evident after accounting for differences that are driven by term and credit rating.

Our analysis suggests that there may be some residual outperformance, but it appears to exist only when credit spreads observed from the third-party debt series are above a certain level. If this residual outperformance is considered material and persistent in these circumstances, we consider a cap on the debt risk premium may be appropriate. We believe that further analysis and consultation are required regarding whether we should adjust for this type of residual outperformance, and what form such adjustment would take. We will revisit the need for making adjustments based on the outcome of this further analysis and consultation.

We considered further options of adjusting the benchmark term or credit rating in addition to removing any residual outperformance. Our preliminary position is to not make any adjustments to the credit rating to reflect the EICSI. While we acknowledge that term appears to be a key driver of the observed outperformance of the EICSI there are significant practical limitations on implementing this adjustment. We intend to consider the issue of term further in future consultation on the 2022 Instrument.

We will also continue collecting debt data through our formal information gathering powers to better understand firms' actual financing practices over time.

3.4 Reasons for position

3.4.1 Background of the EICSI

The EICSI is a simple index constructed from actual debt information collected from privately owned (i.e. non-government owned) network service providers we regulate. In 2018 we obtained data on actual debt costs from most of these service providers for the period 2013–17.[199] We engaged Chairmont to assist us with the collection and analysis of this debt data, and the development of the EICSI. The purpose of collecting actual debt information (and the development of the EICSI) was to provide a 'sense check' of reasonableness of outcomes under our benchmark approach.

Since its development, we have updated the index to include data unavailable in 2018 and enhanced the functionality of the existing model.

How is it constructed?

Not all debt issued by networks is included in the EICSI. When creating the EICSI in 2018, Chairmont decided which instruments would be included. It indicated its approach to inclusion and exclusion was based on broad criteria and the exercise of professional judgement.

Having resolved to make greater use of the EICSI in determining the benchmark cost of debt, we considered it important to develop refined criteria to guide our decisions as to which debt instruments should be included.

Criteria will promote transparency and replicability, but we recognise the application of the criteria may also require the exercise of judgment.[200] In our 2020 paper on *Energy Network*

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199 We asked for details of all outstanding debt and financial instruments held as at 1 January 2013, and then details of all debt and financial instruments issued between January 2013 and December 2017 (though some networks provided data through to February 2018). AER, *Discussion paper, Estimating the allowed return on debt*, May 2018, p. 27.

200 By replicability in this context, we mean the ability of other parties to replicate our work, that is, to reproduce the EICSI given the same raw data.

Debt Data, we set out criteria by which we would include and exclude debt instruments from the Index.

For inclusion, there was a single overarching criterion:

- We will include any instrument that has the purpose of financing the RAB, has the characteristics of debt and does not meet one of the exclusion criteria. Types of instruments that are included are simple bond issuances, bank loans, USPP (US private placement) or MTN (Medium Term Note).

We will exclude instruments that do not have simple debt characteristics or are issued for other purposes. These include:

- Commercial papers, non-convertible subordinated notes, hybrids, and short-term capex facilities
- Bridges, working capital and overdrafts
- Anything with a term under 12 months.

We have also followed Chairmont's previous treatment of callable debt and transitioning debt as part of the NSW State Government privatisation exercise.[201] Where revolving bank debt has been extended with a change to the margin, we have included this extension as a separate debt instrument reflecting the new pricing and maturity date. We have only included limited instruments from APA Group due to the firm being primarily unregulated and the total value of instruments received exceeding that of the regulated asset base. We welcome submissions from stakeholders on the treatment of this debt in the EICSI.

To assist in the replicability of the EICSI, we met with the CEG who were independently commissioned by the ENA to analyse the industry data provided to them separately.[202] In this meeting we were able to identify aspects of the construction of the EICSI where we could be clearer in our description to improve the transparency and replicability. We have included further details on our inclusion and exclusion criteria and treatment of instruments in this paper. We consider that following these clarifications, the differences between our calculation of the EICSI and that calculated by CEG should be relatively inconsequential.

How is the data collected?

We continued to collect data on an annual basis from the networks since the initial collection in 2018.[203] This data was used to update the EICSI and inform our analysis. The updated EICSI and analysis was published in the *Rate of Return annual updates*.[204] This data was provided to us on an informal and voluntary basis.

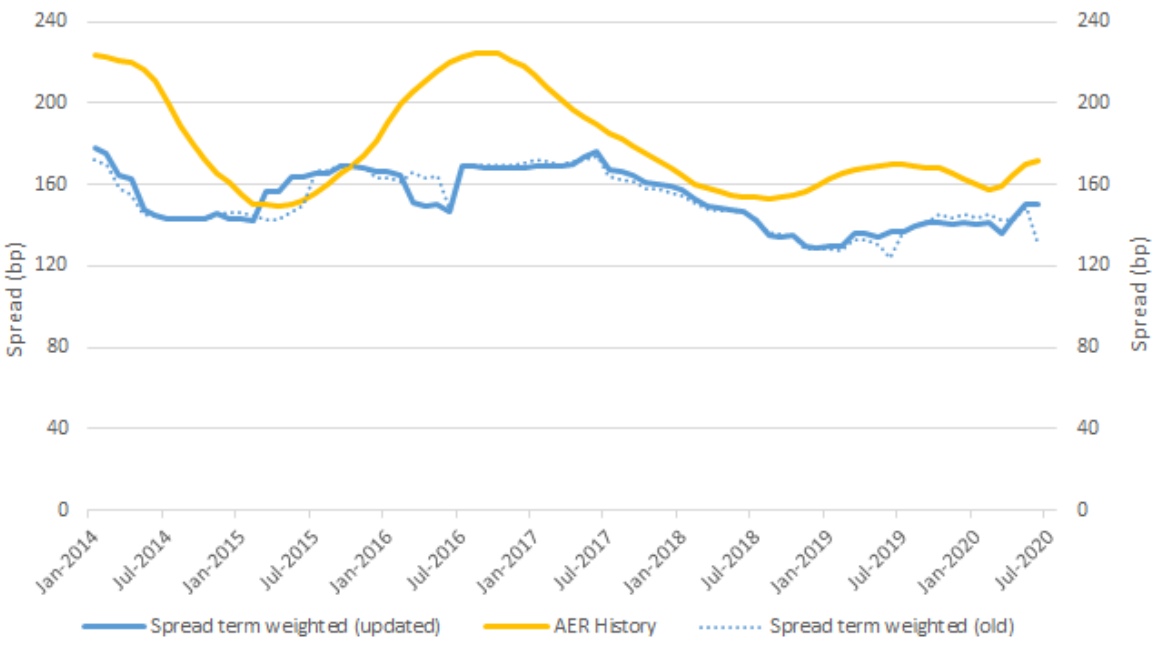
In 2021 the AER moved from a voluntary data request to a compulsory information gathering process and issued regulatory information notices (RINs) to the networks. As well as being compulsory, a RIN requires assurances, by way of Statutory Declaration, from the networks that the data provided is actual or the best estimate when it is not possible to provide actual information. These assurances provide greater certainty that the data included in the EICSI is accurate, which we considered necessary for the ongoing use of the EICSI.

201 Chairmont, *Letter - Response to Consultants Questions*, 4 June 2018.
202 Meeting with AER staff and CEG, 16 November 2021.
203 The 2019 submission included all debt issuances between 1 July 2018 and 30 June 2019, the 2020 submission included all debt issuances between 1 July 2019 and 30 June 2020.
204 AER, *Rate of return Annual Update*, December 2020, pp. 20–22.

For the 2021 submission,[205] the networks were asked to submit all debt issued between 1 July 2020 and 30 June 2021 as well as resubmit all instruments issued back to 1 July 2013. This was so we could have the same assurances over the accuracy of new and previously supplied data and for the networks to update any information using the instructions outlined in the RIN.

Due to the more detailed instructions provided in the RIN and greater assurances required over the data than previous collections there have been revisions to the data between 1 July 2013 and 30 June 2020. Figure 5 displays the EICSI weighted by term using the updated data received in 2021 against the previously supplied data back to January 2014.

Figure 5 Comparison of the EICSI weighted by term using data supplied in 2021 (updated) vs. previously supplied data (old)



Source: AER analysis; Chairmont, *Aggregation of debt data for portfolio term to maturity*, 28 June 2019.

The differences between the EICSI using the updated and old data are a result of revisions to data by the networks, both self-initiated and due to RIN instructions. They are not due to us removing instruments from the EICSI. Revisions that had the greatest impact were:

- Self-initiated revisions to data, such as the pricing date and spread of individual debt instruments;
- Revisions based on RIN instructions, such as removing certain fees from the spread and reporting these separately; and
- Providing additional instruments that weren't reported previously.

Over the January 2014 to June 2020 period, there was a 1.5 basis point drop on average in the EICSI due to these changes. The largest deviations that can be seen between Jan-July 2015 and Jan-July 2016 of Figure 5 are due to the pricing date of several instruments changing.[206]

[205] Received on 27 September 2021

[206] The pricing date of an instrument dictates when it will enter and leave the EICSI.

Overall, we are satisfied that any changes to the EICSI due to revised data are appropriate and will use this updated data going forward.

How do we compute it?

The EICSI is based on a 12-month rolling average of, in broad terms, the 'current' return on debt. When we apply the 2018 Instrument we use a 10-year trailing average portfolio return on debt, built up from the historical return on debt across the previous 10 years.[207] Changes in the current return on debt each year will flow through to the trailing portfolio, but only at 10 per cent of the overall value.

The EICSI was deliberately constructed without model adjustments, as described by Chairmont:[208]

> It does not weight or adjust the raw data from the companies. The purpose is to produce a 'pure' unadjusted index which reflects actual debt raising costs[209] without modelling adjustments to target a theoretical benchmark.

When Chairmont created the EICSI in 2018, it was recognised that the index was a basis that should be built upon for future analysis. This includes updating the EICSI analysis to include data unavailable in 2018 and enhance the functionality of the existing debt aggregation model. As part of our updates, and further analysis in the *Energy network debt data* working paper in 2020, we identified several improvements that can be made to the original Index that ensure it better reflects the costs faced by networks. The main change was the reweighting of debt costs by tenor, which accounts for the difference in issuing long term debt compared to short term debt. That means the credit spread of longer-term debt in the rolling data window (12 months) is given more weight than the credit spread of shorter-term debt.[210]

Fees that are directly attributable to eligible instruments are also included. In this way, the EICSI reflects the actual expenditure related to the instruments. This is particularly significant for short-term debt, such as bank debt that has high commitment fees. Therefore, we have included ongoing annual commitment fees for bank debt. Networks were asked not to include any fees that would be compensated in the debt raising cost allowance or the OPEX allowance more generally. We note that the intended use of the EICSI has implications on what fees are included for which instruments. We welcome submissions from stakeholders on which fees, if any, should be included in the EICSI.

How is it different to other series?

When referring to the market for debt, there are commonly two distinct subcategories that underly the market. The 'primary market', where securities are initially created and issued, and the 'secondary market', where these securities are subsequently traded by investors.

The EICSI is constructed from debt issued directly by the business on the primary market. The price and yield of this debt are determined by market conditions and the characteristics of the issuer and bond at the time of issue. The issuer is required to pay back this debt at the agreed rate and terms.

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207 The full 10 year historical window is only used after the transition to the trailing average portfolio approach is complete.

208 Chairmont, *Aggregation of Return on Debt Data*, April 2018, p. 3.

209 In this quote, Chairmont uses the term 'debt raising costs' to refer to the ongoing costs of issued debt (effectively interest payments every year). The AER reserves the term 'debt raising costs' for one-off transactional costs incurred when debt is first raised, and uses the terms 'cost of debt' and 'return on debt' for the ongoing interest costs. The AER provides a separate debt raising costs allowance (as part of operating expenditure).

210 AER, *Rate of Return - Draft Debt Omnibus Paper,* July 2021, p. 13.

The third-party yield curves that we use in estimating our return on debt—RBA, Bloomberg, and Thompson Reuters—are constructed using data from the secondary market. These transactions occur without the issuers' involvement and do not impact the cost incurred by the issuer of the underlying security.

There are fundamental reasons that there may be differences between these markets, such as the liquidity of the markets, and number of securities issued. A bond, for example can only be issued once, but it may be traded multiple times before its maturity on the secondary market.

The third-party curves also include debt in other industries beyond regulated gas and electricity networks. The EICSI only relates to debt issued by privately owned service providers of regulated gas and electricity networks.

The EICSI is also weighted by tenor to give more weight to the credit spread of longer-term debt than shorter term debt in the 12-month window. The RBA yield curve is weighted by the value of debt instruments included, while the Bloomberg and Thompson Reuters series are at least partly value-weighted through excluding low value bonds.[211]

The criteria for instruments to be included in the series also vary. We have set out the broad principles for inclusion/exclusion in the EICSI above. The third-party providers have their own criteria for inclusion in their series and this will differ from the EICSI (and from each other). Some may include only unsecured bonds, while others include both secured and unsecured bonds. Some include only bonds denominated in Australian Dollars, while others include multiple currencies. None of the third-party curves include bank debt issued.[212]

Subordinated debt is also generally not included in the third-party providers' series. Non-convertible subordinated notes are currently excluded from the EICSI, and there are no subordinated debt instruments included in the current index. We note though that consistent with the advice from Dr Lally, whether subordinated debt is included/excluded depends on the use of the EICSI. If the EICSI is to be used to directly set the debt premium, then it is beneficial to exclude it from the analysis to ensure it matches the costs of these businesses in aggregate.[213]

3.4.2 Does the index show outperformance?

Our debt allowance, now using the A/BBB weighted average, cycles over time.[214] Prior to January 2018 we had seen peaks around 225 basis points and lows around 150 basis points, with the data taking around 18 months to 2 years to move between highs and lows. With the data updated to mid-2021, the credit spread appeared to level off around 160–170 basis points between 2018 and 2021. Since January 2021 we have seen a sharp decline with the current credit spread around 130 basis points.

The EICSI has remained below our cost of debt for almost the entirety of the period observed. There have only been 11 months in the last 91 where the EICSI has been slightly above our cost of debt (based on our current debt methodology approach set in the 2018 rate of return Instrument). On average the gap between the EICSI and our approach has been about 18 basis points. The gap has been as high as 74 basis points (June 2016) but has closed markedly since March 2021. Nevertheless, the historical gap between these measures suggests there may be some outperformance that is worth investigating further.

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211 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 51; ACCC, *Thomson reuters credit curve methodology - Note for the AER*, April 2017, pp. 6–7.

212 ACCC, *Thomson reuters credit curve methodology - Note for the AER*, April 2017, pp. 6–7.

213 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 51.

214 Our approach uses an average weighted 2/3 to BBB and 1/3 to A to estimate a credit rating of BBB+.

When we refer to outperformance in this context it means that the EICSI is showing a lower credit spread than our current approach would have set at that time. For example, when the EICSI is 10 basis points lower than the AER historical index: outperformance is 10 basis points.

What are the views?

In the final 2020 working paper, we indicated a number of alternative methods for using the EICSI in our Instrument that may address this perceived outperformance.[215] Several of these methods were ruled out for technical and practical reasons, and our proposed approach in that working paper was to use the EICSI to directly determine the benchmark blend of A and BBB bonds.

In a response to our final working paper, the ENA submitted a memo, opposing the use of the EICSI to adjust the benchmark blend.[216] In particular, the ENA considered:

- The industry data confirmed that the current approach for determining the benchmark efficient cost of debt remained fit for purpose
- Implementation issues would be significant
- The risk of deviating from the benchmark debt lies with the issuing service provider and, as a result, the reward and penalty should do so as well. Altering the blend would remove this link and punish those issuing benchmark debt
- Altering the benchmark blend is an inappropriate response to correct what is a predominantly term generated disparity.

Our draft debt omnibus paper maintained that the analysis underlying the 2020 paper remained appropriate. However, we recognised the points set out by the ENA and CEG, noting a number of issues to consider in response:

- Whilst the risk and rewards/penalties are currently taken on by the NSPs, our data appears to reflect a higher reward than risk. Ensuring that this is accounted for in our regulatory judgement is something we are now able to do with the formation and extension of the EICSI.
- Whilst the term of the debt issued is the area being actively managed by the NSPs, it is the most difficult part of the benchmark to change in the Instrument. If we adjust the term, we may also need to adjust the trailing average calculation.
- The benchmark was set with the efficiency of managing the relevant debt portfolio in mind. If there is evidence that there is a more efficient strategy for an NSP, then regulation should reflect that efficiency. Otherwise, consumers would never benefit from the more efficient practices that are observed.
- As part of our regulatory approach, simplicity is important. Adjusting the blend is clear and transparent, can be replicated during the Instrument and can be adjusted from Instrument to Instrument without significant adjustment or impact on the networks' debt raising strategy.

In its submission to the draft debt omnibus paper, ENA was supportive of our ongoing use of industry debt costs to inform the benchmark cost of debt and outlined different methods for how the EICSI can be used.[217] However, ENA noted that the intended use of the EICSI has critical implications on its construction:

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215 AER, *Energy Network Debt Data*, November 2020, pp.33-34.

216 ENA, *Effective regard to network debt data - response to AER's Energy Network Debt Data*, August 2020.

217 ENA, *Estimating the cost of debt*, 3 September 2021, p. 3.

- If testing for the existence of a halo effect relative to a third-party data provider, it makes sense to exclude bonds that are materially different to the 'standard' bonds used by these providers, such as callable and/or subordinated debts.[218]
- If the objective is to use network data to arrive at an estimate of average network debt costs, and to set compensation using the EICSI, then all network debts should be included in the analysis – no matter how different to the 'standard' debts. This debt should be tenor and value weighted to reflect its weight in the networks' portfolios.[219]

ENA also noted that if the EICSI analysis indicated outperformance based on average debt term, any changes to the benchmark debt term must be matched in the trailing average to ensure that the benchmark remains replicable to the networks.[220]

Submissions by APGA, NSG and individual networks endorsed ENA's submission and did not support our proposal in the draft debt omnibus paper. They only supported using the EICSI as a cross-check, as it was used in the 2018 Instrument. The submissions cited concerns with using the EICSI to estimate return on debt as it will lead to a non-replicable benchmark.[221]

The CRG strongly supported the principle of maintaining the EICSI and seeking ways to use it to ensure consumers can benefit from network outperformance against the current benchmark. However, the CRG did not support our proposal in the draft omnibus paper to use the EICSI to adjust the BBB+ credit spread blend as it adds further complexity and removes the benchmark credit rating. Instead, we should continue to consider other options, such as removing any potential halo effect and consideration of adjusting for the benchmark tenor.[222]

MEU was supportive of our proposal to use the EICSI to adjust the BBB+ credit rating blend as it integrates a forward-looking value for the cost of debt rather than setting the cost of debt based on purely historical data.[223]

As part of the work on recent working papers, we also received a consultant report from Dr Martin Lally which included comments on our construction and proposed use of the EICSI. This report noted that in determining how suitable any proposed adjustment would be, we should look to decompose the observed outperformance into three factors to judge which is the most significant.[224] These factors were:

- Term
- Rating
- Residual

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218 In this context, we understand 'halo effect' to be the same as the 'residual outperformance' referred to in this paper.

219 ENA, *Estimating the cost of debt*, 3 September 2021, pp. 3, 15.

220 ENA, *Estimating the cost of debt*, 3 September 2021, pp. 27-29.

221 APA, *Submission on rate of return working papers*, 3 September 2021, p. 9; APGA, *Submission to the AER rate of return omnibus papers*, 3 September 2021, p. 25; Ausgrid, *Submission Debt Omnibus*, 3 September 2021, p. 6; AusNet Services, *Rate of Return – Draft Omnibus Papers*, 3 September 2022, p. 4; Energy Queensland, *Rate of Return Omnibus Papers*, 3 September 2021, p. 3; SAPN, CitiPower, Powercor, United Energy, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 5; NSG, *Response to AER RORI Omnibus papers*, 3 September 2021, p. 3; TransGrid, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 5.

222 CRG, *Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers - Volume 1: Technical*, 3 September 2021, pp. 109-110.

223 MEU, *Response to draft working papers*, 3 September 2021, pp. 8-10.

224 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p.48.

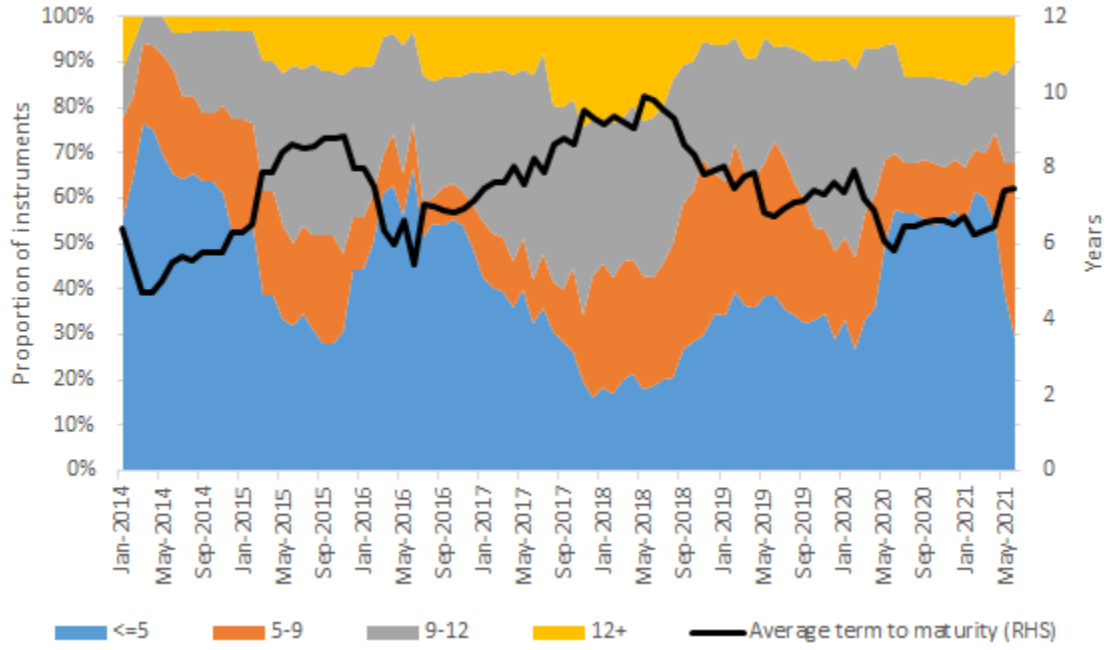
The following sections discuss our analysis of the drivers of the perceived difference.[225]

Impact of term

The average term at issuance has continued to change in negative correlation with our cost of debt calculation. Most recently there has been a decline from an average term at issuance of 10 years in April 2018 down to around 7.5 years in mid-2021.

This is due to a large proportion of instruments issued with terms to maturity of 5 or fewer years as shown in Figure 6.

Figure 6 Proportion of debt instruments included in EICSI by broad term to maturity grouping (January 2014 to June 2021)



Source: AER analysis; Chairmont, *Aggregation of debt data for portfolio term to maturity*, 28 June 2019.

To analyse the impact that the term of debt is having on outperformance we can compare the EICSI against a matched-term AER cost of debt.[226] The average outperformance when compared against this matched-term cost of debt is reduced from 18 basis points to 4 basis points. This analysis suggests that the term of debt issuances included in the EICSI is a key driver of the noted outperformance.

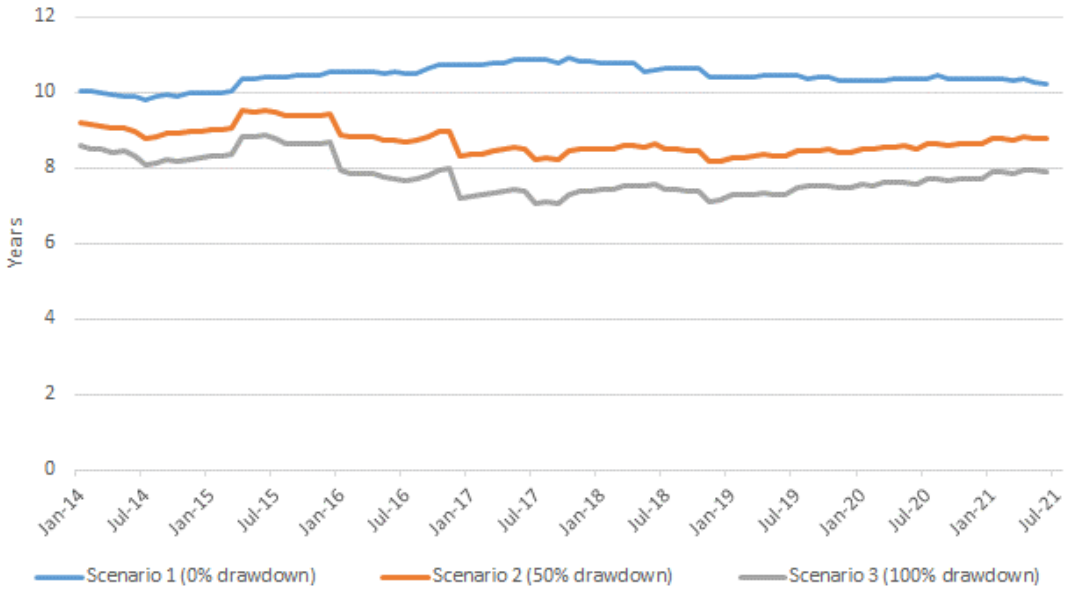
As shown in Figure 6, in 2018 the average term of instruments in the EICSI was very close to 10 years. The median term of instruments in the EICSI between July 2017 and July 2018 was also 10 years. It is unclear from the data available that the more recent trend of issuing shorter-term debt will continue in the long-term.

The average term of debt also varies significantly across service providers. Individual service providers' average term of instruments issued since July 2013 ranges from under 5 years to over 12 years. As such, the average term of instruments in the EICSI is influenced by a few service providers that raise shorter term debt. For example, if three of the service providers with the shortest-term debt instruments are removed from the analysis, the overall average term of instruments in the EICSI increases from 7.5 years to 8.5 years.

[225] We note that the decomposition that we undertook was broader in nature than that described by Dr Lally in his report.
[226] This involves interpolating values from the published debt curves for each 0.1 year increments between 5 and 10 years.

The 2019 Chairmont report also suggested an alternative method to calculate the average term of debt using a weighted average term to maturity at issuance (WATMI). This index is weighted by the face value of debt, and does not apply the same exclusion criteria as the EICSI, therefore includes a broader range of instruments. This is presented in Figure 7, reflecting the updated data received from networks through to June 2021.

Figure 7 Weighted average term to maturity at issuance for the EICSI dataset – comparison of drawdown sensitivities (January 2014 to June 2021)



Source: AER analysis, based on method in Chairmont, *Aggregation of Debt Data for Portfolio Term to Maturity*, June 2019.

The WATMI also includes scenarios for the drawdown of bank debt (that is, whether funds are drawn for any of the bank debt reported by the energy networks). Scenario 1 (blue line) reflects no funds being drawn, scenario 2 (orange line) reflects 50 per cent drawdown of bank debt, and scenario 3 reflects 100 per cent draw down (that is, all bank facilities are fully utilised). When bank facilities are used, the weighted average term drops because the bank facilities used by the energy networks have shorter term than other debt instruments (i.e., bond issuance).

The zero per cent drawdown scenario results in the weighted average debt term at issuance being relatively stable between 10 and 11 years. The 50 per cent and 100 per cent drawdown scenarios show lower average terms, and some evidence of increase in the period from January 2019 on. The 100 per cent drawdown scenario is currently around 8 years.

Our debt RIN asked networks to report the amount of debt drawn for relevant facilities across the most recent year, with a monthly reporting frequency. This will allow us to refine our estimate of drawdown percentages. At the time of publishing, we are yet to fully analyse this further data to adjust the scenarios. At present, our assessment remains that:

- Scenario 1 (with 0 per cent drawdown) and scenario 3 (with 100 per cent drawdown) are conservative upper and lower bounds.
- We consider that overall drawdown likely sits between scenarios 2 and 3, and potentially closer to scenario 3.

We consider that further analysis on the benchmark term and actual drawdown of bank debt is required to make a more accurate assessment to inform any change to the benchmark

term. We intend to consult on this further in making the 2022 Instrument and welcome submissions on this issue. We also intend to continue to collect and monitor the data collected from service providers to determine if any change to term is required in the future.

Impact of credit rating

We also analysed the credit ratings given to issued debt and whether the mix of credit ratings changes over time. To do this we have applied a numerical rating to each instrument included, with a 'BBB−' rated instruments assigned 1 and 'A' instruments assigned 5, with each higher integer representing a step up in the rating system. This allows us to check whether the outperformance appears to be impacted by the changes in credit ratings of the debt instruments in the EICSI.

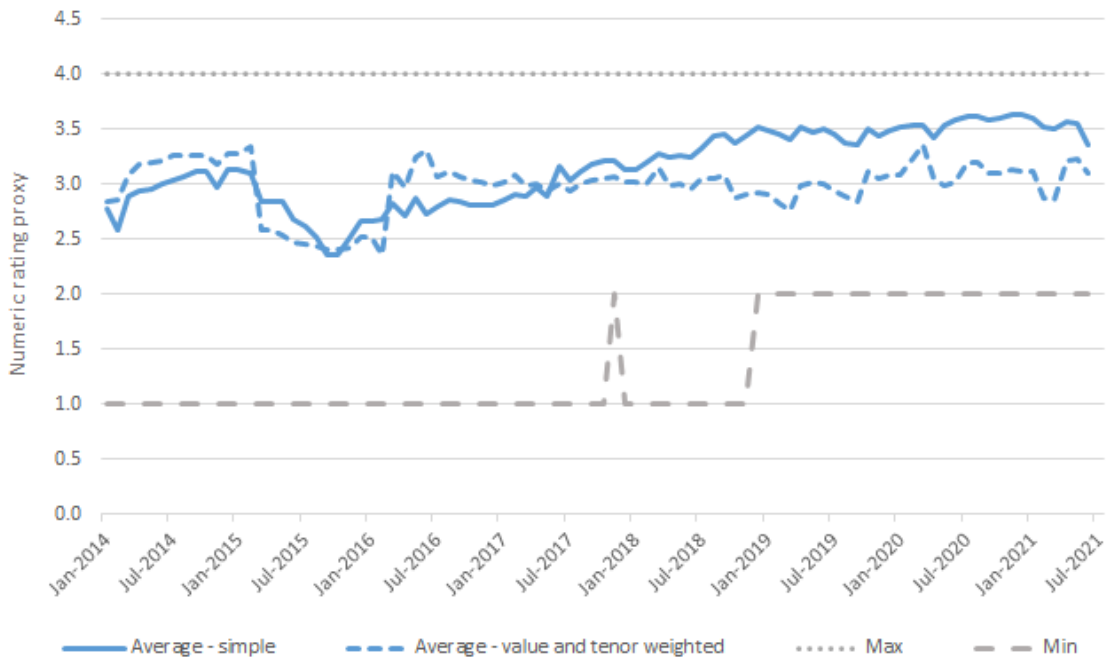
Table 10 Numerical rating proxies applied to instruments

Rating (S&P/Fitch)	Rating (Moody's)	Numerical proxy
A	A2	5
A-	A3	4
BBB+	Baa1	3
BBB	Baa2	2
BBB-	Baa3	1

Notes: Where an instrument has multiple ratings we have used the S&P/Fitch rating.
Where it has an alternative rating we have matched to the equivalent S&P/Fitch rating.

As shown in Figure 8, the average credit rating of instruments issued has slowly increased since around 2016. Under our numerical rating, BBB+ would be around 3. The current average rating is around 3.25, and it has been relatively stable at this level since around 2018.

Figure 8 Average and face value weighted credit rating (proxy) of instruments in EICSI (January 2014 to June 2021)



Source: AER analysis; Chairmont, *Aggregation of debt data for portfolio term to maturity*, 28 June 2019.

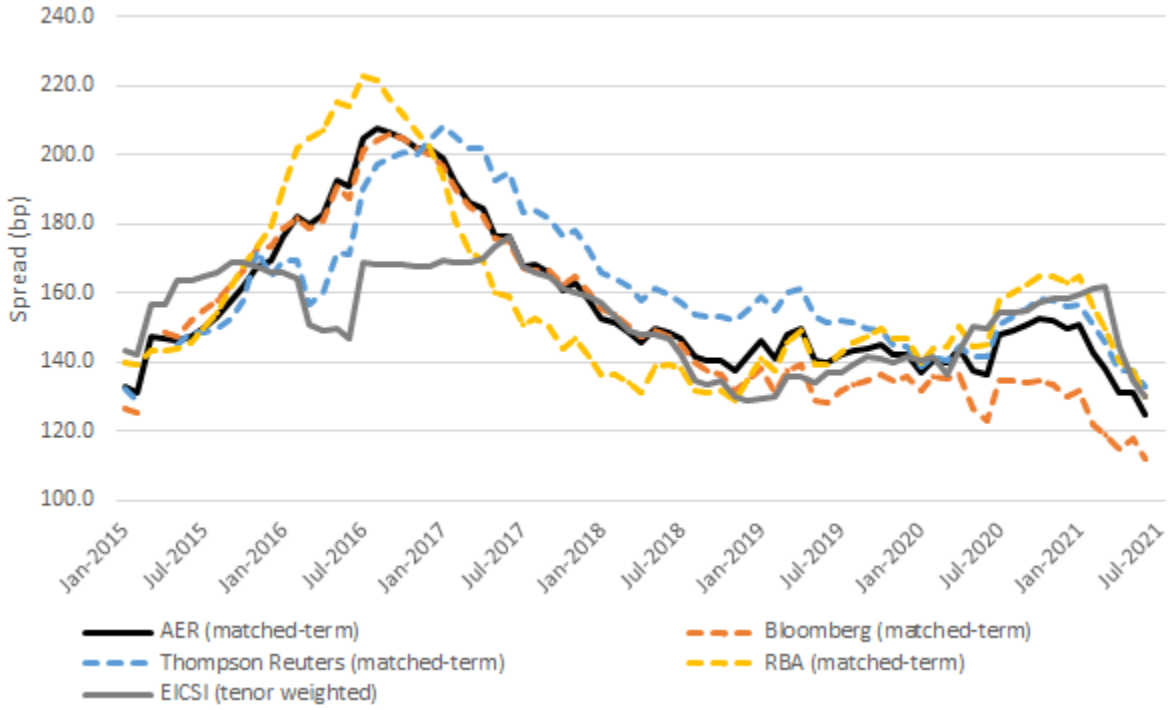
Although we note that the average credit rating of instruments in the EICSI has been above 3 (BBB+) for some time, it has only been marginally above the broader BBB+ band of 2.5 to 3.5 in this time. There also appears to be little correlation between the average credit rating of instruments in the EICSI and any outperformance against the benchmark estimate. Furthermore, when weighted by the face value of instruments it has remained stable within the BBB+ band since 2016.

It should also be noted that while rating proxies have been used to allow for this analysis, credit rating bands are ordinal (non-metric). While they are ordered categories, the distances between each category are not known. The proxies assume equal distances of 1 between each band, which may not be true in practice.

Other impacts

We have also performed further analysis to see what else might be driving the residual outperformance of our benchmark. We examined whether any of the individual third-party data series used for our estimate (Bloomberg, Thompson Reuters, and RBA) appears to better reflect the debt costs of the networks. As shown in Figure 9, while the individual series (weighted 2/3 to BBB and 1/3 to A) varied over time, none appeared to be particularly more reflective of the EICSI over the longer term than the average used in our benchmark approach.

Figure 9 Comparison of individual matched-term series (RBA, Thompson Reuters and Bloomberg), A/BBB 12 month rolling average against EICSI (January 2015 to June 2021)



Source: AER analysis; Chairmont, *Aggregation of debt data for portfolio term to maturity*, 28 June 2019.

Table 11 compares the range and standard deviation of the EICSI and our on the day benchmark since January 2014. It shows that while minimums observed are very similar, the EICSI has a much smaller range and standard deviation compared to our current approach.

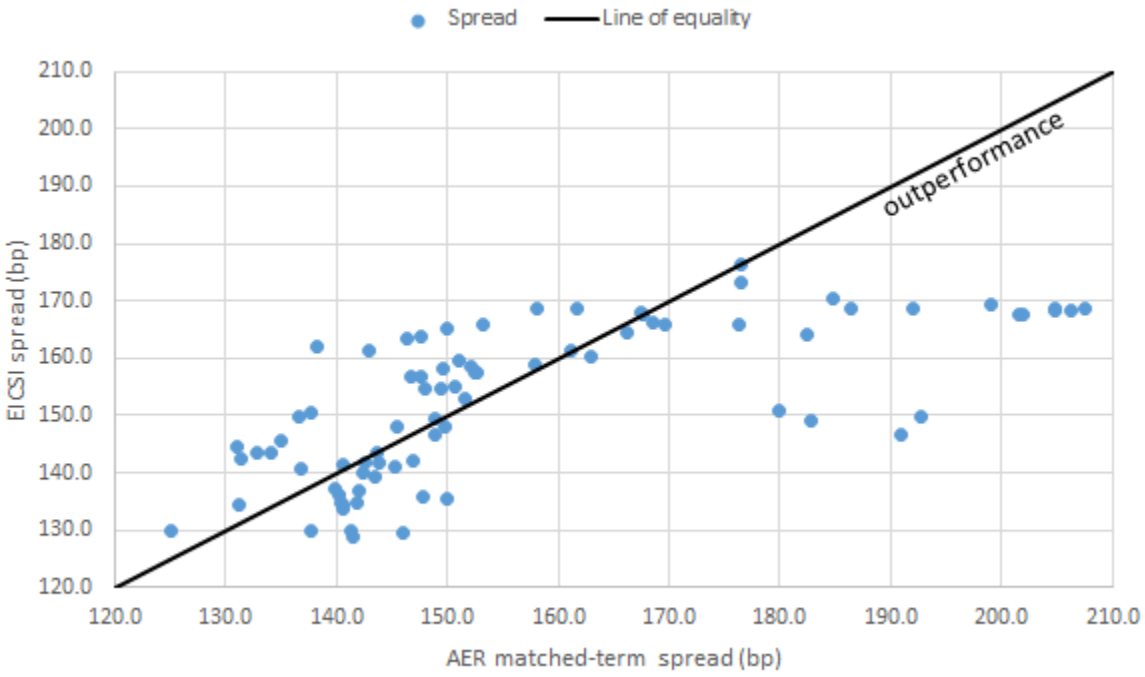
Table 11 Range comparison of EICSI and AER benchmark credit spreads (January 2014 to June 2021), basis points

	EICSI	AER
Min	129	127
Max	178	223
Range	49	97
Standard deviation	13	25

The peaks of the benchmark credit spread also tend to be the periods of highest outperformance. This is the case after adjusting for the difference in term. Figure **10** plots the monthly EICSI credit spread against the relevant AER matched term credit spread. Where the point lies to the right of the line there is outperformance (the EICSI is lower than the AER estimate). It shows minimal outperformance when the AER benchmark credit spread is under 170 basis points but increases substantially as the benchmark credit spread increases above

170 basis points. When the AER (matched term) credit spread is above 170 basis points the EICSI shows consistent outperformance.

Figure 10 AER A/BBB 10 year rolling 12 month and matched-term outperformance (January 2015 to June 2021)



Source: AER analysis; Chairmont, *Aggregation of debt data for portfolio term to maturity*, 28 June 2019.

This suggests that the debt raised by privately-owned regulated service providers on the primary debt market may be somewhat insulated from the high average risk premiums when these are evident in the secondary market data used for our estimation. As such, there may be some residual outperformance allowing the regulated networks to raise debt a lower cost than the third-party data suggests, but only in times of high credit spreads (or risk premiums) in the secondary debt market.

3.4.3 What options were considered?

In coming up with our preliminary position we considered three broad options for using the EICSI to adjust our benchmark to better align the benchmark allowance with the actual debt costs of the networks. These options were:

- Remove the residual outperformance
- Remove the residual outperformance and adjust the benchmark term
- Remove the residual outperformance and adjust the benchmark blend of credit curves.

This section discusses these options further.

Option 1: Remove residual outperformance

This option involves using the EICSI to adjust our return on debt approach to remove the residual outperformance if the effect is material and persistent. To make this adjustment we would subtract a fixed margin from our return on debt, or apply a cap or other constraint on the benchmark debt risk premium allowance.

This option is similar to the 'Option 4' put forward in the *Energy Network Debt Data* working paper.[227] However, the adjustment in this case only reflects the residual outperformance margin that is evident after accounting for differences in term and credit rating.

Our analysis shows that there is minimal residual outperformance against the benchmark when our benchmark estimated credit spread is under 170 basis points, but this outperformance increases as the benchmark credit spread increases above 170 basis points. This suggests that the debt raised by the privately-owned regulated service providers on the primary market may be insulated from the high average risk premiums that are at times evident in the secondary market. Our approach uses information from third-party curves which rely on the secondary market to set the return on debt allowance. If there is a residual outperformance that is material and persistent over periods when the secondary market credit spread (or debt risk premium) is above a certain level, we consider that eliminating, or reducing it would better align the benchmark allowance with the relevant comparator set and so would be generally warranted.

Our preliminary position is that further analysis and consultation are required regarding whether we should adjust for residual outperformance, and what form such adjustment would take. We consider that if an adjustment is necessary, it may take the form of a fixed margin which is removed from the return on debt, or a cap or other constraint applied on the debt risk premium or credit spread.

Given the nature of the residual outperformance that we have identified, we consider that a cap or other constraint is more appropriate than removing a fixed margin from the return on debt. We acknowledge that in this paper we decided not to pursue the option of setting a floor on the risk-free rate due to its low theoretical support (see section 2.4.2). On the contrary, in this case we consider that there are theoretical grounds for why a cap may be appropriate.

While the credit rating is an indicator of the probability of default, a debt instrument's return and risk premium also reflect other information such as market expectations regarding recovery of loss in case of default.[228] Other features, such as coupon type and size, embedded options, and currency of issue might also affect their yields.[229] We consider it reasonable that the debt issued by the regulated networks in the primary market may have certain underlying characteristics that make it more favourable to debt holders in times of high average risk premiums when these are evident in the secondary market data. It is also conceivable that due to relatively low expected loss in case of default, the debt risk premiums for such regulated networks debt are bounded from above or constrained in some way.

We consider that adjusting for this effect, if it is considered material and persistent, will result in an approach that better aligns the benchmark allowance with the actual debt costs of the networks. We welcome submissions from stakeholders on whether this residual outperformance should be adjusted for, and what form the adjustment should take. We intend to continue consultation on the need for making adjustments for residual outperformance in the period leading up to the draft Instrument.

Option 2: Remove residual outperformance and adjust term

This option uses the EICSI to adjust our return on debt approach for both the residual outperformance (option 1) and departures on term (if those effects are material and persistent). To make these adjustments, we would remove the residual outperformance

227 AER, *Energy Network Debt Data*, November 2020, p. 33.

228 ACCC, *Thomson reuters credit curve methodology - Note for the AER*, April 2017, pp. 16–18.

229 ACCC, Return on debt estimation: a review of the alternative third party data series - Report for the AER, August 2014, p. 11.

through a fixed margin, or applying a cap or constraint as discussed in option 1. Additionally, we would adjust the benchmark term used to determine our benchmark allowance.

Our analysis suggests that the term of debt issuances included in the EICSI is a key driver of the noted outperformance. However, we consider that altering the term whilst on a trailing average approach would create practical issues, and the benefit or appropriateness is not currently clear. Analysis of the WATMI also suggests that 10–11 years may be the upper bound for the benchmark term, with the lower bound around 8 years as presented in scenario 3. Further analysis on the actual drawdown of bank debt is required to make a more accurate assessment to inform any change to the benchmark term.

We consider that any change to term is likely to require a transition to ensure that the zero NPV condition continues to hold, and for firms to remain able to match the benchmark strategy. If the change to term is one-off this would not be particularly cumbersome. However, having an NPV-neutral transition to a trailing average with a different benchmark term every time the benchmark term changes would cause significant implementation issues.

The benefit to consumers from moving to a shorter term is unclear. First, if a transition is implemented, the change would be neutral in terms of the NPV. Further, applying a shorter term under the trailing average is likely to lead to higher price volatility. This is opposed to an on the day approach of setting the return on debt where it the regulatory return on debt allowance is always reset at the start of the regulatory period. The current trailing average is over 10 years to reflect the benchmark term, if this average is shortened to reflect a shorter term, then the volatility of the average would likely increase.

Adjusting the term to reflect actual debt issuances may benefit the networks, by better matching the debt allowance to their financing practices. However, we consider any adjustment for term should also be based on evidence that this is efficient practice and will continue to be so in the long term.

We also note that the average term of instruments in the EICSI is influenced by a few service providers raising shorter term debt. We do not consider it appropriate to make an adjustment to the benchmark for something driven by the practices of a small number of service providers.

We intend to consider the issue of term in the further consultation period leading up to the draft Instrument.

Option 3: Remove outperformance by adjusting blend of credit curves

This approach uses the EICSI to adjust our return on debt approach for both the residual outperformance and departures on term and credit rating, i.e. all observed outperformance (if those effects are material and persistent). To make these adjustments a margin would be removed from our return on debt by using the EICSI to the directly determine the benchmark blend of A and BBB credit curves used.

In the *Energy Network Debt Data* working paper released in 2020 our referred approach was to use the EICSI to determine the benchmark blend of A and BBB bonds.[230] Instead of blending A and BBB yield curves on a 1:2 ratio to align with a BBB+ rating, the blend would be informed by the average yield of the EICSI over a given observation window. If the average yield from the EICSI matched a blending of A and BBB curves at a 4:1 ratio, then this is the blend of curves used for the Instrument. This option also means that we would no longer need to specify a benchmark credit rating within this band, as the blend of curves would be that which most closely matches the actual debt costs incurred by the NSPs.[231]

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230 AER, *Energy Network Debt Data*, November 2020, p. 35.

231 AER, *Energy Network Debt Data*, November 2020, Appendix A.

This option was further considered as an option in the draft debt omnibus paper. However, reflecting feedback from stakeholders and the decomposition analysis on the drivers of the outperformance we no longer consider it appropriate to adjust the benchmark blend of credit ratings used in our estimate.

As noted by our expect consultant Dr Lally, implicit in adjusting the benchmark credit rating blend is that the entire difference between the EICSI data and the AER benchmark is ascribed to the credit rating. Lally suggested that before such an adjustment is made, we should decompose the difference into the part due to credit rating, the part due to debt term, and the residual before making any adjustment to the credit rating blend.[232]

As noted above, the result of this decomposition indicates that credit rating does not appear to be a particular driver of the observed outperformance. The main driver of the observed outperformance is related to the term of debt, with some residual outperformance in times of high average risk premiums evident in the secondary market data. As such, we no longer hold the view that it is appropriate to adjust the blend of credit rating curves for a difference that is not directly related to credit rating. Doing so may also create issues with the ability of the firms to match this strategy, while maintaining the benchmark term. This is consistent with the advice from Dr Lally in his report.[233] We also note that changes to the credit curve blend to reflect the EICSI will generally not be NPV neutral, whereas a change to term can be NPV neutral with an appropriate transition.

[232] Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 48.
[233] Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 47–49.

4 Weighted trailing average return on debt

4.1 Overview

Under the 2018 Rate of Return Instrument, we estimate the return on debt using a trailing average approach and:

- Apply equal weights to each annual return on debt estimate feeding into the trailing average other than the first year where the transition to the trailing average commenced
- Update the return on debt estimate annually
- Use a benchmark term of debt of 10 years
- Implement a 10-year transition into the adoption of the 10-year trailing average approach.[234]

The integrated system plan (ISP) developed by the Australian Energy Market Operator (AEMO) has raised the prospect of large projects being undertaken over the next ten to fifteen years.[235] These projects could result in the Regulatory Asset Bases (RABs) of several Transmission Network Service Providers (TNSPs) increasing significantly over a short period. As a result, there could be large debt raising requirements in some years beyond the 10 per cent level built into our current trailing average return on debt.

In light of these changing circumstances, we want to examine whether our approach of assigning equal weights to each element of the trailing average remains appropriate.

We consider whether the annual components of our trailing average return on debt allowance should be weighted to reflect potential time variability of businesses' RABs. Applying weights better aligned with the level of capital investment required may reduce any mismatch between the return on debt allowance and benchmark efficient debt financing costs. This should better align with the zero net present value (NPV) condition and therefore may better promote efficient investment. We also explore how such an approach could be implemented in the 2022 Instrument.

4.2 What is the issue?

When we introduced the trailing average approach, we recognised that there would likely be a difference between the trailing average return on debt and the on the day cost of debt at any particular time. However, we also recognised that the trailing average approach would approximately satisfy the zero NPV condition so long as we had a transition into the trailing average and we maintained the trailing average consistently over the life of the assets.[236]

At the time, the QTC proposed that the trailing average should be weighted according to the service providers' debt profile so the weight for any year would match the debt raising requirement in that year.[237] We decided not to use a weighted approach because it introduced complexity and we saw that 10 per cent weights were a fair approximation for debt raising requirements. As such, we did not see that the mismatch between the trailing average and the on the day rate would be material.[238]

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234 AER, *2018 Rate of return instrument – Explanatory statement*, December 2018, pp. 276, 282.

235 AEMO, *2020 Integrated System Plan (ISP),* 30 July 2020, p. 64.

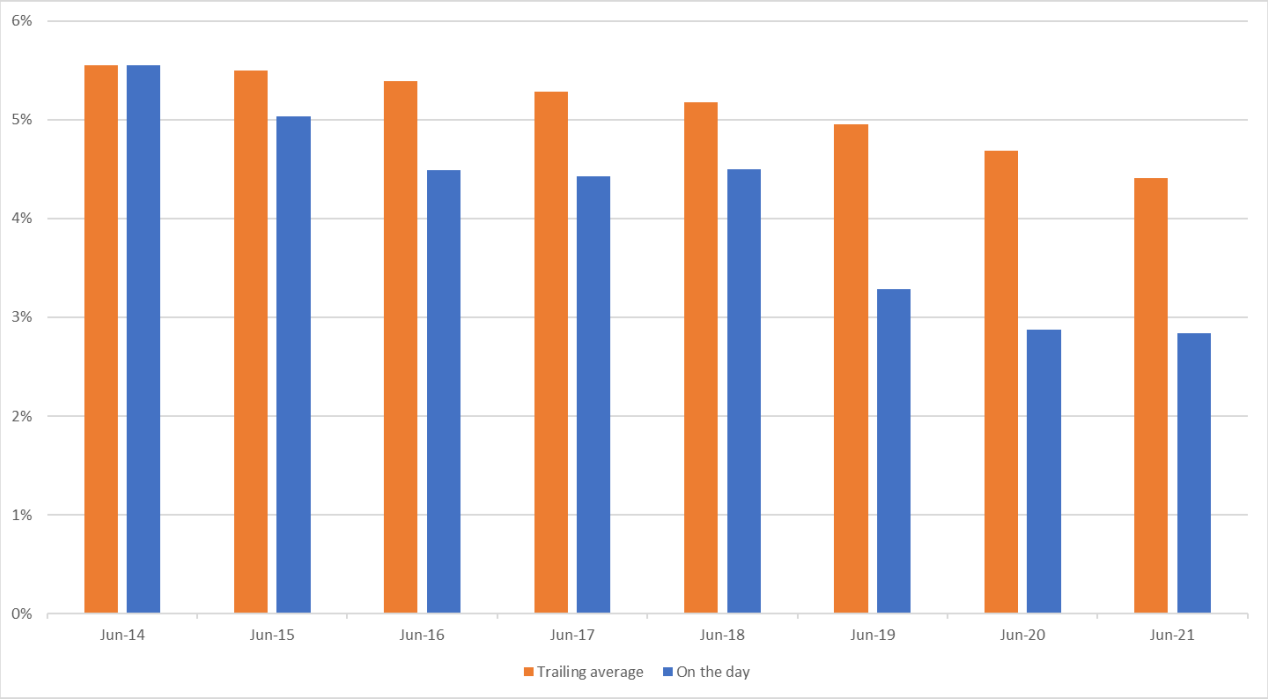
236 See, for example, AER, *Attachment 3 – Rate of return, AusNet Services distribution determination final decision 2016-2020*, May 2016, pp. 291–308; AER, *Explanatory statement: Rate of return guideline*, December 2013, pp. 102–125.

237 QTC, *Rate of return guidelines issues paper*, 15 February 2013, pp. 15–20.

238 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 92.

The energy sector is currently undergoing transformation requiring large infrastructure to be built to connect more locationally and regionally dispersed variable renewable energy generation regions or zones. Following the AEMO's ISP, we are now seeing the potential for large projects and a corresponding large impact on the RAB and debt raising for electricity transmission businesses. This raises the prospect of material mismatches between the trailing average and the on the day rate. Over time these mismatches could be either to the advantage of the networks or consumers. Figure 11 illustrates that in recent years the trailing average return on debt allowance has usually exceeded the on the day rates due to a downward trend in interest rates and bond yields. However, the situation could change once the cost of debt starts trending up.

Figure 11 AER BBB+ return on debt, 10-year trailing average approach vs on the day return on debt (June 2014 – June 2021)



Source: RBA, Bloomberg, Thomson Reuters

Note: The whole month of June is used as averaging periods for both approaches. The trailing average is calculated by applying equal weights to each annual return on debt estimate feeding into it, other than the first year where the transition commenced. We selected 1 July 2014 as the starting point for the transition, with the corresponding averaging period of one month (June 2014). As such, this example is still transitioning to the 10-year trailing average, with June 2021 being the 7th year.

We are concerned about the possibility of material mismatch in this situation for two key reasons:

- Firstly, a material mismatch will result in a non-zero NPV outcome. This will both distort investment incentives and result in consumers paying too much or too little for the network services.
- Secondly, we are concerned with the potential for asymmetric treatment. When our trailing average regulatory allowance is below the prevailing cost of debt, we could see pressure from the businesses to increase the regulatory allowance. In these circumstances a network may refuse to undertake the investment, or implicitly threaten to do so unless the regulatory allowance is increased. In this case consumers will be exposed to the downside, but not to the upside of the cost of debt changes.

We therefore think it is prudent to consider addressing the potential mismatch in the upcoming rate of return Instrument and have set out some options for doing so.

While we have not seen much interest in modifying the trailing average in submissions so far, we think this is an important issue worth considering. While not necessarily an immediate issue we can see states in the future where this issue could lead to major concerns.

4.3 Proposed position

We propose to maintain an open position on whether and how our current 2018 approach needs to be modified in response to RAB growth at beyond 10 per cent a year. We will continue to explore and analyse the available options:

- **Option 1:** Maintain the current (simple trailing average) approach.
- **Option 2:** Weighted trailing average that applies to every regulated business. Weights are based on the debt issuance assumptions in the PTRM.
- **Option 3:** Weighted trailing average only starts to apply when a large increase in the RAB (and therefore debt issuances) is forecast. We would need to set a threshold for the shift to a weighted trailing average. Once the weighted trailing average is triggered, weights are based on the debt issuance assumptions in the PTRM.
- **Option 4:** Weighted trailing average that applies to all electricity TNSPs. Weights are based on the debt issuance assumptions in the PTRM.

Our preliminary position is that if a weighted trailing average (using any of the above options) was to be adopted, it should be based on the debt issuance assumptions in the PTRM, that is, forecasts rather than actual data.

Some of the relevant considerations for our analysis include:

- NPV=0 condition and effect on investment incentives
- materiality and complexity
- benchmark definition
- longevity or sustainability of the approach and other AER assessment criteria.

4.4 Reasons for proposed position

In section 4.4.1 we explore the relationship between the debt financing costs of regulated businesses and the trailing average return on debt regulatory allowance. We observe that a mismatch between the two can arise for businesses with temporarily high capex and new industry entrants. When a mismatch occurs, it results in a departure from the zero NPV condition and potential distortion of incentives to invest in large projects. We further discuss whether – and if so, how – we should account for these situations in our regulatory approach to the return on debt.

In section 4.4.2 we set out the available options of modifying our trailing average return on debt approach and considerations that may help direct future discussion of these options.

4.4.1 Zero NPV condition for a simple trailing average – when might there be a problem?

Our current approach to estimating the return on debt is a trailing average portfolio approach. Under this approach, we set the return on debt allowance normally as an average of (up to)

ten annual return on debt estimates, which we then update annually.[239] Each year in the 10-year trailing average is given equal weighting. We refer to such a weighting scheme as a simple (unweighted) trailing average.

The trailing average approach (past transition) is defined by the following formula:

$$k_t^d = \frac{1}{10}\sum_{j=t-9}^{t} R_j$$

Where:

k_t^d = The allowed return on debt for the regulatory year t

R_j = The on the day rate of return on debt in any regulatory year in the series j

j = Indexes a series of regulatory years for summation

A simple trailing average regulatory allowance matches the debt financing costs of a benchmark firm staggering its debt issuance uniformly over time. Issuing debt annually in tranches of equal size and maturity is consistent with maintaining a constant debt balance. A firm with a constant nominal debt balance would be able to finance capital expenditure exactly offsetting its regulatory depreciation, while maintaining constant leverage.

A new entrant, or an existing regulated business that is about to undertake much more substantial capex, would not be able to finance its capex program by issuing debt uniformly in tranches of equal size (unless it were to simultaneously issue additional equity, reducing its leverage). Therefore, there may be a mismatch between its debt financing costs and the regulatory allowance. In this case the zero NPV condition would not hold in general.[240]

The above summary is consistent with the conclusions Dr Lally reached in his 2021 report.[241]

Dr Lally demonstrated that for an existing regulated business, the only two regulatory return on debt approaches that are capable of exactly satisfying the (expected) NPV = 0 condition are an *N*-year trailing average approach for the entire return on debt and a 'hybrid' approach with an *N*-year trailing average for the debt risk premium component coupled with the five-year prevailing base rate component. In both cases, the weights in the trailing average would have to reflect the circumstances of the regulated business.[242] For instance, an equally weighted trailing average would only result in exactly NPV of zero in one special case, where after the initial investment any further capex matches the regulatory allowance for depreciation (that is, the RAB is stable over time).[243]

If the RAB is not stable over time, the regulatory return on debt allowance is not likely to sufficiently match the entity's debt financing costs and the NPV = 0 condition would not hold exactly.[244] Dr Lally's analysis suggests that for an existing business with moderate capex and growing over time at a moderate rate, regulatory use of a (simple) trailing average cost of debt would yield very small divergences from the NPV=0 condition. However, if capex

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239 The number of components in the trailing average depends on how far along a regulated business is in the 10-year transition from the on the day approach. Once the transition is completed, the trailing average will have ten annual components. For the Victorian electricity and gas DNSPs, due to their movement to financial year regulatory years, we will have 11 regulatory years in the trailing average for ten regulatory years to facilitate this change.

240 It would still hold when the prevailing rate of return on debt and the trailing average rate of return are equal.

241 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, 9 April 2021.

242 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, 9 April 2021, p. 26.

243 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, 9 April 2021, p. 27.

244 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, 9 April 2021, pp. 27–32.

were temporarily high,[245] the divergences from regulatory use of the trailing average approach would significantly worsen, whilst those from the on the day approach would lessen.[246]

A zero NPV investment condition

A zero NPV investment condition, also sometimes referred to as the expected NPV = 0 condition, is a forward-looking concept where the regulator provides a benchmark efficient firm with a reasonable opportunity to recover at least efficient financing costs over the life of its investment (in its RAB). This condition is vital to the regulation of infrastructure with monopoly characteristics such as the businesses we regulate. It aims to prevent the exercise of market power, while still providing regulated business an ongoing incentive to invest and outperform efficient benchmarks.

Partington and Satchell have described the NPV=0 condition as follows:

> The zero NPV investment criterion has two important properties. First, a zero NPV investment means that the ex-ante expectation is that over the life of the investment the expected cash flow from the investment meets all the operating expenditure and corporate taxes, repays the capital invested and there is just enough cash flow left over to cover investors' required return on the capital invested. Second, by definition a zero NPV investment is expected to generate no economic rents. Thus, ex-ante no economic rents are expected to be extracted as a consequence of market power. The incentive for investment is just right, encouraging neither too much investment, nor too little.

Further, investment results in zero NPV if the present value of the stream of expected future cashflows (the market value of the RAB) is equal to the initial investment (the book value of the RAB):

> By definition, a stream of expected cash flows that allows the current required return on the book value of capital invested, recovers the capital invested and covers other costs, will have a discounted present value that ex-ante is equal to the book value of the investment. Allowing this cash flow for a regulated business, the book value of the RAB will be equal to the market value of the RAB. To put it another way this cash flow gives rise to a zero NPV investment.

Source: Marshal, W., Yawitz, J. And Greenberg, E. (1981), 'Optimal Regulation Under Uncertainty', The Journal of Finance, vol 36, pp. 913–914; Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5

The mismatch between the regulatory return on debt allowance and the efficient entity's debt financing costs and the related departure from the NPV = 0 condition might potentially distort investment decisions and lead to an inefficient outcome.

For instance, a business that receives a trailing average allowance below the prevailing return on debt, might be discouraged from undertaking efficient investment (if the capex goes well beyond replacing the regulatory depreciation). On the other hand, whenever the allowed return on debt is above the prevailing rate, a new or existing business about to undertake substantial capex might have an incentive to overinvest.

[245] Dr Lally considers new borrowing of 50 and 100 per cent of the existing level in the first year, followed by more moderate increases.

[246] Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, 9 April 2021, p. 32.

At any given time, the materiality of the mismatch and the extent to which the zero NPV condition is violated would depend on the difference between the prevailing and trailing average return on debt. For an existing business, it would also depend on the size of the new capex relative to its RAB and depreciation profile.

Figure 11 illustrates that for a hypothetical business that has begun its transition to a trailing average in mid-2014, the trailing average regulatory allowance would have exceeded the prevailing rates in every year since then.[247] For example, using the 2018 RORI approach and our example in Figure 11, the trailing average return on debt regulatory allowance estimated as of 1 July 2021 is 4.4 per cent, whereas the corresponding prevailing rate (using one month averaging period) is 2.8 per cent. A benchmark firm trying to finance a substantial new project would not be able to go back in time and raise additional funds at the historical rates and instead would have to borrow at the prevailing rate. This would result in a mismatch between its debt financing costs (2.8 per cent) and its regulatory allowance (4.4 per cent).

While there can be material difference between the simple trailing average regulatory allowance and the prevailing cost of debt (as Figure 11 illustrates), the extent of departure from the NPV = 0 condition also depends on stability of the RAB over time. Several stakeholders submitted that most networks have predominantly incremental (BAU) capex requirements.[248] Indeed, Table 12 illustrates this point.

Table 12 presents annual changes in PTRM debt balances for the regulated businesses based on recent round of the AER decisions (or draft decisions). Regulated assets are grouped by gas distribution, gas transmission, electricity distribution and electricity transmission assets. Annual increases in PTRM debt balances of 5 per cent or above are underlined. Setting aside TransGrid and ElectraNet electricity transmission regulated assets, annual growth in PTRM debt balances varied between -3.83 and 8.05 per cent in the most recent regulatory decisions (or draft decisions), or between -0.48 and 4.63 per cent for the average annual growth rates over a regulatory period.

Table 12 Annual changes in PTRM debt balances, current/open decisions

Entity / Year of the regulatory period	Year 1	Year 2	Year 3	Year 4	Year 5	Regulatory period average
Gas distribution:						2.90%
AGN SA (2021-26)	3.17%	3.08%	2.19%	2.51%	1.74%	*2.54%*
AGN Vic & Albury (2018-22)	5.10%	5.80%	4.75%	3.80%	1.77%	*4.24%*
AusNet Gas (2018-22)	4.24%	4.66%	4.24%	3.63%	3.11%	*3.98%*
Evoenergy (2021-26)	1.94%	1.19%	-0.18%	-0.72%	-1.10%	*0.23%*
Jemena Gas (2020-25)	3.66%	3.25%	2.44%	1.99%	2.50%	*2.77%*

247 The exact result would depend on the length and timing of the averaging periods, as well as the precise method of calculating the return on debt benchmark. We use the current AER approach, that is a blend of the A and BBB credit curves from three third party data providers.

248 TransGrid, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 6; SAPN, CitiPower, Powercor, United Energy, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 6; MEU, *Response to draft working papers*, 3 September 2021, p. 11.

Multinet Gas 2018-22	5.29%	3.82%	3.85%	2.79%	2.42%	*3.63%*
Gas transmission:						2.05%
Amadeus (2021-26)	0.97%	0.51%	0.70%	0.61%	0.46%	*0.65%*
APA VTS (2018-22)	5.32%	6.14%	5.47%	-0.28%	0.14%	*3.36%*
RBP (2017-22)	4.69%	2.18%	0.08%	1.68%	2.10%	*2.15%*
Electricity distribution:						3.08%
Ausgrid (2019-24)	3.67%	2.83%	2.26%	2.03%	1.99%	*2.56%*
AusNet (2021-26)	3.46%	3.61%	2.45%	1.71%	1.65%	*2.58%*
Endeavour Energy (2019-24)	4.18%	3.41%	3.32%	3.50%	3.44%	*3.57%*
Energex (2020-25)	2.10%	2.12%	2.01%	1.76%	1.57%	*1.91%*
Ergon Energy (2020-25)	2.47%	2.38%	2.30%	2.07%	2.04%	*2.25%*
Essential Energy (2019-24)	5.25%	3.68%	3.37%	2.93%	2.81%	*3.61%*
Evoenergy (2019-24)	2.55%	1.71%	3.73%	2.25%	1.34%	*2.32%*
Jemena Electricity (2021-26)	7.34%	6.03%	4.31%	3.49%	1.99%	*4.63%*
Power and Water Corp. (2019-24)	7.44%	4.77%	5.43%	2.51%	2.02%	*4.43%*
SAPN (2020-25)	2.69%	2.59%	1.92%	1.82%	1.82%	*2.17%*
TasNetworks (2019-24)	5.07%	4.15%	3.13%	3.44%	3.48%	*3.85%*
CitiPower (2021-26)	3.21%	2.90%	2.21%	1.41%	0.72%	*2.09%*
Powercor (2021-26)	5.93%	6.26%	4.02%	2.85%	2.22%	*4.26%*
United Energy (2021-26)	5.86%	3.29%	2.28%	2.07%	1.28%	*2.96%*
Electricity transmission:						2.65%
Ausgrid (2019-24)	3.13%	2.76%	1.54%	2.51%	2.16%	*2.42%*
AusNet (2022-27)	1.45%	2.27%	2.12%	0.97%	-0.05%	*1.35%*
Directlink (2020-25)	0.95%	1.98%	0.93%	0.38%	-0.63%	*0.72%*
ElectraNet (2018-23)	3.13%	6.24%	5.78%	13.31%	9.97%	*7.69%*
Evoenergy (2019-24)	-1.71%	2.13%	-0.26%	-1.27%	-1.31%	*-0.48%*
Powerlink (2022-27)	0.38%	0.56%	-0.30%	-0.44%	-0.50%	*-0.06%*

TasNetworks (2019-24)	2.90%	2.35%	1.97%	1.37%	0.77%	*1.87%*
TransGrid (2018-23)	2.27%	4.03%	7.75%	17.31%	10.79%	*8.43%*
Murraylink (2018-2023)	0.96%	8.05%	5.64%	-1.02%	-3.83%	*1.96%*

Source: AER.

While Table 12 suggests that our simple trailing average approach is likely to remain appropriate for regulated businesses in most cases, there could be significant departures from the zero NPV conditions where large investments are undertaken as part of the AEMO Integrated System Plan (ISP). For example, TransGrid's Project EnergyConnect is estimated to have new capex of around 1.8 billion, while its RAB in 2020 was around 6.6 billion.[249] This implies this project will increase its RAB by around 27 per cent of its 2020 RAB.

This poses the question whether – and if so, how – we should account for the large capital expenditures under the ISP in our regulatory approach to the return on debt.

Figure 11 above illustrates that currently the regulatory return on debt allowance is above the prevailing cost of debt. Therefore, a business facing similar risk to that of the benchmark firm would receive more than the costs associated with raising new debt at the prevailing rate. In fact, any such entity raising significant new debt at the prevailing rates would prefer to remain under the simple trailing average return on debt approach for as long as the corresponding allowance is above the prevailing cost of debt. This situation would then likely result in consumers paying more than necessary for the provision of the regulated services.

TransGrid submitted that it raised debt on its aggregated balance sheet, and it did not issue discrete tranches to finance particular components of capital expenditure. TransGrid further submitted that the fixed costs associated with the issuance of significant debt tranches meant that it was not viable for firms to issue a new tranche of debt to match the annual capital expenditure for a particular year.[250]

We have access to the debt issuance information we obtained for TransGrid and other non-government regulated networks via regulatory information notices (RIN) process in September 2021. However, due to the confidential nature of the provided data we cannot share observations about debt raising practices of any particular business. Therefore, we restrict our commentary to what can be deduced based on publicly available information and finance theory.

Unless a regulated business knows well in advance about a new significant project it is to undertake, it would not be able to raise debt to support the new project smoothly over a long period of time. Further, finance theory suggests that even when a business is aware of a large new project upcoming in the next ten years, it would be unlikely to increase its debt balances well in advance in anticipation of the project commencement. A more plausible scenario would be for a business to raise capital (either debt or equity or both) closer to the point of time it is required. This scenario would likely lead to a mismatch between the business's efficient debt financing costs and the regulatory return on debt allowance.

Given that we are currently experiencing historically low interest rates, it is possible that interest rates, including the required rate of return on debt, will increase in the future. In that scenario, it is possible that the current (spot) cost of debt will increase above a simple trailing average. If this occurs a regulated business that is required to invest in a large-scale new

[249] AER, *TransGrid and ElectraNet – Project EnergyConnect contingent project*, May 2021.
[250] TransGrid, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 6.

project, or projects, would not have a reasonable opportunity to recover their debt financing costs if they were to raise debt at the prevailing rates. The CRG contemplated this scenario in the recent submission:[251]

> This is important as at some point in time, interest rates will begin to rise, and the trailing average will be below the current cost of debt… if an NSP has a very uneven capex profile there is some risk of a mismatch. It appears that the AER is seeking to protect against this outcome by proposing to capex-weight the trailing average. The CRG notes that this is unlikely to preclude NSPs raising issues with the trailing average approach when interest rates do rise, but it may assist the AER in rebutting these issues. If the AER did switch back to an on-the-day approach at this point, consumers would lose out, having not fully benefited from the on-the-day approach during the period of very low interest rates. Accordingly, if the capex-weighting approach does assist in maintaining the trailing average approach into the future, then that would be a positive outcome for consumers.

The above observations on potentially material departures from the NPV = 0 condition and incentives to invest in large projects suggest we need to examine the situation and consider alternatives to a simple trailing average approach. These alternatives should accommodate the circumstances where an existing business plans a significant new investment – or when new entries into the market occur.

An alternative approach considered in this paper is weighting the elements of the trailing average so that the return on debt (post transition) is defined by the following formula:

$$k_t^d = \sum_{j=t-9}^{t} w_j * R_j$$

Where:

k_t^d = The allowed return on debt for the regulatory year t

R_j = The on the day rate of return on debt in any regulatory year in the series j

w_j = The weight applied to on the day rate of return on debt in regulatory year in the series j

j = Indexes a series of regulatory years for summation

We discuss some alternative ways of setting the weights in a weighted trailing average in the next section. For now, we point out that these weights are contemplated to be firm-specific. This raises a related question as to what represents a benchmark and whether the current benchmark definition is broad enough to accommodate for the 'special case' of large ISP projects.

When we considered using a weighted trailing average in our 2013 rate of return guideline process, we noted that doing so would imply that the weights used would be different for each individual service provider. As such, this represents a departure from the existing benchmarking approach.[252] Stakeholders raised similar concerns in the recent round of submissions and suggested that an approach based on firm-specific capex forecasts would be a step away from the AER's one generic benchmark approach.[253] They suggested that

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251 CRG, *Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers – Volume 1: Technical*, 3 September 2021, p. 111.

252 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 90.

253 TransGrid, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 6; SAPN, CitiPower, Powercor, United Energy, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 6; NSG, *Response to AER RORI Omnibus papers*, 3 September 2021, p. 3.

the generic benchmark efficient allowance should not be changed without very careful consideration of the implications of moving towards a more firm-specific form of regulation.[254]

Further, the CRG submitted that the scenario with the significant step-up in the capex programs is only applicable to some TNSPs. The CRG further noted that no evidence has been presented to suggest that equivalent scenarios are expected to affect distribution Network Service Providers (DNSPs) or gas Network Service Providers (NSPs). So, to the extent the change is warranted, a more tailored approach may be more appropriate. For example, a threshold of 'lumpiness' of capex could be predefined in the Instrument so that it can be applied mechanically.[255]

This approach may be worth exploring, but there are some issues under the current energy laws. Firstly, the rate of return methodology is subject to some constraints. The rate of return methodology must be the same across businesses.[256] Further, it must apply automatically and not be dependent on the exercise of any AER discretion.[257] A concern with this approach is, it could be seen as applying different methodologies to different businesses. Our view is that provided this predefined approach is included in the Instrument in a way that it could apply automatically to any service provider in the NEM, then it would be compliant with these constraints. We would welcome stakeholder comments on this view or whether the NEL should be amended to accommodate this approach expressly.

Another concern is that the rate of return Instrument can only generate one rate of return for a business[258] and each business can only have one RAB.[259] Potentially, the rate of return methodology could be written in a way which does this mathematically and still applies one rate of return to a single RAB. However, this would result in a complex formula. It may be beneficial to explore whether the NEL could be amended to accommodate this approach.

We would like to hear further stakeholder views and consider evidence presented by experts at the Concurrent Evidence Sessions on whether a more tailored approach to determining the return on debt for regulated firms with temporarily large capex is appropriate. We are also interested in how such an approach would work under the current law and given the mechanistic nature of the RORI. In particular, if we were to set up a threshold of capex 'lumpiness' as proposed by the CRG, what such a threshold would look like. There is also a further question of whether setting up a threshold would present some gaming opportunities for businesses with capex programs that take them close to this trigger.

4.4.2 Weighted trailing average: alternatives

As we note above, one way to address the divergence from the zero NPV condition due to temporarily high capex is to vary the weights within the trailing average to reflect the expected (or actual) debt issuance dynamics.[260] In our 2013 Rate of return guideline we examined three alternative weighting schemes:

- weights based on the actual debt issuance data
- weights based on the actual changes in RAB, adjusted by the benchmark gearing

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254 TransGrid, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 6; SAPN, CitiPower, Powercor, United Energy, *Response to AER Rate of Return Omnibus papers*, 3 September 2021, p. 6.

255 CRG, *Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers – Volume 1: Technical*, 3 September 2021, p. 111.

256 NEL, s18J(2)(a).

257 NEL, s18J(2)(b).

258 NEL, s18I(1)(2).

259 NER, cl. 6.5.1(a).

260 Another option may be to adopt the on the day approach for businesses with high capex. We discuss it further below.

- weights based on the debt issuance assumptions in the PTRM.[261]

Our considerations with respect to the three alternatives remain largely consistent with our 2013 analysis:[262]

- The return on debt allowance which relies on the actual value of a parameter that the service provider can influence is generally not consistent with incentive–based regulation. For example, if weights are based on the actual debt issuance data, this may interfere with the regulated businesses' decisions regarding the optimal timing of debt issuance.
- The first two approaches would need to be implemented via a retrospective (NPV-neutral) true up, since such weights can only be computed after the parameters they are based on have been observed. This would increase the complexity of the estimation process. This also could potentially result in higher price volatility for consumers and cash flow volatility for investors.
- Whether or not the third approach would be effective in minimising the mismatch would depend on the quality of the PTRM forecasts. Service providers may not (and indeed, often do not) follow their forecast PTRM profile. Moreover, there are circumstances when it might be efficient for a service provider to do so.
- All three approaches would be relatively complex to implement (as compared to a simple trailing average).

In our draft debt omnibus working paper we expressed our initial view that it would be better to use weights based on forecast capex (and hence debt issuance assumptions in the PTRM) so that the weights can be set in advance.[263] The submission from Ausgrid supported this view, and we have not received any new evidence to the contrary.[264] Therefore, our preliminary position is that if a weighted trailing average was to be adopted, it should be based on the debt issuance assumptions in the PTRM, that is, forecasts rather than actual data.

We note that while we referred to 'capex weighting' in our draft working paper, the weighting schemes we considered rely on either actual debt issuance, actual changes in RAB adjusted by the benchmark gearing, or the debt issuance assumptions in the PTRM. Therefore, it would be more accurate to refer to weights as based on debt issuance, debt balances, or RAB, rather than based on capex. CRG made a similar observation in its recent submission:[265]

> The AER is proposing non-equal weightings, based on each year's forecast or actual capex. It appears that the actual weightings will be based on each year's RAB adjusted for forecast or actual capex, rather than the capex itself. This is logical, given that NSPs need to finance their entire RAB, not just new expenditure. If forecast capex is used, the weightings could be set at the start of the revenue determination period, while if actual capex is used, then ex post adjustments will be required each year. For simplicity, though, this approach will be referred to as "capex-weighting".

We have adjusted the language in the current working paper to reflect this observation and refer to weights based on either debt issuance or debt balances interchangeably.[266] For avoidance of doubt, this does not constitute a change in the basic types of weighting schemes we consider, but simply a change in terminology.

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261 AER, *Explanatory statement: Rate of return guideline*, December 2013, p. 115.

262 AER, *Explanatory statement: Rate of return guideline*, December 2013, p. 115–119.

263 AER, *Draft debt omnibus paper*, July 2021, p. 24.

264 Ausgrid, *Submission Debt Omnibus*, 3 September 2021, p. 7.

265 CRG, *Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers – Volume 1: Technical*, 3 September 2021, p. 110.

266 As debt balances can be derived from a series of new debt issuance and vice versa.

Dr Lally considered alternative return on debt approaches for a regulated business that is a new entrant or an incumbent with temporarily high capital expenditure.[267] Dr Lally noted that an existing regulated business that is about to undertake substantial capex (relative to RAB) could be viewed as a portfolio comprising an existing regulated business with relatively stable RAB and a new entrant. Suppose the regulator has chosen to apply a (simple) *N*-year trailing average to existing regulated businesses with moderate capex. Suppose also that the difference between the prevailing and trailing average return on debt is substantial. Then the regulator should initially apply the on the day approach to the borrowing induced by new capex and transition towards a (simple) *N*-year trailing average approach over *N* years. They should continue applying the trailing average approach to rest of the firm's debt.[268]

It can be shown that the approach described by Dr Lally is mathematically equivalent to a weighted trailing average. For instance, the QTC provides an example of a weighted trailing average approach that is identical to applying an on-the-day transition to the annual increases in the PTRM debt balance and combining the corresponding benchmark debt yields on new debt with benchmark debt yields that apply to the existing PTRM debt balance.[269]

Representing a weighted trailing average as a combination of a simple trailing average and an on the day transition for the annual PTRM debt increases (as done by Lally and the QTC) usefully illustrates the following idea. If for most businesses most of the time RAB is relatively stable, then the deviations of the trailing average weights from the simple weights would be largely transitory in nature. If we then further make the weights conditional on the size of new capex – consistent with the CRG 'threshold' proposal, then the return on debt allowance for most businesses most of the time would be essentially a simple trailing average allowance.

An alternative approach to achieve a similar outcome would be to apply a weighted trailing average only to TNSPs. This more targeted approach may be justified, given the uncertainty around future transformation of the energy sector and the level of investments required by TNSPs to facilitate this. In this case we would not introduce a threshold and avoid the implementation complexity and possible gaming associated with it.

Therefore, at this point we are interested in further exploring the following four options:

- **Option 1:** Maintain the current (simple trailing average) approach.
- **Option 2:** Weighted trailing average that applies to every regulated business. Weights are based on the debt issuance assumptions in the PTRM.
- **Option 3:** Weighted trailing average only starts to apply when a large increase in the RAB (and therefore debt issuances) is forecast. We would need to set a threshold for the shift to a weighted trailing average. Once the weighted trailing average is triggered, weights are based on the debt issuance assumptions in the PTRM.
- **Option 4:** Weighted trailing average that applies to all TNSPs. Weights are based on the debt issuance assumptions in the PTRM.

As discussed above, we are interested in stakeholders' and experts' views on how (and whether) Options 3 and 4 could be implemented. We are also interested in their views on what would be an appropriate threshold level. Further, we are interested to hear experts' and stakeholders' opinions on the relative merits of the four options and whether a better option of addressing our concerns exists.

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267 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, 9 April 2021, pp. 44, 55.

268 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, 9 April 2021, pp. 44, 55.

269 QTC, *Submission to the draft debt omnibus paper*, 3 September 2021, p. 1.

We consider that the threshold in Option 3 would be largely informed by having regard to the likely materiality of the mismatch between the return on debt allowance and the efficient firm's debt costs arising due to new capex. It is likely that for most regulated businesses most of the time a simple trailing average would remain an appropriate approach. In other words, the thresholds would be high enough to be triggered only very occasionally.

When comparing the four options, the consideration of materiality should be balanced against the relative complexity of weighted trailing average. Another relative consideration is whether our approach would be sustainable – that is, whether it would remain appropriate if the economic conditions or circumstances of the regulated businesses were to change. We examine one example of such change above, with respect to a potential reversal in the interest rate dynamics.

5 Equity beta

5.1 Introduction

Our current approach for determining the return on equity as set out in the AER's 2018 Instrument is that we use the Sharpe-Lintner CAPM (SL CAPM) as our foundation model for estimating return on equity. The SL CAPM specifies that:

return on equity = risk free rate + beta * market risk premium.[270]

Under the SL CAPM, beta measures an asset's systematic risk (it is the covariance between the expected return on the risky asset and the market portfolio divided by the variance of the market portfolio[271]). Investors expect to be compensated for bearing systematic risk as it cannot be diversified away. In contrast, non-systematic risk can be diversified away and is not compensated under the CAPM.

Under the current approach, we use a comparator set of nine Australian energy firms for estimating the beta for the benchmark business that provides the Australian regulated energy network services. The full list of the comparator set is shown in the table below.

Table 13 List of AER's comparator firms

Firm (ASX ticker)	Time / trading period	Sectors
AGL Energy Limited (AGK)	January 1990 – October 2006	Electricity, Gas
Alinta (AAN)	October 2000 – August 2007	Gas
APA Group (APA)	June 2000 – present	Gas, Minority interest in other energy infrastructure
DUET Group (DUE)	August 2004 – April/May 2017	Electricity, Gas
Envestra Ltd. (ENV)	August 1997 – October 2014	Gas
GasNet (GAS)	December 2001 – November 2006	Gas
Hastings Diversified Utilities Fund (HDF)	December 2004– November 2012	Gas
Spark Infrastructure Group (SKI)	March 2007[272] – present	Electricity, Gas
AusNet Services (AST), formerly SP AusNet (SPN)	December 2005 – present	Electricity, Gas

Source: AER analysis

We note that some of the comparator firms have been gradually de-listed over time.

5.1.1 2018 Instrument approach

During the 2018 Instrument review, there were three live firms (APA, Spark Infrastructure, AusNet) in the comparator set. We estimated beta values for each firm in the comparator set and a number of portfolios consisting of a combination of various firms in the comparator set.

[270] When we refer to beta throughout the chapter, it generally means equity beta. Depending on the assumption of the gearing ratio, a benchmark firm's estimated beta value may vary.

[271] Copeland and Weston, *Financial theory and corporate policy*, 3rd edition, 1992, p.198.

[272] The SKI data is available from December 2005, but the data prior to March 2007 reflects stapled securities traded as instalment receipts—these instalments require further leverage adjustment and makes beta estimation difficult.

Their beta values were estimated using the generally adopted ordinary least square (OLS) method with three different estimating periods (longest period available, longest period available post technology bubble excluding the global financial crisis, and the most recent 5-year period).[273]

These estimates informed our decision on the beta value we set for the benchmark business that supplies the Australian regulated energy network services. In particular, the 2018 Instrument sets a single beta of 0.6 for both electricity and gas network businesses. When determining the beta value, we placed most weight on estimates from the longest period available. The beta estimates derived from the comparator set clustered around 0.5-0.6.[274]

We note that the approach we adopted in the 2018 decision was broadly consistent with the overall approach for the AER's 2013 decision, which set a beta of 0.7. The broad level of consistency in our approaches over time underlined our consideration of promoting stability and predictability.

5.2 What is the issue?

More recently, we have prepared a number of working papers as part of our '*Pathway to the 2022 Rate of Return Instrument*', which identified and sought stakeholders' views on some of the key issues for the 2022 Instrument review. This includes the '*Equity omnibus draft working paper*', which considered our proposed approach for estimating equity beta in the 2022 Instrument. We have received submissions in response to our draft working paper. They expressed views on the key issues in relation to equity beta, including:

- Given the small number of live firms in the comparator set, should the AER take into account other information, in particular estimates of international energy firms, to inform its decision?
- Should the AER place more weight on contemporary data and shorter-term estimates and less weight on de-listed firms (or remove them from the comparator set)?
- Should the AER determine a separate beta for gas networks to account for any differences in their characteristics when compared with the electricity networks (e.g., potential stranding risk)?
- Should the AER take into account 'low beta bias' in its decision?

The concern around the declining number of live firms is underlined by recent take-over activities for Spark Infrastructure and AusNet, two of the three remaining live firms in the comparator set.

At the same time, these take-over bids appear to indicate there is a strong interest in the world capital market for the equity of Australian regulated energy networks.

On the issue of setting a separate beta for gas networks, a number of submissions noted that gas networks face different risks to electricity networks particularly given governments' policies in relation to climate change and decarbonisation.

In the section below, we set out our proposed position on these issues.

[273] Under the AER's approach, these raw estimates were de-levered and re-levered to the AER's gearing parameter (i.e. 60 percent). We note that the ENA's submission to our *Draft equity omnibus paper* noted that this is the AER's standard approach.

[274] AER, *Rate of return instrument, Explanatory Statement*, December 2018, p.189-190.

5.3 Proposed position

Preliminary position

Our preliminary position is that we should maintain the 2018 Instrument approach to determining beta in the 2022 Instrument. This includes:

- placing most weight on the longest period estimates
- retaining the existing comparator set and not using international energy firms, domestic infrastructure firms or other regulators' decision to inform our estimate range for beta
- continuing to set a single rate of return for gas and electricity network businesses
- not adjusting equity beta or the rate of return for a 'low beta bias'.

Open position

We acknowledge that it is likely that the number of live comparator firms may decline further in future and we need to consider suitable approaches to lay the foundation for future reviews. In that context, we would be open to considering:

- appropriate approaches that gradually place less weight on the de-listed firms
- ways in which other available information such as international energy firms and domestic infrastructure firms may be used to inform our decision on beta.

Further, to the extent that regulated gas networks may face material stranding risks now or in future, which could lead to outcomes that are inconsistent with the NEO and NGO, we consider that it may be appropriate to consider this issue under the broader regulatory framework (e.g., through adjustments to cash flow and/or depreciation).

We discuss the reasons for our proposed position in the section below.

5.4 Reasons for proposed position

The key issues raised in the submissions are broadly consistent with the range of issues that have been considered in the past including the AER's 2013 and 2018 rate of return reviews.

More recently, we have commissioned a number of expert reports (Partington & Satchell[275], Economic Insights[276]) as part of our working paper series leading up to our 2022 Instrument review.

Our proposed position in the final working paper is therefore formulated based on careful consideration of a range of information and evidence, including:

- Stakeholder submissions in response to our working papers
- Expert reports commissioned by the AER and stakeholders
- The current market environment, including the Covid pandemic and the recent take-over activities in relation to Spark Infrastructure and AusNet, and its implication for the rate of return
- Our considerations of these issues in the previous decisions.

We note that a key objective of ours, as in the previous reviews, is to promote stability and predictability of our regulatory approach, which are highly valued by stakeholders. We

[275] Partington & Satchell, *Report to the AER: Alternative Asset Pricing Models*, June 2020

[276] Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses*, June 2021

consider this would promote efficient investment in and operation and use of the regulated energy network infrastructure and, in turn, promote the NEO and NGO.

Some stakeholders have echoed the importance of stability and predictability in their submissions. The CRG noted that one of its five high level principles is 'there should be a high bar for change'.[277]

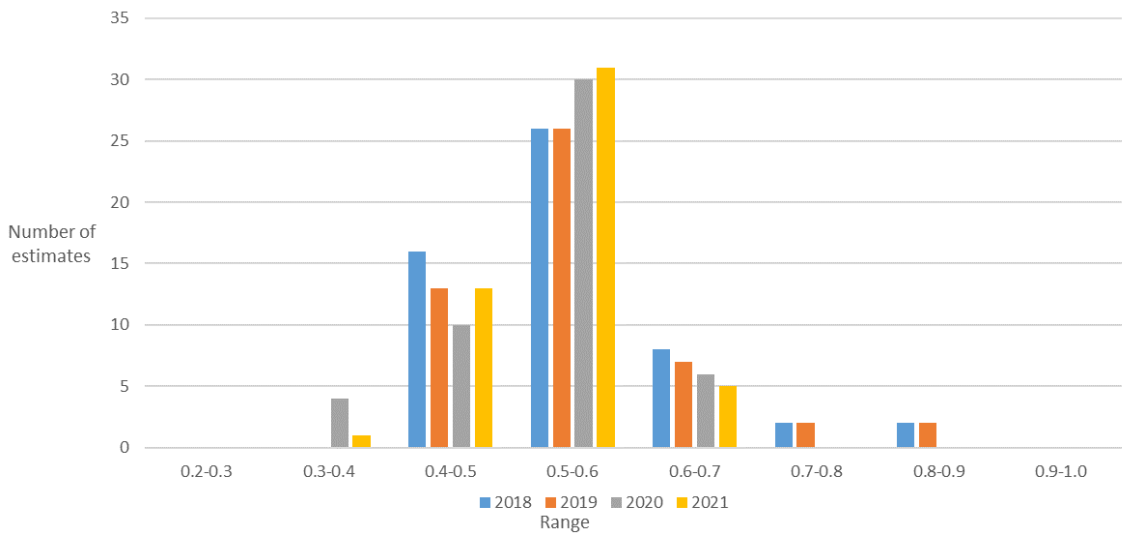
When considering whether any changes to our current approach are warranted, we are keen to ensure that there is clear evidence suggesting our current approach is no longer appropriate or fit for purpose and that adopting an alternative approach would lead to a better outcome with respect to NEO and NGO.

5.4.1 2021 update of beta estimates of the comparator set

Since 2018, the AER has undertaken to provide an annual update on its rate of return data series. We have recently published the rate of return 2021 annual update.[278] Some of the results on beta is briefly discussed below, which informs our consideration of relevant issues.

The figure below shows the distribution of beta estimates from the existing Australian comparator set. It shows that beta estimates remain closely clustered around a range of 0.5-0.6, which is consistent with our observation in the 2018 Instrument.

Figure 12 Distribution of re-levered weekly beta by range (OLS, all periods)



Source: Bloomberg, AER analysis

Further, as noted previously, we placed the most weight on the longest-period estimates in the 2018 Instrument. The table below shows that the longest-period estimates from the three different portfolios consisting of the whole comparator set, the still listed firms (APA, Spark Infrastructure, and AusNet), and the still listed majority regulated firms (Spark Infrastructure and AusNet) remain relatively stable. In contrast, their most recent 5-year estimates have shown notable declines since 2018.

[277] CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1: Technical*, September 2021, p.22.

[278] AER, *Rate of return, Annual Update*, December 2021.

Table 14 Whole comparator set compared to listed comparators (OLS, weekly) (June 2000 to August 2021)[279]

Equal and value weighted portfolio estimates	Whole comparator set [P1 to P8]	Still listed firms (APA, SKI, AST) [P7]	Still listed majority regulated firms (SKI, AST) [P8]
Longest period			
2018 review	0.42 - 0.67	0.52 - 0.55	0.42 - 0.43
2019 update	0.42 - 0.68	0.53 - 0.56	0.42 - 0.43
2020 update	0.40 - 0.68	0.51 - 0.54	0.40 - 0.41
2021 update	0.40 - 0.68	0.51 - 0.55	0.40 - 0.41
Post tech boom and excl. GFC			
2018 review	0.50 - 0.67	0.64 - 0.67	0.52 - 0.53
2019 update	0.50 - 0.69	0.64 - 0.68	0.54 - 0.55
2020 update	0.47 - 0.69	0.60 - 0.62	0.47 - 0.47
2021 update	0.47 - 0.69	0.59 - 0.62	0.47 - 0.47
Recent 5 years			
2018 review	0.49 - 0.88	0.81 - 0.88	0.70 - 0.72
2019 update	0.69 - 0.89	0.83 - 0.89	0.73 - 0.74
2020 update	0.44 - 0.69	0.59 - 0.68	0.44 - 0.44
2021 update	0.37 - 0.70	0.53 - 0.59	0.37 - 0.38

Source: Bloomberg, AER analysis

5.4.2 We should continue to place most weight on beta estimates from the longest period available

Our preliminary view is that we should continue to place most weight on the longest-period estimates as this can lead to a more robust and statistically reliable equity beta estimate and better account for the cyclicality in factors affecting empirical equity beta estimates.

Our draft working paper proposed that we use beta estimates from the longest period available and the most recent 5-year period, with most weight given to the longest period.

On a high level, there appeared to be broad support from both energy networks and consumer groups for using long-term beta estimates to inform our decision:

- The ENA considered that short term estimates contain statistical noises and can be significantly impacted by once-off events. It proposed the use of 10-year beta estimates.[280]
- The CRG noted that it strongly supports the use of long-term estimates of beta for the purposes of determining the allowed rate of return. It considered that doing so is

[279] The results for the 2020 update have been revised due to an anomaly in SKI data.

[280] ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.76.

consistent with the view that beta appears to be broadly constant and that short-term fluctuations do not bear significantly on investors' expected returns over the life of their long-term investments.[281]

The NSG noted however that the equity beta estimate should reflect contemporary risk and be adjusted in line with changes in systematic risk.[282]

5.4.2.1 The systematic risk of the Australian regulated energy networks is likely stable over the long term

A key reason for our proposed approach of using long-term estimates is that we consider the beta for the benchmark business that provides the Australian regulated energy network services is likely to remain relatively stable over the long term.

This view is shared by Economic Insights, which noted in its report that:

> "For the regulated network energy businesses we consider that the regulatory arrangements contain a number of features that greatly limit the systematic risk that would otherwise apply in the absence of the regulatory protection and the natural monopoly type, essential service type characteristics and are most likely to lead to a high degree of stability for the equity beta."[283]

It further noted that:

> "Recognising that economy-wide shocks are in general likely to impact on the market risk premium much more than industry betas, we consider that the betas of network energy businesses would not change much over time and particularly in the period since the regulatory arrangements described in this report have applied."[284]

We recognise there is a trade-off between increased statistical robustness from using long-term data with more observations and the risk of changes in beta in longer periods potentially as a result of structural break. However, as Economic Insights has suggested, given the natural monopoly characteristics of the Australian regulated energy networks and the stability of and the protection from the Australian regulatory framework, it is likely that their systematic risk is relatively stable over long periods of time.

Further, the empirical evidence that we have also appears to support this. We note that Henry's original studies for the AER found evidence of long-term stability for beta for the Australian firms in the existing comparators.[285]

The ENA's submission noted that "we never observe the true systematic risk of an energy network – we can only ever observe beta estimates."[286]

We acknowledge that empirical evidence may carry statistical noises and true beta is unable to be observed directly. We will therefore need to exercise a degree of judgement on the question of the long-term stability of beta. Our view that the systematic risk of the benchmark business supplying the Australian regulated energy network services is relatively low and stable is reinforced by the fact that the revenues and share prices of the Australian regulated energy businesses have shown relatively high degree of stability during recent times of

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281 CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1: Technical*, September 2021, p.89-90.

282 NSG, *Response to AER RORI Omnibus papers*, September 2021, p.2.

283 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses*, June 2021, p.vi.

284 Ibid., p.vii.

285 Olan Henry, *Estimating Beta*, April 2009, p.48-49.

286 ENA, *Submission to AER's review of the rate of return guidelines – response to draft guideline*, September 2018, p.86.

market volatility. A fundamental reason that these firms have high-level stability in their revenues and cash flows is because they have strong natural monopoly characteristics and operate in a stable regulatory framework.

We note that the beta estimates from our longest-period available comparator set continue to be relatively stable despite events such as the Covid-19 and the recent take-over bids (see Table 14).

Further, as Sapere noted in its report for the CRG:

> "In the absence of clear evidence for rational variation in beta through time, then acting as if beta is constant may well be a reasonable working assumption for regulators."[287]

This view is shared by Economic Insights, which noted that "provided there is not statistical evidence of beta instability the longest time period would provide the most reliable estimates for beta."[288]

In the absence of robust empirical evidence suggesting otherwise, we remain of the view that the systematic risk of the Australian regulated energy networks is likely to be relatively stable in the long term.

5.4.2.2 We should continue to place most weight on the longest period available data

In the 2018 Instrument, our approach was to place most weight on the longest period available data, while we have also constructed estimates for the longest period available post the technology boom excluding GFC and the most recent 5-year data.

In our draft working paper, we noted that we could use both the longest period and the most recent 5-year data with most weight being placed on the longest period available data.[289]

As noted above, there was broad support from stakeholders (e.g. ENA, CRG) for using long-term estimates. The majority of the submissions did not support use of 5-year estimates.

The ENA and a number of network businesses proposed that we use 10-year estimates rather than 5-year estimates. The ENA noted that "beta estimates using 5 years of data tend to be unstable over time, more indicative of estimation error than changes in the true level of systematic risk."[290] It considered that "the trade-off between sample size (statistical precision) and recency (relevance) might be best achieved by considering estimates computed over a 10-year period rather than periods of 2-5 years".[291]

We note that in the past, the ENA had proposed that the AER should place more weight on short-term data as they are more reflective of current market conditions. In the 2018 Instrument review, when commenting on the AER's beta estimates, the ENA noted that "when the most recent data are included, the beta estimates are materially higher", and that the AER's estimates "largely rely on including data that are more than ten years old and excluding data that are less than five years old". It considered that approach is "difficult to

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287 Sapere Research Group, *Systematic risk and the role and measurement of equity beta: A report to the AER Consumer Reference Group*, September 2021, para.V.

288 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses*, June 2021, p.ix.

289 AER, *Rate of return, Equity Omnibus, Draft working paper*, July 2021, p.43.

290 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.76.

291 Ibid., p4.

reconcile with the requirement to produce an estimate that is commensurate with the prevailing conditions in the market."[292]

Brattle Group's recent report for the AER recommended that 2-5 year estimates are more reflective of current market conditions.[293]

The NSG's submission noted that the AER should give greater weight to more contemporary data, less weight to the longest-dated series and remove obsolete data points.[294]

We note that our most recent 5-year estimates were typically lower than that from the longest-period available, and this pattern has included data from the Covid pandemic. The ENA's submission showed that short-term beta estimates (e.g. 5 year) of the three remaining live firms of the comparator (Spark Infrastructure, AusNet, and APA) have declined significantly since the beginning of 2020, while their 10-year estimates are relatively more stable.[295]

We agree with the ENA's view that short term data is likely subject to significant statistical noises and impact of once-off events. However, the more recent data has also highlighted the stability of the businesses we regulate in times of material disturbances.

We also note that some stakeholders also did not support use of short-term data. The CRG noted that "determining a weighting factor for the most recent 5-year estimate is an unavoidably arbitrary matter for regulatory judgment and therefore, represents another opportunity for endless dispute by networks and investor groups." Further, it considered that such an approach is inconsistent with its own arguments and no theoretical nor statistical justifications for considering short-term estimates of beta has been provided.[296]

Given the above, our preliminary view is to maintain our approach of placing most weight on the longest period available estimates, but also recognising that short-term estimates also have some values.

We note that the ENA and network businesses proposed use of 10-year estimates. We acknowledge that both the longest period available and 10-year estimates would likely provide more robust estimates than short-term data. However, there does not appear to be clear advantage of switching from the former to the 10-year estimates as proposed by the ENA, particularly given our view that systematic risk for the benchmark business is likely to be stable in the long term. We note that the ENA submission does not appear to analyse differences between its proposed approach of using 10 year estimate with our current approach.

We also note that some stakeholders (e.g., CRG, MEU[297]) were supportive of maintaining our current approach, which includes placing most weight on the longest period available data.[298] Given there is a lack of clear benefits of switching to the use of 10-year estimates, our preliminary view is we should maintain our current approach, which will promote stability and predictability.

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[292] ENA, *Submission to AER's review of the rate of return guidelines – response to draft guideline*, September 2018, p.89.
[293] The Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020, p.38.
[294] NSG, *Response to AER RORI Omnibus papers*, September 2021, p.2.
[295] ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.80 and 84.
[296] CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1: Technical*, September 2021, p.90.
[297] MEU, *Rate of return omnibus papers on 2022 RoRI, response to draft working papers*, p.12.
[298] Ibid., p91.

5.4.3 We should continue to use the existing comparator set when estimating equity beta

In the 2018 Instrument, we continued to use the existing comparator set of nine Australian energy firms to estimate beta. At that time, six firms had been de-listed and there were three live firms (Spark Infrastructure, APA, and AusNet).

More recently, Spark Infrastructure and AusNet have been subjected to take-over bids. This means that the number of live firms may potentially decline to one firm in future (APA).

Some stakeholders (in particular the energy network businesses) had in the past suggested that the existing comparator set is limited and insufficient and the AER should expand the comparator set and take into account other available information.

The ENA noted that our 2018 Instrument set a beta that is lower when compared with international data and other regulators' decisions.[299] It considered that the AER should take into account all available evidence including international energy firms, domestic infrastructure firms, and other regulators' decisions when setting the beta. They also considered that the de-listed firms should be removed from the comparator set.[300]

In contrast, submissions from consumer and retailer groups (e.g. CRG, MEU and AEC) considered our current approach remains appropriate.

Having considered the submissions and expert advices, our preliminary view is that it remains appropriate to use the existing comparator set for the 2022 review. We acknowledge that it is possible that the number of the live firms may decline further in future, and it may be useful to lay the foundation by considering how we address this issue in the context of future reviews.

Below we discuss the following issues in more detail:

- Suitability of international energy firms as comparators
- Use of other regulators' decisions to inform the AER's decision
- Suitability of domestic infrastructure firms as comparators
- Weight given to the de-listed firms

5.4.3.1 Should we use international energy firms as comparators?

In the 2018 review, we decided not to include international energy firms in the comparator set or use them to inform a point estimate. This was primarily because international energy firms are different to a benchmark efficient service provider supplying Australian regulated energy service and we cannot reliably quantify and adjust for their differences.

We instead used international data as a cross check for our empirical estimates to inform whether the equity beta for an efficient firm in the supply of Australian regulated energy services would likely be above or below that of the market (1.0).

Our concern about using international firm included:

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299 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.88-89.

300 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.78-79.

- International firms do not operate within Australia, and differences in regulatory framework, the domestic economy, geography, business cycles and other factors are likely to drive different equity beta estimates.
- Further they may not have the same structure as an efficient firm supplying Australian regulated energy network services. For example, some US businesses identified as potential comparators are vertically integrated and engage in other areas of energy industry with some even operating in other industry sectors (e.g. telecommunications). It is therefore difficult to quantify the impact of these factors on beta estimates.

We consider that these conceptual and practical issues associated with using international data remain a significant challenge. Further, the submissions we received which supported use of international data did not propose a practical, transparent, and consistent methodology which would enable beta estimates from international firms to be compared with the benchmark Australian network service provider on a 'like for like' basis.

The ENA submission noted that our 2018 Instrument beta is significantly lower than beta estimates from international firms. However, it appears that the ENA did not seek to make any adjustments when comparing international data with the AER's estimates to account for potential differences in the two types of estimates due to the factors discussed above. It is therefore unclear whether the unadjusted international estimates appearing higher than the AER estimates is an indication that the AER's estimates are lower than the true beta for the Australian benchmark business.

We note that views on whether the AER should use international comparators differ among experts. While Brattle Group considered that international data should be taken into account, Partington & Satchell considered that there appear to be no justifiable economic principles involved for using international betas to augment the betas from the comparator set as there is no simple way that these estimates can be converted into Australian betas. They also raised concern that that the data issues are complex and such a procedure would be open to gaming. Economic Insights and Sapere also cautioned use of international data without making the adequate adjustments needed.

The ENA's submission noted "the QCA has recently concluded that, although there are some differences between international and domestic firms, the international firms are likely to be broadly similar in terms of their risk profile".[301]

We acknowledge other regulators may adopt the approach of using international data (e.g. NZCC, QCA[302]). However, we are not convinced that in the context of the 2022 Instrument review, the benefit of including international data in terms of increased number of observations outweighs the risk of introducing data that can potentially significantly bias our estimates.

Further, an additional issue with international data is they reflect systematic risk in in relation to the market portfolio risk in other countries rather than Australia. It would therefore be inconsistent to adopt those estimates in our foundation model – SL-CAPM, which is based on the Australian market.

Conceptually, a potential approach to addressing this is to adopt a version of international CAPMs. However, there are significant challenges with adopting an international CAPM as pointed out by Partington & Satchell.[303]

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[301] ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.89.

[302] The QCA recently decided to continue its approach of using international firms to inform its decision (see QCA's rate of return review 2021 – final report).

[303] Partington & Satchell, *Report to the AER: Alternative Asset Pricing Models*, June 2020, p.33-34

The ENA submission considered that we should not use international CAPMs, noting that some regulators that use international data do not use international CAPMs.[304]

We agree that using an international CAPM is not warranted given its significant challenges.

Finally, a number of submissions argued that there is no other choice but to include international firms as the current number of live firms is too small.[305] [306] [307] However, we consider that a small set of comparators does not necessarily justify expanding the comparator set. This view was shared by Partington & Satchell, Sadeh and the NSG previously in the 2018 review.[308] We also note that international regulators, such as the Water Services Regulation Authority (Ofwat) and the Office of Gas and Electricity Markets (Ofgem) also use a small number of domestic listed entities to estimate beta.[309]

We note that there are currently three live firms remaining for the purpose of the 2022 Instrument review, which is the same number of live firms during the 2018 Instrument review. Our preliminary analysis indicates that the longest period available beta estimates from the comparator sets (including the three live firms) have been quite stable (see Table 14). In addition, we are of the view that data from the de-listed firms remain relevant and informative (discussed in section 5.4.3.4).

Given the above, our preliminary view is that there is no sufficient evidence which would support the use of international firms as comparators for estimating beta in the 2022 Instrument review. If it is identified that the existing comparator set becomes insufficient at some point in future, we would be open to considering alternative approaches, which may include appropriate use of international energy firm data to inform our decisions.

5.4.3.2 Should we use other regulators' decisions to inform our equity beta estimates?

The ENA's submission considered that we should also take into account information from other domestic infrastructure firms as well as other regulators' decisions when setting beta.[310] It stated that our 2018 Instrument beta is lower than the value set by a number of international regulators[311] and noted that:

> "Other regulators consider different sets of evidence and exercise judgment in different ways, but the one thing in common is that they all adopt an equity beta substantially higher than the AER's 2018 figure of 0.6."[312]

Further, the ENA noted that:

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304 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.76-77.

305 Ibid., p92.

306 Jemena, *Submission on rate of return omnibus papers*, September 2021, p.7.

307 APA, *APA submission on rate of return working papers*, September 2021, p.6.

308 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p.160.

309 The Brattle Group, *A review of international approaches to regulated rates of return, Prepared for the Australian Energy Regulator*, 30 June 2020, pp. 123, 131.

310 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.72.

311 The ENA noted that there were errors in the AER's calculation in its working paper 'International regulatory approach to rate of return'.

312 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.87.

> "The ERA of WA performed the same beta estimation exercise at the same time as the AER in its 2018 Guideline. Examining the same set of evidence as the AER, the ERA of WA adopted an equity beta (re-levered to 60%) of 0.79 in its 2018 Guideline."[313]

In the AER's working paper '*International regulatory approach to rate of return*', we analysed these international regulators' decisions and observed that there are a number of factors which may have contributed to their beta estimates differing from ours.[314]

As noted previously, we consider that caution needs to be taken when comparing beta estimates from different types of businesses and/or in different jurisdictions with that of Australian regulated energy network businesses.

We note that the international regulators, whose decisions were compared with the AER's 2018 RORI include European and US regulators of various industries include energy, water, transport etc. It is therefore difficult to draw clear conclusions as the difference in beta may be driven by differences in underlying risks associated with the sectors rather than an indication of the AER's estimates being too low.

In relation to the ENA's view that in 2018, the ERA of Western Australia (ERAWA) set a higher beta than the AER having considered the same evidence, we note that the ENA did not appear to comment on the differences in the methodologies and data sets employed by the two, which may have contributed to the difference in the beta values:

- While the AER used the OLS method to estimate beta, the ERAWA adopted three other statistical approaches. It observed that the OLS method gives the lowest beta estimates.[315]
- The ERAWA appeared to prefer 5-yearestimates while the AER placed most weight on the longest period available data.[316] We observe that 5-year estimates at that time were typically higher than the long-term estimates
- It appears the ERAWA's comparator set is based on 4 firms, which is only a subset of the AER's comparator set (9 firms), notwithstanding that the two sets share the same live firms.[317]

By highlighting these differences in the methodologies adopted by the AER and some other regulators, we are not seeking to make an assessment about which approach is more appropriate. Nor do we reject any informative values that other regulators' decisions may have. Rather our aim is to emphasise that there is a need to be cautious when comparing beta estimates across industries and/or jurisdictions without making any proper adjustments to quantify the impact of inherent differences in the circumstances in which other regulators' decisions were made.

Given these issues, our preliminary view is that we should not use other regulators' decision to directly inform our beta estimates. Having said that we are open to considering using other regulators' decisions as a cross check in a broader context (discussed in chapter 6).

313 Ibid., p.89.
314 AER, *International regulatory approach to rate of return*, p.27.
315 ERA Western Australia, *Final Gas Rate of Return Guidelines Explanatory Statement, Meeting the requirements of the National Gas Rules*, December 2018, p.221.
316 Ibid., p.228.
317 Ibid., p.217.

5.4.3.3 Should we include domestic infrastructure firms as comparators?

The ENA submission also considered that we should use other domestic infrastructure firms to inform our decision. We consider that this would entail some of the same conceptual and practical issues as is the case of international firms.

We note that one of the options considered by Economic Insights for augmenting the existing comparator set is to consider a number of domestic infrastructure firms that may share similar characteristics as the regulated energy businesses.[318]

The ENA submission analysed a number of domestic transport firms (Aurizon, Atlas Arteria, and Transurban), which reported beta in the range of 1.08-1.60 (OLS estimates).[319] It noted that it did not suggest that this particular set of comparators should be adopted and given weight but that during the 2022 Instrument process, work will need to be done to update this evidence and to select the best possible set of domestic infrastructure comparators.[320]

A challenge of using domestic infrastructure firms is that they inherently face different risks when compared with Australian regulated energy network firms. However, unlike international firms, using domestic firms would likely be more consistent with our use of domestic CAPM. This, we consider, is a potential advantage of using domestic firms when compared with international energy firms, which may require using an international CAPM. As discussed previously, we do not think use of an international CAPM would be warranted.

The ENA's analysis of the three domestic transport firms suggested that their beta estimates are significantly above that of the Australian energy firms. Further they are above the market level risk (1.0). We note that the ENA did not appear to propose any methods for adjusting for the differences between the domestic infrastructure firms and the regulated Australian energy networks.

Given the above, our preliminary view is that we should not include domestic infrastructure firms as comparators for the purpose of the 2022 Instrument review. Having said that, if the existing comparator becomes no longer sufficient at some point in future, we would be open to considering alternative approaches for estimating beta for future reviews, which may include being informed by domestic infrastructure firms. We have commenced work to explore ways in which domestic firms may be used to inform our future decisions on beta.

5.4.3.4 How much weight should we place on the de-listed firms?

A number of submissions (ENA[321], NSG[322]) considered that we should remove the de-listed firms from the comparator set or gradually give less weight to those (CRG).[323]

As discussed above, we remain of the view that the beta for the benchmark energy network business is likely relatively stable over the long term. As pointed out by Economic Insights, this is due to the long-term nature of the regulatory framework under which the regulated energy firms operate and their strong natural monopoly characteristics.[324]

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318 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses*, June 2021, p.71-75.

319 ENA, *Estimating the cost of equity: Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Overall Rate of Return Omnibus Working Paper*, September 2021, p.92.

320 Ibid.

321 Ibid., p4.

322 NSG, *Response to AER RORI Omnibus papers*, September 2021, p.12.

323 CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1: Technical*, September 2021, p.91.

324 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses*, June 2021, p.vi.

Economic Insights considered that:

> The appropriateness of using equity betas for firms no longer listed depends on the likely stability of beta for if beta is considered stable the historical use of estimates of beta for firms that are no longer listed would contribute to lowering the standard errors for the beta estimates meaning more statistically precise estimates would be obtained.[325]

We agree with this view and consider that the data from de-listed firms in the comparator sets remain relevant to informing our decision.

Having said that, we acknowledge that some of the comparator firms were de-listed up to 15 years ago. As the CRG noted, it may be appropriate to consider an approach to gradually place less weight on this data in the context of future reviews. However, it is important to note that given the small number of domestically listed live firms available, and the potential issues associated with use of international firms as a substitute, the data of the de-listed firms may continue to provide useful information.

Further, we note that each de-listing arose from take-over activity. This highlights the long-term attractiveness of the energy network businesses we regulate to investors.

We are open to considering a suitable approach to potentially placing less weight on the de-listed firms in future. We note however the relative merits of de-listed firms and other available information such as international firms would need to be carefully examined. Given that the de-listed firms are better comparators for the Australian benchmark business than international firms, there is likely a trade-off between suitability and contemporaneity of the data.

5.4.4 We should continue to set a single equity beta for the regulated electricity and gas networks

We have in the past set a single beta for the regulated electricity and gas networks. In the 2018 Instrument review, we considered that gas and electricity service providers face similar regulatory frameworks and limited systematic risk as regulated natural monopolies. We noted that to the extent there are genuine risks of extreme changes in demand which present the potential of asset stranding, the regulatory regime can mitigate this by providing prudent discounts and accelerated depreciation provisions.[326]

Our draft working paper proposed that we continue to use a single benchmark beta value for electricity and gas networks.[327]

Submissions from a number of gas network stakeholders considered gas networks face difference systematic risks to the electricity networks due to their different characteristics such as penetration, volume uncertainty and income elasticity.[328] In particular they raised concern about asset stranding risk as a result of government climate policies and decarbonisation, and considered this could be addressed as part of the rate of return.[329]

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325 Ibid., p.vii.
326 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p.175.
327 AER, *Rate of return, Equity Omnibus, Draft working paper*, July 2021, p.49.
328 Jemena, *Submission on rate of return omnibus papers*, September 2021, p.6.
329 APGA, *APGA Submission to the AER Rate of return omnibus papers*, September 2021, p.13.

We note that the ENA did not appear to raise similar issues in its submission. The CRG supported our use of a single beta value and considered that the potential risk of stranding is not systematic.[330]

Having considered the evidence in the submissions, our preliminary view is we should retain our existing approach of using a single beta value across the regulated electricity and gas networks given that:

- There is no clear evidence that there is a material difference in overall systematic risks between electricity and gas networks.
- There is no robust empirical evidence suggesting part of asset stranding risk facing the regulated Australian gas networks is systematic in nature and thus should be considered in the beta parameter.

We discuss these in more detail below.

5.4.4.1 The regulated electricity and gas networks likely face similar systematic risks

Submissions from a number of gas network stakeholders considered that gas networks face different systematic risks than the electricity networks (Jemena, APGA):

- APGA noted that "although in the past it may have been appropriate to adopt a single benchmark, climate policy and the energy transition is having noticeably different effects on the risks facing gas and electricity businesses." [331]
- Jemena did not consider "the 2018 estimate of 0.6 reflects the systematic risk faced by gas networks as these businesses have lesser penetration compared to electricity networks, face greater volume uncertainty and have higher income elasticity." [332]

We have considered this issue in detail in the past (e.g. the 2009, 2013 and 2018 reviews) and have decided to use a single benchmark for the gas and electricity networks. In the AER's 2013 review, we assessed two main areas where stakeholders considered there might be differences in the risk exposure between gas and electricity businesses— demand risk and competition risk and concluded that they should not lead to material differences in the net systematic risk exposure.[333] We also noted that the results of our empirical analysis are not sufficiently precise to distinguish a measurable difference between the gas and electricity sectors.

While we acknowledge that there may be some differences between the regulated gas and electricity networks (including some of the factors identified by Jemena), we do not consider these differences are likely to result in material differences in the systematic risks they face, which would warrant setting a separate beta.

Our conceptual analysis suggests that the equity beta for regulated gas and electricity firms are likely to be similar because they are regulated natural monopolies with similar regulatory frameworks which limits systematic risk exposure.

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330 CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1: Technical*, September 2021, p.92-93.

331 APGA, *APGA Submission to the AER Rate of return omnibus papers, September 2021*, p.4.

332 Jemena, *Submission on rate of return omnibus papers*, September 2021, p.6-7.

333 AER, *Better Regulation, Explanatory Statement, Rate of Return Guideline*, December 2013, p.38.

Importantly, empirical evidence based on domestic data on any difference between gas and electricity network risks is quite limited and as Jemena noted, there is currently no 'pure play' gas firms in the comparator set.[334]

There are some recent studies using international data. Economic Insights' recent analysis based on a sample of 56 US utilities (47 electricity utilities and 9 gas utilities)[335] showed that there are no significant differences between the re-levered equity betas for electricity and gas utilities.[336]

Competition Economists Group (CEG), in a report on behalf of APGA, noted that Economic Insights' analysis on the difference between gas and electricity utilities' beta is based on dated sample set and data.[337] However the CEG did not appear to undertake a similar analysis with more recent data.

The CEG instead analysed a comparator set of US gas firms and found their beta estimates to be higher than that of the 2018 Instrument.[338] It also found that the asset betas of its comparable firms have increased in recent years.[339] Based on this, the CEG considered that asset beta for the Australian regulated gas networks should be increased from 0.24 to 0.32.[340] APGA considered that this suggest the equity beta for the gas networks should be 0.71.

As discussed in section 5.4.3.1, we should be cautious when drawing inferences from international studies due to potentially different firm characteristics, regulatory frameworks and market conditions. We note that both of the Economic Insights and CEG's studies are based on international data without any adjustments to reflect potential differences to the domestic circumstances.

We note that our own empirical analysis is based on the existing comparator set which includes gas service providers. Therefore, if there are differences in the systematic risks of electricity and gas service providers, this may already be captured in our Australian empirical estimates of equity beta. The past and current take-over activities in the regulated network businesses including gas networks also appear to suggest our approach of setting a single rate of return remain appropriate.

We note that no empirical evidence has emerged, which clearly supports setting a different beta for the regulated gas networks. Further, we consider that our conceptual analysis remains relevant, which suggests that there should not be material differences in the systematic risks for the regulated gas and electricity network. Finally, while overseas experience of setting a different beta for gas networks is mixed, some regulators do implement an uplift on the rate for return for gas networks (the NZCC has adopted a slightly higher asset beta for the gas networks – we discuss this further below).

Having said that, we are open to examining any relevant new information on this matter in the 2022 Instrument process.

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334 Jemena, *Submission on rate of return omnibus papers*, September 2021, p.7.

335 This is based on earlier study by CEG in 2013 and Frontier in 2016.

336 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses*, June 2021, p.78-82.

337 CEG, *Asset beta for gas transport businesses*, September 2021, para.37-39.

338 Ibid., para.2.

339 Ibid., para.4.

340 CEG, *Asset beta for gas transport businesses*, September 2021, p.3.

5.4.4.2 Should we consider the stranding risk issue as part of the rate of return?

A number of gas network stakeholders also raised concern about asset stranding risk as a result of government policies around decarbonation. This issue was considered during the 2018 Instrument review. At that time, we considered this does not justify setting a separate beta for the gas networks and "to the extent there are genuine risks of extreme changes in demand which present the potential of asset stranding, the regulatory regime can mitigate this risk by providing prudent discounts and accelerated depreciation provisions."[341]

In our draft working paper, we noted that standing risks due to extreme changes in demand are unlikely to be systematic in nature and should not be accounted for in the equity beta or the regulated rate of return.[342] In particular, we note that investors can seek to diversify away this risk by investing in other areas including those that will likely benefit as a result of government decarbonisation policies.

A number of submissions (e.g. APGA) argued that a component of asset stranding risk faced by gas networks may be systematic because it is driven by decarbonisation policies, which affect the entire economy.[343] NERA Economic Consulting (NERA), in a report on behalf of Jemena, presented similar views,[344] and noted that some overseas regulators (e.g. NZCC) have adopted the approach of adjusting the rate of return to account for stranding risks. The NZCC has implemented a slight uplift in the rate of return for its regulated gas networks, in recognition that part of the gas stranding risk may be systematic.

NERA noted that Dr Martin Lally in its 2016 report for the NZCC considered part of the stranding risk is systematic.

In contrast, the CRG's submission considered we should continue to set a single beta for gas and electricity networks.[345]

We previously considered the circumstances of the NZCC 2016 decision[346] which provided an uplift of 0.05 for gas beta, but did not find its argument persuasive in the Australian context for a number of reasons (discussed in our 2018 Instrument). In particular, while the NZCC viewed the low level of penetration as an indication of high expansion potential and asset stranding (deemed partly systematic), it is less relevant in the Australian market, with 56 per cent of Australia connected to gas compared to only 21 per cent of North Island.[347] Further, while the NZCC has identified a number of factors for its decision, it acknowledged that "neither of these factors are sufficient in supporting an uplift in isolation".

As noted by NERA, Dr Lally observed that:

> "The ultimate arbiter here is empirical evidence on betas, there are too few New Zealand businesses to supply such evidence, and foreign beta estimates do not support such an increment (possibly because they are drawn from markets in which some relevant features of the markets differ from those in New Zealand)."[348]

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341 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p.175.
342 AER, *Rate of return, Equity Omnibus, Draft working paper*, July 2021, p.50.
343 APGA, *APGA Submission to the AER Rate of return omnibus papers*, September 2021, p.13.
344 Jemena, *Submission on rate of return omnibus papers*, September 2021, p.11.
345 CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1: Technical*, September 2021, p.92-93.
346 NZCC, *Input methodologies review decisions: Topic paper 4: Cost of capital issues*, December 2016.
347 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p.179.
348 NERA, *Stranding risk for gas networks*, September 2021, p.11.

While we agree with Dr Lally's view that part of the stranding risk may be systematic under certain market conditions (such as that in NZ), it is unclear whether it is also the case in Australia. Further as Dr Lally pointed out, there was limited evidence that would allow the magnitude of the 'systematic' part of the stranding risk to be estimated in New Zealand.

We also face the same challenge in Australia. We note that the submissions we have received have not sought to quantify, in an Australian context, the magnitude of the difference in gas and electricity beta or the magnitude of stranding risk for the gas networks.

Further, two of the three live comparator firms (AusNet and APA) both have exposure to Australian gas networks. Their long-term beta estimates however appear quite stable.

In relation to the argument that stranding risk is related to decarbonisation and therefore systematic, we consider that while there may be some merit in that view conceptually, the key issue remains that there is a lack of empirical evidence. We also observe that, while states and territories have adopted various decarbonisation policies, there are also policy initiatives that support continued gas usage, particularly in the short to medium term, at the federal level[349] as well as in some states/territories.[350] [351] [352] These policies potentially mitigate stranding risk for gas networks.

There was also a view that there may be a change in investors' perceptions of carbon transition risks.[353] While some recent research suggest that investors are increasingly considering climate risk in their investment decisions,[354] [355] [356] the CRG interview of five independent investment consultants in energy infrastructure found that they perceive the betas for gas and electricity assets to be similar.[357]

The submissions from gas stakeholders and their consultant reports (e.g. NERA, CEG) identified a number of ways for addressing asset stranding risks, including shortening asset life, removal of indexation of RAB, accelerated depreciation, ex-ante compensation, adjustment to the rate of return. CEG also considered that the impact of accelerated depreciation and adjustment to the rate of return is broadly similar,[358] but noted that there is a risk of missing the window of opportunity for addressing this stranding risk.

We acknowledge gas stakeholders' concern about potential asset stranding and its urgency. As noted in the AER's recently released "*Regulating gas pipelines under uncertainty - information paper*", we need to balance the interests of regulated businesses and gas consumers, as well as the interests of current consumers versus future consumers when considering this issue.[359] The AER information paper considered a range of options for addressing gas stranding risk and noted that our approach "is a balancing act between

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[349] Commonwealth of Australia, *National Gas Infrastructure Plan: Interim Report*, May 2021.

[350] Victorian State Government, *Restart of onshore conventional gas industry in Victoria*, available at: https://earthresources.vic.gov.au/projects/onshore-conventional-gas-restart

[351] NSW Government, *Future of Gas Statement*, 2021.

[352] Government of South Australia, *PACE GAS grants*, available at: https://www.petroleum.sa.gov.au/industry-activity/pace-gas-grants

[353] APA, *APA submission on rate of return working papers (public version)*, September 2021, p.1.

[354] Philipp Krueger, Zacharias Sautner, Laura T. Stark, "The Importance of Climate Risks for Institutional Investors", Review of Financial Studies, 2020, 33(3), p.1067-1111.

[355] Johannes Stroebel, Jeffrey Wurgler, "What do you think about climate finance?", editorial, Journal of Financial Economics, 2021, forthcoming.

[356] Patrick Bolton, Marcin Kacperczyk, "Do Investors Care About Carbon Risk?", Journal of Financial Economics, 2021, forthcoming.

[357] CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 2: Engagement*, September 2021, p.30.

[358] CEG, *Stranding risk: depreciation vs uplift*, September 2021, p.1.

[359] AER, *Regulating gas pipelines under uncertainty- Information paper*, November 2021, p.27-28.

preserving the right incentives for network investments and maintaining price affordability of gas network services, avoiding price shocks and further gas substitution where possible."

Given the above, our preliminary view is that, in the context of the 2022 Instrument, it is more appropriate to address stranding risk issue under the broader regulatory framework (e.g. depreciation policy) rather than as part of the rate of return process.

5.4.5 We should not adjust beta for "low beta bias" in the SL CAPM

The low beta bias is an observation that ex-post returns from low beta stocks tend to outperform the expected returns implied by the SL CAPM.

In the 2018 Instrument review, we considered this issue in detail and our decision was to not adjust our SL-CAPM estimate for low beta bias. We considered that the SL-CAPM remains the standard and most widely used model and investors and market practitioners do not appear to consider low beta bias on an ex-ante basis.[360] Our decision reflected the Independent Panel view that low beta bias (and the Black CAPM[361]) have 'nothing to do with estimating beta' and there should not be 'an arbitrary add-on' to the equity beta to account for them'.[362]

In our draft working paper, we did not consider the issue of low beta bias and did not call for stakeholder submissions on the issue. However, a number of submissions from energy network stakeholders (e.g. ENA) considered that 'low beta bias' needs to be taken in account in our decision.[363] On the other hand, the CRG considered that no new evidence has emerged and therefore no further consideration should be given to the issue.[364]

A number of experts agree that the SL-CAPM should continue to be used without adjusting for low beta bias. Partington & Satchell observed that low beta bias shrinks to insignificance with longer holding periods.[365] They also noted that the SL-CAPM remains the best available model, despite some caveats.[366] Sapere Research Group, in a report on behalf of the CRG, suggested that low beta bias should not be accommodated by adjusting beta.[367] Economic Insights also suggested that despite the low beta bias issue, the CAPM may still be appropriate for regulated monopolies, because the monopoly nature of the firm and the regulatory arrangements provide strong stability in the cash flows and low revenue and profit risk, and hence low beta.[368]

Given the lack of new evidence, our preliminary view is we should continue to adopt our approach of not adjusting equity beta or the rate of return for low beta bias.

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360 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p.196.

361 The Black CAPM is an alternative model to the SL CAPM. It predicts a slope of estimated returns that can be flatter than for the SL CAPM.

362 Independent panel, *Review of the Australian Energy Regulator's rate of return draft guidelines*, 7 September 2018, p.81.

363 ENA, *Estimating the cost of equity, Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Equity Omnibus Working Paper*, September 2021, p99-100.

364 CRG, *Advice to the Australian Energy Regulator, CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers, Volume 1: Technical*, September 2021, p.94.

365 Partington & Satchell, *Report to the AER: Alternative Asset Pricing Models*, June 2020, p.22.

366 Ibid., p.8.

367 Sapere Research Group, *Systematic risk and the role and measurement of equity beta: A report to the AER Consumer Reference Group*, June 2021 p.32-33.

368 Economic Insights, *Methodological issues in estimating the equity beta for Australian network energy businesses*, June 2021, p.28.

6 Use of cross checks to sense check overall rate of return

6.1 Overview

Cross checks involve comparing estimates of the rate of return against other relevant information sources. They may provide a sense check on whether the calculated estimates appear reasonable and consistent with other sources of information. They can also provide additional information in situations where regulatory judgement may be required.

We can apply cross checks at the overall rate of return level and at the return on equity level. In this chapter, we will focus on possible cross checks at the overall rate of return level. These checks do not relate to individual parameters of our rate of return.

In 2018, we considered four types of overall cross checks but did not use them in a deterministic role for informing the rate of return:

- Financeability tests
- RAB multiples
- Historical profitability
- Investment trends

We are looking at these cross checks again, along with two additional cross checks, following submissions advocating for their use:

- Scenario testing
- Rate of return by other regulators and discount rates from other practitioners.[369]

The APGA has also proposed a new way of using overall cross checks. This section details our consideration of these checks.

6.2 What is the issue

We are exploring the possible use of overall cross checks for informing the rate of return, the information they can provide and the best approach to incorporate this information (if any) in response to stakeholder submissions.

Stakeholders have proposed that we should use cross checks for assessing and ensuring an appropriate return. However, they differed on the sort of cross checks that should be considered.

6.3 Proposed positions

We have thought further on what information we can draw from overall cross checks and the role we can give them. Our preliminary position is that the overall cross checks may provide contextual information and/or inform us of potential areas of inquiry and research. As such, we consider we can use them as an overall sense check of our rate of return.

We have further considered what information we can infer about our rate of return estimate based on each cross check, particularly in response to stakeholder submissions.

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369 We consider other Australian regulators' return on equity (specifically the equity risk premium) as part of the return on equity cross check.

Our preliminary position for each cross check is as follows (see section 6.4 and 6.5 for more detail):

- We are open to using RAB multiples, scenario testing and financeability tests. However, they carry some limitations that hinder their use for informing the rate of return. To the extent any information can be drawn, RAB multiples may act as a trigger for investigation and indicate if the total compensation (inclusive of the rate of return) provided to investors is sufficient.
- We think historical profitability, investment trends, other regulators' rate of return and discount rates from other practitioners have greater limitations and are of less value than RAB multiples, scenario testing and financeability. Nevertheless, we report on them for completeness.
- Subject to the limitations of the cross checks we examined, they do not appear to suggest any major concerns with our current approach to the rate of return (the 2018 Instrument) in the context of the total return provided to investors.

6.4 What role for overall cross checks?

We considered the use of overall cross checks in our past rate of return reviews. In the 2013 RoR guideline, we initially proposed a reasonableness check role for RAB multiples before arriving at the view that we should instead monitor them over time and across network businesses to help inform us of potential areas of inquiry and research.[370]

We also looked at the use of historical profitability and did not find a role for it. We considered that the incentive framework limited the use of historical profitability. Service providers are incentivised to outperform regulatory benchmarks for opex, capex, debt, tax and service performance. The ability for a service provider to earn an actual return on equity higher than the allowed return on equity, therefore, may be due to the outperformance of any of these benchmarks. Importantly, outperformance cannot be used as an indicator of whether the regulatory rate of return is correct.

In the 2018 Instrument we examined a range of cross checks and concluded that, while none of them can be used to inform the rate of return in any deterministic way, at least some of them may provide useful contextual information that can assist our investigation of other evidence and our risk-cost trade-off assessment. Table 15 summarises our analysis.

370 AER, *Better regulation explanatory statement rate of return guideline*, December 2013, p. 48.

Table 15 2018 considerations of overall cross checks

	2018 considerations
RAB multiples and historical profitability	The substantial difficulty in disaggregating the information contained in RAB multiples and historical profitability measures means that this information cannot currently be used to reliably determine the degree of outperformance of the allowed rate of return. However, they may provide contextual information that can assist our investigation of other evidence and our risk-cost trade-off assessment.
Investment trends	The currently available evidence on investment trends may provide contextual information that can assist our investigation of other evidence and our risk-cost trade-off assessment.
Financeability tests	Our final decision is to not use financeability assessments to inform our rate of return. We remain of the view there is no clear guidance on the assumptions that should be used in any financeability assessment as a cross check on the benchmark parameters in the Sharpe-Linter CAPM that we are using in our foundation model. We are of the view the appropriateness of these parameters should continue to be based on the evidence examined in determining these parameters. Regulated firms under financial metric pressure would be expected to take counter measures to protect their credit profiles. Rating agencies' assessment of credit rating and financeability involve more than just the cashflows from the rate of return. It is also not appropriate to use actual costs of a business to conduct a financeability test because we aim to provide an efficient allowance and actual costs may not be efficient.

Source: AER

We are looking at overall cross checks again in response to stakeholder submissions to previous working papers and to the *Overall Rate of Return* draft working paper.[371] We recognise that there can be benefits to using cross checks at the overall rate of return level (we discuss the benefits in section 6.5). We are open to receiving more information on how cross-checks can be used as a sense-check of our overall rate of return.

There are strengths to using cross checks to sense check our rate of return:

- Allows the incorporation of additional information, for example, can reflect investors' and other market participants' views of the regulated businesses and/or the rate of return
- Can be used as a trigger for investigating potential shortcomings in the regulatory regime once appropriately assessed
- May be used to inform the allowed rate of return if relevant factors are properly accounted for

371 AER, *Rate of return, International regulatory approaches to rate of return, Draft working paper*, August 2020; AER, Rate of return, *International regulatory approaches to rate of return, Final working paper*, December 2020, p. 40.

- Some are relatively easy to compute so the benefit of using them may outweigh the cost

We are however, mindful that there are challenges in using cross-checks and we welcome suggestion on how these can be mitigated. The key challenges we have identified in the past include:

- By their nature, overall cross checks capture a range of non-rate-of-return factors, and it is difficult to reliably isolate and quantify the effect of the rate of return. For example:
    - RAB multiples and financeability tests reflect a range of cashflows of regulated businesses and not just the rate of return. RAB multiples can also reflect investors' expectation of unregulated activities to the extent regulated businesses operate them.
    - Historical profitability carries similar issues except it looks at historical data. It is also potentially exposed to subjectivity in cost allocations if businesses operate regulated and unregulated activities.
    - A number of non-rate-of-return factors can contribute to investment trends with conflicting impact. Their influence and the difficulty disentangling their impacts complicates using investment trends as an indicator of the rate of return.[372]
- There is subjectivity in the appropriate assumptions used to disaggregate overall cross checks to identify the impact of the rate of return.[373] For example:
    - RAB multiples may reflect the value bidders place on having control over company's shares (control premium) as well as the degree of the bidders' optimism about the future cash flows. To quantify those, a set of largely subjective assumptions need to be made.
- If we can use overall cross checks to reliably inform the rate of return, they do not tell us which rate of return parameter to adjust. Therefore, any resulting adjustment may be considered arbitrary.

We note that there are different roles for using cross-check evidence to inform the rate of return:

- A formulaic approach: evidence is used to change the rate of return by means of a mathematical formula or other type of a mechanistic approach. For example, if an economic or financial indicator is outside a predetermined range by X amount, we adjust the rate of return (or a rate of return parameter) by Y per cent. This approach is more appropriate for indicators with relatively high information content with respect to the rate of return.
- Sense-check/contextual: evidence is used to gauge whether the regulatory allowance is likely to be sufficient; alternatively, evidence is used to assist with identifying potential issues with our regulatory regime and areas of further research and inquiry. This approach is better suited for economic and financial indicators with relatively lower information content.
- No role. This approach would be appropriate for the empirical evidence that contains little or no information relevant to the rate of return.

We consider there is no new evidence that would support elevating any of the cross checks we reviewed to a higher status.

Using overall cross checks in a formulaic sense may also be inconsistent with NEO/NGO which requires us to satisfy ourselves that we are making the decision that best promotes the long-term interest of consumers.

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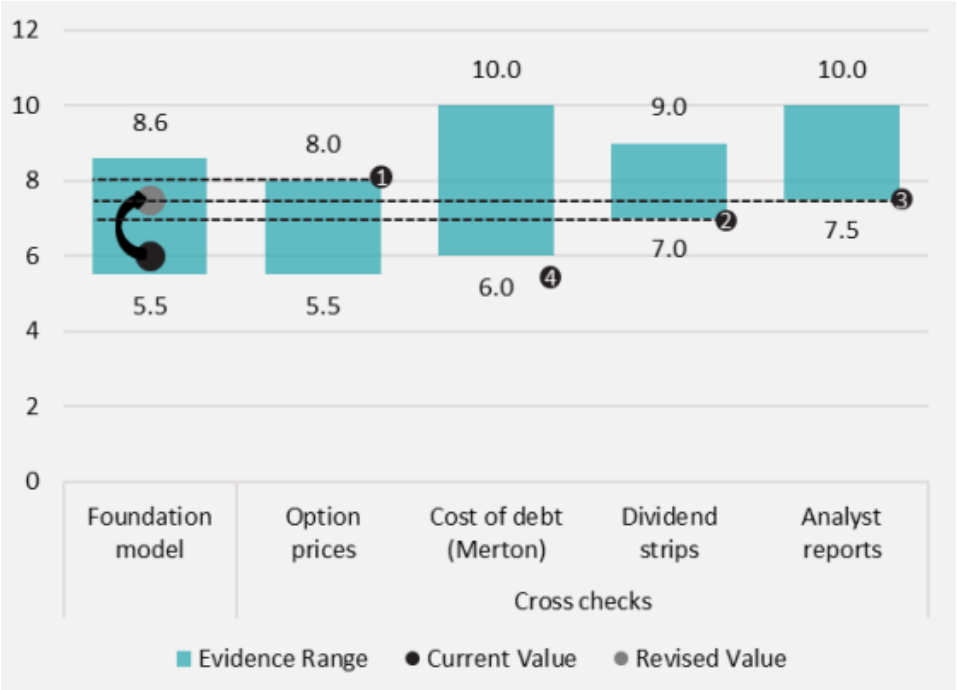
372 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 392

373 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 386

We are investigating if and how some overall cross checks can be used in a sense-check/contextual role.

We note the APGA's proposal for using overall cross checks. It proposed computing the rate of return implied by a select group of cross checks and then selecting the final value from the overlapped area.[374]

Figure 13 APGA proposal for using overall cross checks



Source: APGA

We consider the APGA's proposal would elevate the selected cross checks to having a role that is beyond their underlying merit. The proposal also does not address certain practical implementation issues such as:

- What if there is no overlap with the chosen cross checks?
- APGA's proposal assumes an equal role to each cross check. We have previously rejected similar methods (multi-model approach for return on equity) because the merit of each piece of evidence for estimating the rate of return differed.

However, we do think there may be value in using the format proposed by the APGA to summarise evidence with higher information content than that associated with the set of overall cross checks we examine below.

6.5 What do cross checks tell us about the rate of return?

Below we consider the set of cross checks discussed by the stakeholders in the recent submissions. We examine whether we can infer any information from each of the cross checks about our rate of return estimate. We also discuss the limitations of each cross check.

The table below provides a summary of our positions on the individual cross checks.

374 APGA, *APGA submission to the AER, Rate of return omnibus papers*, September 2021, p. 15.

Table 16 Summary of preliminary positions on overall cross checks

Overall cross check	Preliminary position
Financeability tests	Open to using financeability tests in a contextual role
RAB multiples	May be useful as a sense check and trigger for further investigation into the regulatory framework
Historical profitability	No role in informing the overall rate of return
Investment trends	No role in informing the overall rate of return
Other regulators' rate of return	No role in informing the overall rate of return
Scenario testing	Open to using scenario tests in a contextual role

Source: AER

6.5.1 Financeability tests

Financeability refers to a service provider's ability to meet its financing requirements and to efficiently raise new capital.[375] The 2018 Instrument did not use financeability assessments to inform the rate of return.[376]

Networks and investors supported using financeability tests with the primary focus on whether the FFO/net debt metric (from regulated revenue) was consistent with rating agencies' requirement for an investment-grade credit rating. They suggested that financeability assessments can indicate if an estimated rate of return is consistent with its input parameters (such as benchmark gearing and credit rating) and if it would lead to financing difficulties.[377] Consumer and retailer groups rejected the idea of using financeability tests. They noted concerns such as financeability tests capturing a range of non-rate of return factors and financeability being the responsibility of regulated businesses to manage.[378]

We acknowledge that financeability tests can help assess whether a hypothetical entity with a capex program, gearing and level of risk, reflected in our rate of return allowance, can raise debt at the credit rating consistent with the benchmark credit rating.

To our knowledge, the IPART is the only Australian regulator to conduct financeability tests and its reasons are to:

375 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 392.

376 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 393.

377 TransGrid, Letter *Re: Response to AER Rate of Return Omnibus papers*, 2 September 2021, p. 2; APGA, *Submission to the AER rate of return omnibus papers*, 3 September 2021, p. 7; ENA, *Overall Rate of return, Response to AER's Pathway to 2022 Rate of return instrument: Draft Overall Rate of return Omnibus working paper*, September 2021, . p. 31; Endeavour Energy, *Draft working Omnibus papers: Overall rate of return, equity and debt*, September 2021,,.... p. 5.

378 CRG, *Advice to the Australian Energy Regulator, CRG response to the AER's July 2021 draft working papers: The Overall rate of return, Debt Omnibus and Equity Omnibus papers, Volume 1: Technical*, September 2021, p. 19; South Australian Council of Social Service, *Re: AER Consultation on the rate of return – Omnibus papers*, September 2021, p. 3; Australian Energy Council, *Rate of return omnibus papers*, September 2021, p. 2.

- Check whether its pricing decisions were likely to give rise to a financeability concern and to identify the reasons for any concern[379]
- Ensure pricing decisions would allow an efficient investment grade rated business to raise finance and remain financeable during the regulatory period[380]
- Assess whether the actual business would be financeable during the regulatory period [381]
- Assist in identifying the source of a financeability concern and potentially tailoring a response to the source of the concern.[382]

A NERA report considered in our *Rate of return and cashflows in a low interest rate environment* working paper noted that financeability tests benefitted consumers.

We have considered the use of financeability tests in the 2018 Instrument, our submission to the AEMC and recent working papers. We believe our previous concerns remain relevant given the absence of substantive new material:

- It is not clear whether a regulator has an active role to play in addressing financeability issues for example by changing benchmark gearing:
    - A credit rating agency often recommends reducing leverage when it identifies a problem. However, the regulatory allowance is fairly insensitive to the level of gearing and a change may not have much effect on regulated businesses (since they do not have to follow the benchmark).[383] [384]
    - Regulated businesses tend to be part of larger groups and may potentially have financeability issues for many reasons.[385]
- Rating agencies assess firms' expected actual (and not regulated) cash flows against firms' actual debt. This makes any financeability assessment removed from the actual assessment performed by rating agencies.[386] The cash flows from the allowed rate of return is also just one component of the regulated cashflow.[387]
- It is not appropriate to undertake a financeability assessment using the actual costs of a service provider. This is because we are aiming to provide benchmark allowances to allow for efficient service delivery – not actual costs which may be inefficient.[388]
- There is no universally agreed publicly available methodology for financeability assessments.[389]

379 IPART, *Review of our financeability test*, November 2018, p. 10.
380 IPART, *Review of our financeability test*, November 2018, p. 2.
381 IPART, *Review of our financeability test*, November 2018, p. 2.
382 IPART, *Review of our financeability test*, November 2018, p. 2.
383 AER, *AER submission - Consultation on TransGrid and ElectraNet participant derogations - Financeability of ISP projects*, December 2020, pp. 2, 5.
384 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 403; AER, *AER submission - Consultation on TransGrid and ElectraNet participant derogations - Financeability of ISP projects*, December 2020, p. 5.
385 AER, *Rate of return and cashflows in a low interest rate environment, Draft working paper,* May 2021, p. 63.
386 AER, *Rate of return instrument explanatory statement,* December 2018, p. 393, 396.
387 AER, *Rate of return instrument explanatory statement,* December 2018, p. 393.
388 AER, *Rate of return instrument explanatory statement,* December 2018, p. 394; AER, *Draft rate of return guidelines explanatory statement,* July 2018, p. 152.
389 AER, *AER submission - Consultation on TransGrid and ElectraNet participant derogations - Financeability of ISP projects*, December 2020, p. 2

- Available methodologies are complex, look at many metrics and qualitative factors, and are ultimately subjective.[390] Financial metrics (and FFO/net debt) are only one part of the assessment.[391] [392]

We are open to considering financeability tests to inform the rate of return in a contextual role. However, we are also mindful of the challenges in using these tests.

We have updated the FFO/net debt calculation from the 2018 Instrument in section 6.5.1.1. This analysis was undertaken in 2018 because submissions noted it as the indicator for an investment grade rating. We found that the majority of regulated businesses would achieve 7 per cent.[393] As in 2018, our update indicates that most regulated businesses will achieve a 7 per cent FFO/net debt.

6.5.1.1 Updated 2018 analysis of FFO/net debt

In 2018 we expressed reservations about using financeability testing in the context of rate of return estimation. However, given stakeholder feedback, we nevertheless estimated FFO/net debt metric for a number of regulated businesses. We further considered what change in the benchmark gearing would be sufficient to address financeability concerns and whether such a change was warranted. We concluded that no change in the benchmark gearing was necessary and our rate of return estimate was sufficiently high.

We have updated the FFO/net debt analysis in the 2018 Instrument given submissions on financeability tests. A summary of the analysis is in the table below and Appendix B contains details and output of the full analysis.

As in 2018, we have used a lower bound guidance on FFO to net debt for BBB+ entities of 7% FFO to net debt. Actual lower bounds used by rating agencies may vary across firms and is simply guidance and not a hard requirement.

390 AER, *Rate of return and cashflows in a low interest rate environment, Draft working paper*, May 2021, pp. 36, 47

391 AER, *Rate of return instrument explanatory statement,* December 2018, p. 396.

392 AER, *AER submission - Consultation on TransGrid and ElectraNet participant derogations - Financeability of ISP projects*, December 2020, p. 2; AER, *Rate of return and cashflows in a low interest rate environment, Draft working paper,* May 2021, p. 85.

393 AER, *Rate of return instrument explanatory statement,* December 2018, p. 397.

Table 17 Update of 2018 Instrument FFO/net debt analysis

	2018	2021 (2018 firms)	2021 (all firms)	2021 (firms not in 2018 analysis)
Number of firms	29	29	32	3
Average FFO/net debt	8.44%	8.32%	8.33%	8.42%
Industry average return on equity	7.06%	5.86%	5.78%	5.00%
Number of firms with less than 7% FFO/net debt	8	7	8	1
Number of firms with higher FFO/net debt compared to 2018		12 out of 29		
Average increase in FFO/net debt		0.89%		
Average decrease in FFO/net debt		-0.82%		

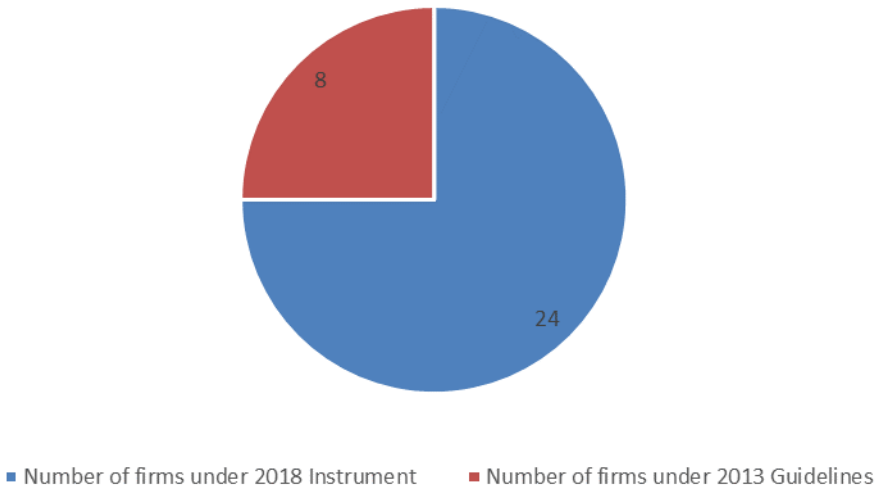
Source: AER; net debt is estimated as the average of opening and closing debt proportion (60 per cent) of the RAB
Average change in FFO/net debt is the simple average of the difference between each firm's 2018 estimate to the 2021 estimate. We estimated each firm's FFO/net debt as the average over the relevant five-year period.

We make the following observations for firms in the 2018 analysis:

- The industry average FFO/net debt has experienced a small decline (0.12 percentage points) as the industry average return on equity fell 1.2 percentage points over time.
- The increase in FFO/net debt for 12 firms has largely offset the fall in the other 15 firms.
- The number of firms, absent counter measures, will not achieve the 7% regulated FFO/net debt in certain years and on average over their regulatory periods has dropped to 7 in 2021.

We note that the majority of firms in our 2018 analysis now have the 2018 Instrument applied to them (see figure below).

Figure 14 Number of firms subject to the 2013 Guidelines and 2018 Instrument



Source: AER

Notes: For firms operating under the 2018 Instrument, their return on debt is partially based on estimates under the 2013 Guidelines because of our trailing average approach to estimating the return on debt.
AusNet Electricity Transmission and Powerlink have been included as 'under 2018 Instrument' because we have published draft decisions for them in 2021.

Therefore, the analysis above does not suggest a material deterioration in financeability since the application of the 2018 Instrument.

We have delved further into the reasons why the industry average FFO/net debt has remained relatively unchanged for firms in the 2018 analysis.

Using Citipower and Powerlink as examples, we see that FFO in 2021 increased due to higher depreciation and revenue adjustments offsetting the decline in return on equity (see table below). This is consistent with our view that a range of factors contribute to financeability tests (and the FFO/net debt metric)–expenditure decisions, the size of the RAB and depreciation are just some of these factors.

Table 18 Comparison of Citipower and Powerlink 5 year average FFO/net debt components ($M)

	FFO	RoE	Depreciation	Revenue adjustments	Net debt	FFO/net debt
Citipower 2018 @7%	122	56	67	0	1,231	9.9%
Citipower 2021@5.0%	141	42	84	15	1,260	11.1%
Powerlink 2018@7.4%	337	213	125	-2	4,340	7.8%
Powerlink 2021@5.2%	337	146	189	2	4,207	8.0%

Source: AER

6.5.2 RAB multiples

RAB multiples are the enterprise value of a firm divided by its Regulatory Asset Base (RAB).[394]

It can be calculated using two main sources of data to evaluate the market value of equity in service providers:

- Acquisition data – the purchase price when a transaction[395] of the service providers occurs, or
- Trading data – the existing share price of a business that has an equity ownership in a service provider.

The 2018 Instrument did not use RAB multiples in a deterministic way to inform the overall rate of return.[396] This was because of the difficulty in disaggregating the information contained in RAB multiples meant it could not be used to reliably determine the degree of correspondence with the allowed rate of return. However, we did note that the trends in RAB multiples may provide useful contextual information about the allowed rate of return.[397]

We also considered that the size of recent RAB multiples and historical profitability measures combined with a continued ability of service providers to raise capital suggest that realised returns have been at least sufficient.[398]

We have looked further into the possible use of RAB multiples in a contextual role, particularly considering the CRG and MEU suggestion that they should be used as a cross check.[399]

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394 Enterprise Value is the sum of the following: (a) the equity (at market value, also known as the market capitalisation) plus any preferred equity at market value; (b) the debt at market value (both long and short-term); (c) any unfunded pension liabilities (or other debt-deemed provisions); and (d) less any cash or cash equivalents. The Enterprise Value (unlike the market capitalisation of the equity) is often not entirely transparent and may require some subjective estimates. See Darryl Biggar, Understanding the role of RAB multiples in regulatory processes, 20 February 2018.

395 A transaction may only involve the purchase of a certain portion of equity in a service provider, in which case, an implied RAB multiple can be calculated based on the price paid for the percentage of shares acquired.

396 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 388.

397 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 387.

398 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 387.

399 CRG, *Advice to the Australian Energy Regulator, CRG response to the AER's July 2021 draft working papers: The Overall rate of return, Debt Omnibus and Equity Omnibus papers, Volume 1: Technical*, September 2021, p. 19; MEU, *Rate of return, Omnibus papers on 2022 RoRI, Response to draft working papers*, September 2021, p. 6.

Our preliminary position is that RAB multiples may be useful as a trigger for further investigation into the regulatory framework. This follows from our 2018 position. However, it is unlikely to be able to provide conclusive information on the rate of return unless properly adjusted for the influence of other possible factors.[400]

We explain this view in more detail below.

We recognise that RAB multiples carry a number of strengths:

- Can be used as a trigger for investigating potential shortcomings in the regulatory regime once appropriately assessed [401]
- May be used to adjust the allowed rate of return if relevant factors are properly accounted for[402]
- Reflects investors' valuation of regulated businesses based on their estimate of the present value of the expected future cash-flows of the firm relative to the amount required to fully compensate investors in the firm[403]
- Relatively easy to compute and are often cited in the financial press.[404]

RAB multiples also carry the following limitations:

- RAB multiples measure the difference between investors' valuation of the businesses' future cashflows and the RAB. It captures all factors (including non-rate of return ones) that would affect investors' valuation of a business' cashflows.
    - It would be difficult to isolate and quantify the rate of return's impact because bidders do not disclose their valuation of the contributing factors. The valuations may also be quite subjective.
- Transactions that provide data on acquisition RAB multiples are relatively infrequent and there is a risk of inappropriately applying circumstances from one transaction generally across all the service providers. For example:
    - Certain acquisition RAB multiples may encapsulate a control premium whereas others may not.
    - The valuation of cashflows can differ from takeover to takeover depending on each investor's valuations of future cashflows. In the first dot point we noted an example of a factor (control premium) that contribute to investors' cashflow valuation differing from the regulated cashflow. These factors can differ depending on the investor.
- Data on acquisition multiples may not be reflecting the same factors as trading multiples. For example:
    - Trading multiples are unlikely to reflect a control premium
    - Acquisition multiples may reflect the financing structure and options available to the bidder and how these relate to the allowed returns for the regulated asset.

We note Darryl Biggar's view that RAB multiples can be used as a trigger for investigating potential shortcomings in the regulatory regime. This is because they reflect investors' valuation of the expected present value of future cashflows which amongst other things include the rate of return. However, as noted by Darryl Biggar, RAB multiples may be used to

400 Darryl Biggar, *Understanding the role of RAB multiples in regulatory processes*, 20 February 2018, p. 16.
401 Darryl Biggar, *Understanding the role of RAB multiples in regulatory processes*, 20 February 2018, p. 1.
402 Darryl Biggar, *Understanding the role of RAB multiples in regulatory processes*, 20 February 2018, p. 1.
403 Darryl Biggar, *Understanding the role of RAB multiples in regulatory processes*, 20 February 2018, p. 1.
404 Darryl Biggar, *Understanding the role of RAB multiples in regulatory processes*, 20 February 2018, p. 1.

adjust the rate of return only if all relevant factors are properly accounted for and 'peeled away'.

This is consistent with our concern with using RAB multiples in 2018–identifying and disaggregating the impact of the rate of return from other contributing factors.[405] This drove our view that it may be used in a contextual role and monitored, along with other indicators, to assist investigation of other evidence. We did note that the size of recent RAB multiples and historical profitability measures, together with a continued ability of service providers to raise capital, suggested that historical returns had been at least sufficient.[406]

Currently, our network performance report uses RAB multiples in a 'sense-check' capacity.[407] This recognises its strength of providing a forward-looking market-based measure (of investors' expectation of future cashflows) and the above-mentioned difficulty (and subjectivity) in isolating the rate of return's impact.

We considered that RAB multiples, along with the other analysis in our report, in terms of whether investors viewed (total) regulated compensation as being sufficient to warrant investment.[408] We consider that RAB multiples may be used in a similar capacity in the Instrument process. That is, as an indication if we need to investigate further and whether the overall regulatory framework provides sufficient overall compensation to investors.

We note Darryl Biggar's view that analysis may be able to isolate and adjust for the effect of contributing factors and peel away estimates of sources of value. We are considering undertaking work to further disaggregate RAB multiples. If this work is successful, we may be able to place more reliance on this type of information.

We reported on RAB multiples data in 2021 (see figure below).[409] We cautiously note that the information would suggest our current and expected rates of return are at least sufficient (as part of the overall regulatory compensation to investors) and potentially higher than that needed to attract investment.

405 AER, December 2013, p. 48; AER, December 2018, p. 388.

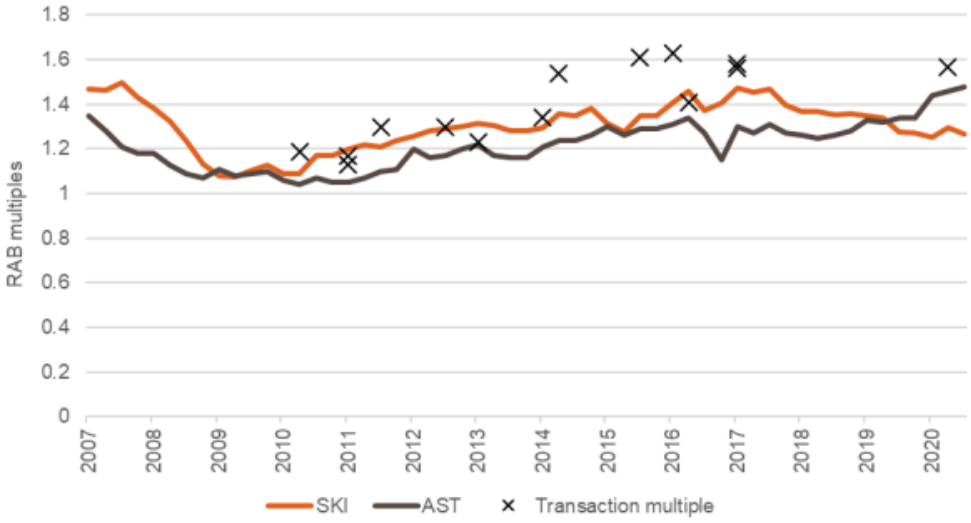
406 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 387.

407 AER, *Electricity network performance report*, September 2020, p. 49; AER, *Electricity network performance report*, September 2021, p. 27.

408 AER, *Electricity network performance report*, September 2020, p. 49; AER, *Electricity network performance report*, September 2021, September 2021, p. 29.

409 AER, *Electricity network performance report*, September 2021, p. 29.

Figure 15 RAB multiples for AER regulated networks



Source: Morgan Stanley Research, AER analysis.

Note: SKI is Spark Infrastructure, which holds ownership stakes in SA Power Networks (49%), Victoria Power Networks (49%) and TransGrid (15%). AST is AusNet Services, which owns a Victorian electricity distribution network, electricity transmission network and gas distribution network.

Our *Overall rate of return* draft working paper looked at how other regulators use RAB multiples with the following observations:[410]

- Australian regulators do not make use of RAB multiples.
- From the Brattle report, international regulators outside the UK generally do not use RAB multiples with the exception of the NZCC.
- The NZCC considered that they provide a useful indicator of the overall reasonableness of the regulatory setting (including the allowed WACC).
- UK regulators considered RAB multiples as an overall cross check but differed in their view of RAB multiples amongst themselves.

The ENA noted in its submission that there was no reason to expect any firm to trade at its book value and referenced the works of Coase and Damodaran (in the context of Tobin's Q) in support.[411] The relevance of these references in this instance is unclear to us for reasons including:

- A RAB multiple is not the same as Tobin's Q because the RAB is not the replacement cost of a business' assets
- Damodaran estimated the Enterprise Value to Invested Capital ratio. The invested capital of a firm is defined as the book value of equity plus the book of debt minus cash.[412] This does not appear to be the replacement cost of a firm's assets. Therefore, the ratio estimated by Damodaran is neither Tobin's Q nor a RAB multiple.
- It is unclear exactly how Coase's theory would apply in this context and why it would explain RAB multiples of 1.5-1.6 magnitude.

410 AER, *Overall rate of return draft working paper,* July 2021, pp. 49–50.

411 ENA, *Overall rate of return, Response to AER's Pathway to 2022 Rate of return Instrument: Draft Overall Rate of return omnibus working paper, September 2021,* pp. 37–38.

412 http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/variable.htm

6.5.3 Historical profitability

Historical profitability measures are backward-looking measures of actual returns earnt by businesses.

The 2018 Instrument did not use historical profitability as a major indicator to inform the overall rate of return.[413] However, we did note that historical profitability may provide useful contextual information about the allowed rate of return. We considered that the size of recent RAB multiples and historical profitability measures combined with a continued ability of service providers to raise capital suggest that realised returns have been at least sufficient.

We have looked further into the possible use of historical profitability in a contextual role. Our preliminary position is that it does not provide information on the expected rate of return.

We consider that there are strengths to using the actual profitability of regulated businesses:

- It informs the historical effectiveness of our regulatory framework and the total return achieved by businesses.[414]
- It is relatively easy to understand and compare over time (at first glance)
- It can potentially help to identify areas that require further investigation.[415]
- It may be helpful in identifying whether the business' actual cost of debt has been systematically higher or lower than the cost debt applied in the rate of return.[416]

However, historical profitability carries a number of limitations:

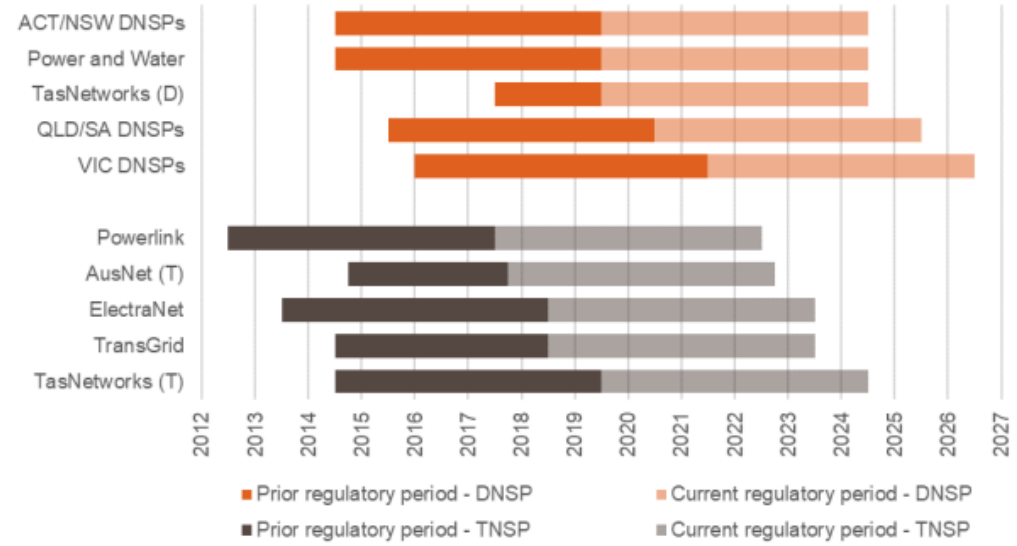
- It is a measure of actual returns rather than expected returns. If actual returns differ from expected returns, this does not indicate the expectation is incorrect since the expected value is based on all possible outcomes
- Past outperformance or underperformance is not necessarily indicative of future performance.
- Historical profitability measures do not provide information about what the expected return should be. If we were to remove the effect of other contributing factors that affect actual return on equity, then in expectation the resulting return on equity will be the same as our allowed return on equity.[417] Our 2021 Network Performance report has performed this analysis and reconciled historical return on regulated equity to the allowed return on equity.
- Historical profitability measures are exposed to a degree of subjectivity due to certain costs requiring allocation. We note that some expenses (tax, interest, corporate overheads, etc.) are more commonly incurred at the ownership group level and not at individual network level.[418] There is also the potential to allocate costs from unregulated business units to regulated units or vice versa.
- Many factors contribute to historical profitability measures diverging from the rate of return. Our revenue requirement does not result in a guaranteed return, as the networks' actual returns are determined in part by whether they spend more or less than these

413 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 388.
414 AER, *Draft rate of return guidelines explanatory statement*, July 2018, p. 148.
415 Ibid.
416 Ibid.
417 AER, *Draft rate of return guidelines explanatory statement*, July 2018, p. 148; AER, *Rate of return instrument, Explanatory Statement*, December 2018, pp. 383, 386.
418 AER, *Electricity network performance report*, September 2021, p. 63.

forecasts and/or depart from benchmarks.[419] For example, they can adopt a different financing structure or debt term or credit rating to our benchmark after assessing the risk-reward trade off. These changes may result in both different expected and realised equity profits.

- Inherent inertia with the application of the Instrument (and the ten-year trailing average return on debt) to businesses limit the observations we can draw:
  - The Instrument is only applied to a business if its revenue reset falls within the specified four-year period (see figure below). There will be some businesses operating under the current Instrument and some under the previous Instrument; those under the current Instrument may have been so for a period from one to four years.

Figure 16 The staggered revenue decision timetable



Source: AER analysis.

Note: The Victorian Government has legislated a 6 month extension to the timing of determinations for Victorian DNSPs which would otherwise have commenced in January 2021. Under this change the previous regulatory period was extended to finish on 30 June 2021 and the full five year regulatory period will commence on 1 July 2021.

Source: AER, Electricity network performance report, September 2021, p. 6.

Given the limitations of historical profitability, we do not think useful conclusions about the rate of return can be drawn from it.

As noted in the 2018 Instrument, it is a measure of the overall returns resulting from a regulated business' operations and not solely from the allowed rate of return. [420] It is a measure of actual returns rather than expected returns and past performance is not necessarily indicative of future performance.

Many factors contribute to historical profitability measures diverging from the rate of return. Our revenue requirement does not result in a guaranteed return, as the networks' actual returns are determined in part by whether they spend more or less than these forecasts and/or depart from benchmarks. There are many factors contributing to historical profitability

[419] AER, *Electricity network performance report*, September 2021, p. 28.
[420] AER, *Rate of return instrument, Explanatory Statement*, December 2018, pp. 383, 386.

and there is much subjectivity and no agreement on the appropriate assumptions to use to disaggregate historical profitability.[421]

We also note that if disaggregation of profitability measures can be reliably undertaken then it may provide information on efficient gearing levels and efficient capital, operating, debt, and tax expenditure, but it cannot provide information on the required return on equity. This is because, after accounting for outperformance of regulatory allowances, a service provider's return is set by regulation.

Observations about historical profitability are also clouded by the inherent inertia with the application of the rate of return Instrument.

We did suggest in 2018 that historical profitability could be used to inform the allowed return on debt.[422] However, our work on the EICSI covers this aspect already.

Our network performance report noted that to the extent that profitability results are systematically and materially higher or lower than forecast, this would prompt us to investigate the causes in more detail.[423] However, this would need to be a more holistic review of our regulatory framework because of the multiple factors captured by historical profitability measures. As noted above, such a holistic review would not be likely to shed any light on what the estimate of the return on equity required by the market should be.

Brattle's review of international regulators observed that international regulators do not use historical profitability as a cross check at the overall rate of return level. We also note that Australian regulators do not appear to use historical profitability to inform the rate of return.

We have assessed the use of historical profitability using our criteria. The key issue is that it does not meet the 'fit for purpose' criterion.

6.5.4 Investment trends

The rationale for why investment trends can provide some indication of the rate of return is that:

- An allowed rate of return that is too high may encourage inefficient overinvestment.
- An allowed rate of return that is too low may discourage efficient investment.

In 2018, we noted that investment trends may provide some indication if the allowed rate of return in past regulatory determinations was too high or too low.[424] We concluded that the currently available evidence on investment trends could not reliably be used to inform the allowed rate of return in any deterministic way.[425] However, they may provide contextual information that can assist our investigation of other evidence and our risk-cost trade-off assessment.

We have looked further into the possible use of investment trends in a sense-check/contextual role, particularly in light of networks' and investors' suggestion that discretionary capital expenditure may provide a better indication of the rate of return's impact.[426] The strengths of using investment trends are that they:

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421 AER, *Rate of return instrument, Explanatory Statement*, December 2018, pp. 383, 386.

422 AER, *Draft rate of return Guidelines explanatory statement*, July 2018, p. 148.

423 AER, *Electricity network performance* report, September 2021, p. 24.

424 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 391.

425 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 392.

426 ENA, *Overall Rate of return, Response to AER's Pathway to 2022 Rate of return instrument: Draft Overall Rate of return Omnibus working paper*, September 2021, p. 39; Ausgrid, *Submission, Overall rate of return*, September 2021, p. 9; NSG, *Re: Response to AER RORI Omnibus papers*, September 2021, p. 3.

- May inform the historical effectiveness of the rate of return in promoting network investments
- Are relatively easy to understand and compare over time (at least on initial glance)

However, we consider that our previous conclusions on its limitations remain relevant given the absence of substantively new evidence:

- A number of non-rate-of-return factors can contribute to investment trends. The influence of these factors, and the difficulty disentangling their impacts, complicates using investment trends as an indicator of the rate of return.
- It is difficult to compare investment levels over time to discern the extent of any impact from the rate of return.[427] Factors influencing investments change over time. For example:
    - A comparison between pre-2013 and post-2013 RABs would need to consider the network reliability standard changes in New South Wales and Queensland in 2005, and the rollout of mandatory smart metering in Victoria, over this period. Furthermore, there were also changes to the regulatory regime, including the AER gaining greater remit in 2012 to assess costs proposed by providers and the introduction of incentive schemes.
    - Our 2020 Network Performance report noted that businesses have significantly reduced augmentation-related expenditure since 2012 due to the changed reliability settings in NSW and QLD and lower actual demand growth.[428]
- Networks and consumers have previously agreed on the difficulty of using investment trends.[429]

We note networks' and investors' view that discretionary capital expenditure trends can be used to inform the overall rate of return. The rationale is that businesses have discretion on the investment decision and would not invest if the rate of return was too low. However, we consider there is no one to one relationship between rate of return and investment trends (including discretionary capital expenditure). A project may not be built due to changing government legislation/directive, environmental concerns, new company direction, etc. Therefore, it is not clear that investment trends (even discretionary ones) can reliably inform the rate of return.

Given these limitations, it is difficult to see how investment trends can be used to inform the rate of return.

We do not think useful conclusions about the rate of return can be drawn from the investment trends information available to us and we do not think they should be used as overall rate of return cross checks.

We have assessed the use of investment trends using our criteria. The key issue is that this indicator does not meet the 'fit for purpose' criterion.

6.5.5 Information from other practitioners

We note the NSG suggested that we look at the rate of return set by other regulators and discount rates used by market analysts, valuation reports and other statutory bodies to inform our rate of return.[430]

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427 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 392.
428 AER, *Electricity network performance report 2020*, September 2020, p. 24.
429 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 390.
430 NSG, *Re: Response to AER RORI Omnibus papers*, September 2021, p. 4.

This type of evidence can provide an indication of the required rate of return for the following reasons:

- Other regulators have similar task as us which is to set the rate of return for regulated businesses. Their estimates may be comparable to our rate of return because they are for businesses with similar risks.
- Discount rates used by market analysts and valuation reports may be an indication of the rate of return expected by investors.
- Depending on the purpose of the discount rates used by statutory bodies, they may provide an indication of the rate of return expected by investors.

There are two possible ways to use other regulators' (and other practitioners') estimates: a comparison with their methodology or their value. Network and investor stakeholder have typically asked us to look at the latter when proposing these materials for cross checking the rate of return. We consider that it is more important to review others' methodology (and reasoning) rather than just their end estimate. This will allow for a better assessment of whether other regulators' and practitioners' estimates are comparable to our rate of return.

In considering this type of evidence, we note that other practitioners' return on debt offers limited comparability. There may be a range of differences driving divergence with other practitioners:

- Different data sources and approaches used to estimate the return on debt.[431] For example, the return on debt could differ due to:
  - The risk free rate differing between countries
  - Different comparator firms (due to different industries) leading to different gearing, term and credit rating being adopted
- We adopt, and are transitioning to, the 10-year trailing average approach whereas other regulators may adopt an 'on-the-day' approach. Consequently, our return on debt will be a particular weighted average of historical return on debt rather than the prevailing rate.[432]

For the return on equity, we look at other Australian regulators and other practitioners as part of estimating the market risk premium and return on equity cross check. We believe international regulators' return on equity and other practitioners' discount rates offer limited comparability to our return on equity and rate of return due to the following factors:

- Different methodology for estimating the return on equity. For example, we previously observed international regulators differ in their implementation of the SL CAPM to estimate the return on equity.[433] Some international regulators also use the DGM and the Wright approach to estimate the return on equity.
- Different context and purpose of estimating the rate of return (and return on equity). For example, our decisions need to contribute to the achievement of the NEO and NGO and the relevant obligations under the National Electricity Rules and National Gas Rules. Other practitioners and regulators have a different objective, which may affect the return on equity estimates.
- An international rate of return would reflect differences between those jurisdictions and Australia in terms of the systematic risk, risk free rate, etc.

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431 AER, *Rate of return, International regulatory approaches to rate of return, Draft working paper*, August 2020, p. 17.
432 AER, *Rate of return, International regulatory approaches to rate of return, Draft working paper*, August 2020, p. 17.
433 AER, *Rate of return, International regulatory approaches to rate of return, Draft working paper*, August 2020, p. 13.

- Other regulators and practitioners make their own assessment of their rate of return methodology. By having regard to their estimates, we will be implicitly giving regard to methodology we may consider inappropriate.
- Lack of transparency on how the return on equity estimates are derived.
- Return on equity estimates from other practitioners are generally company specific and therefore not directly comparable to our estimate.

We also looked at international regulators during the 2018 Instrument (specifically the return on equity) and made similar observations which restricted their comparability and use for informing our decision:[434]

- Differences in regulatory framework, the domestic economy, geography, business cycles and other factors are likely to drive differences in estimates
- Different methodology
- We received a report from Dr Marin Lally which noted a number of concerns with a report by John Earwaker on international regulators' rate of return.

We reviewed international regulators' approach in a working paper in 2020 (and commissioned a Brattle report) in response to stakeholder submissions.

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

[434] AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 119.

Table 19 Brattle comparison of rate of return (WACC) outcomes

		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%			
Gearting, 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 nominall 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] x [14] + (1 - [14]) x [3]
[21]: [8] x [14] + (1 - [14]) x [9], except NZCC and ACM, where the real vanilla WACC is estimated from nominal vanilla WACC and inflation.

Source: The Brattle Group

It highlighted similarities and differences in methodology and application in international regulators' approach to setting the rate of return in many areas.

In comparing and contrasting the international approaches against our own approach, we noted that 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.

On face value, our return on equity is at the lower end of rates of return allowed by regulators internationally. In an environment of international competition for capital this observation leads us to consider whether our return is sufficient to attract necessary investment. However, this seems difficult to reconcile with the recent takeover offers for Spark and AusNet.

Although our rate of return may be at the lower end of the range allowed by regulators internationally, this may not be true of the overall regulatory compensation for businesses.

NERA has reviewed other regulators' market risk premium methodology in 2020.[435] We consider this report more substantively in section 2. Similar to our observations for the Brattle report, differences in the MRP value between regulators are driven by methodological choices. For example, based on the latest estimate from each regulator in NERA's report, we observe that the MRP for regulators using a HER (or predominantly HER) approach tends to be lower than those that did not.

In the 2015 SAPN final decision we noted that the use of other regulators' data is a simple comparison with minimal adjustments to data.[436] We clarify that this was in the context of the return on equity cross check and market risk premium. We looked at the estimates from other Australian regulators because there was less difference with our rate of return. For example, these regulators estimate an 'on-the-day' return on equity via a domestic SL CAPM and a risk-free rate based on the yield on Australian CGS.

The 2018 Instrument observed that differences are likely to be methodological.[437] We also looked at the evidence other regulators used rather than their chosen value to improve comparability.

We have assessed the use of other regulators' rate of return using our criteria. Its key issue is that it does not meet the following criteria:

- 'fit for purpose'
- 'implemented in accordance with good practice'
- 'flexible to allow changing market conditions and new information' criteria.

It is also unlikely to be 'timely and responsive to new information because of the relative infrequency of publication'.

6.5.6 Scenario testing

The draft working paper noted that network stakeholders have raised the topic of using scenario testing to test the computed rate of return under various scenarios. We sought submissions on how it can be used to inform the rate of return.

Networks' submissions to the draft working paper continued to support the use of scenario testing.[438] The ENA noted that the outcomes of scenario testing should not result in mechanistic adjustments but should simply identify both the range of potential outcomes under the proposed AER approach and any scenarios for which the proposed RORI may not appear to produce reasonable outputs.[439] The ENA submission did not elaborate on what it considers a reasonable output. The CRG considered that scenario testing should have no role to play in setting the rate of return until more information was provided.[440] The CRG

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435 NERA, *Review of regulators' approaches to determination of the market risk premium Port of Melbourne*, 25 May 2020.

436 AER, *Final decision, SA Power Networks determination 2015–16 to 2019–20, Attachment 3 – Rate of return*, October 2015, p. 103

437 AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 116.

438 TransGrid, *Re: Response to AER Rate of return Omnibus papers*, September 2021, p. 5; APGA, *APGA submission to the AER, Rate of return omnibus papers*, September 2021, p. 46; Ausgrid, *Submission, Overall rate of return*, September 2021, p. 6; SA Power Networks, CitiPower, Powercor and United Energy, *Response to AER Rate of return Omnibus papers*, September 2021, p. 5; ENA, *Overall Rate of return, Response to AER's Pathway to 2022 Rate of return instrument: Draft Overall Rate of return Omnibus working paper*, September 2021, p. 41.

439 ENA, *Overall Rate of return, Response to AER's Pathway to 2022 Rate of return instrument: Draft Overall Rate of return Omnibus working paper*, September 2021, p. 41.

440 CRG, *Advice to the Australian Energy Regulator, CRG response to the AER's July 2021 draft working papers: The Overall rate of return, Debt Omnibus and Equity Omnibus papers, Volume 1: Technical*, September 2021, p. 12.

outlined that the first step in considering the merits of scenario testing was for a convincing case to be put forward for what sort of test was relevant and how it would be applied.

As noted in the draft working paper, we are supportive of using scenario testing.

The strengths of scenario testing are that:

- It allows stakeholders, including us, to see the rate of return under different conditions and assumptions as well as to examine how it responds to changes in the underlying parameters
- It may act as a sense check for our rate of return if properly implemented especially because the rate of return Instrument is fixed for the duration of its application (that is, four years).

The draft working paper noted a proper implementation of scenario testing could be complex and listed some sample questions that need to be considered. The ENA has provided additional detail on its proposed implementation which responded to some of the questions.[441]

We appreciate the ENA's response to our questions, and welcome further submissions on these questions and how scenario testing can be used to inform the rate of return. For example:

- Can scenario testing be used to identify potential areas of concern?
- How might the rate of return Instrument be made robust to those concerns?
- Can, and should, the AER prioritise one (or some) scenario/s over others? How would this interact with our aim to set an unbiased estimate of the rate of return?
- Should we factor in the burden it would place on stakeholders?

The ENA's current proposal for scenario testing lacks some detail on how it can be used to inform the rate of return. At this stage, we think scenario testing can be used as a tool to illustrate the potential effect of different choices of the rate of return and the revenue requirements. The ENA's model allows stakeholders to vary different inputs (and conditions) to better understand how the rate of return affect the regulated revenue received by businesses. This was why we published an updated version of the 2018 model as part of the *Overall Rate of Return* draft working paper.

We also consider that scenario testing may assist with some key topics raised by the CRG. The CRG noted that key themes from its consumer engagement were:[442]

- Concerns about energy price levels
- The importance of price stability because of consumers' vulnerability to price volatility
- Network self interest and insufficient time to allow 'swings and roundabouts' to accrue to consumers

By modelling the rate of return (and regulated revenue) under different scenarios, we may be able to identify whether some options are more stable across a range of scenarios than others. Scenario testing can also help stakeholders to better understand the impact of alternative proposals on prices levels, price stability and price changes over time. This can promote broader discussion on these themes.

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441 ENA, *Overall Rate of return, Response to AER's Pathway to 2022 Rate of return instrument: Draft Overall Rate of return Omnibus working paper*, September 2021, p. 41.

442 CRG, *CRG response to the AER's July 2021 Draft Working Papers: The overall Rate of Return, Debt Omnibus and Equity Omnibus Papers volume 1: technical,* 3 September 2021, p. 117–119.

The ENA has noted that it has developed a simplified PTRM-style model for scenario testing and was working to share the model with us and the CRG.[443] We have received this model and believe it will be useful for all stakeholders to view and test the model. We are communicating with the ENA on the publication of this model.

The table below contains sample outputs from the ENA's model based on adjusting some of the rate of return parameters in the model. This model contains three risk free rate scenarios with the option to apply different rate of return parameters for each scenario:

1. 'negative nominal rate'
2. 'persistent rate'
3. 'long run convergence'

There is a fourth scenario where users can input their own assumption about the risk free rate and there appears to be a fifth risk free rate scenario enacted as part of the MRP option 'long term MRP paired with long term RFR'.

[443] ENA, *Overall Rate of return, Response to AER's Pathway to 2022 Rate of return instrument: Draft Overall Rate of return Omnibus working paper*, September 2021, p. 42.

Table 20 Sample outputs from ENA scenario testing model

Scenarios	Average WACC over 5 years
1 – ENA default	4.61%
2 – ENA default	4.52%
3 – ENA default	4.87%
1 – ENA default + long term MRP (6.1%)	4.45%
2 – ENA default + long term MRP (6.1%)	4.36%
3 – ENA default + long term MRP (6.1%)	4.71%
1 – ENA default + total market return (9.8% MRP)	5.35%
2 – ENA default + total market return (9.8% MRP)	5.26%
3 – ENA default + total market return (9.8% MRP)	5.6%
1 – ENA default + prevailing debt margin	4.54%
2 – ENA default + prevailing debt margin	4.46%
3 – ENA default + prevailing debt margin	4.74%
1 – ENA default + average post GFC debt margin	4.67%
2 – ENA default + average post GFC debt margin	4.59%
3 – ENA default + average post GFC debt margin	4.87%

Source: ENA, Frontier

Appendix A – Assessment Criteria

1. Where applicable, reflective of economic and finance principles and market information
    (a) estimation methods and financial models are consistent with well-accepted economic and finance principles, and informed by sound empirical analysis and robust data.
2. Fit for purpose
    (a) the use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose
    (b) promote simple over complex approaches where appropriate.
3. Implemented in accordance with good practice
    (a) supported by robust, transparent and replicable analysis that is derived from available credible datasets.
4. Where models of the return on equity and debt are used these are
    (a) based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation
    (b) based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.
5. Where market data and other information is used, this information is
    (a) credible and verifiable
    (b) comparable and timely
    (c) clearly sourced.
6. Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.
7. The materiality of any proposed change.
8. The longevity or sustainability of new arrangements.

Appendix B – Updated 2018 FFO/net debt

Given the submissions on financeability tests, we have updated the FFO to net debt analysis in the 2018 Instrument. We have considered this particular metric based on regulated revenues and regulated debt.

As in the 2018 Instrument, we used Moody's FFO/net debt metric and the regulated cash flows from published AER post tax revenue models. The FFO to net debt metric used by Moody's examines forecast firm cash flows after forecast cash expenditure (including operating costs, interest expenses and tax) to forecast net debt. Moody's provide guidance on the expected FFO to net debt ratios that are expected for a given credit rating. This guidance is indicative only and there are other (qualitative) factors that are considered in determining the final credit rating.

Using regulated cash flows (where we assume revenues and costs equal our regulated allowances) FFO (in a given year) can be calculated as:

> Regulated FFO = Allowed return on equity + net regulatory depreciation (after indexation is removed) + revenue adjustments

Net regulated debt can be calculated as:

> Net debt = (net RAB debt at the start of the year + net RAB debt at the end of the year)/2

Regulated FFO/Regulated net debt can then be calculated for each year as:

> FFO/Net debt = FFO in that year/Net debt in that year

This analysis is based on the regulated cash flows and net RAB debt of 60% contained in the post-tax revenue models. The estimated FFO to net debt figures for a number of businesses we regulate are shown in the table below. We compare the return on equity and five-year average FFO/net in our 2018 analysis to our 2021 update.

Table 21 Comparison of 2018 FFO/net debt to 2021 update

	2018		2021	
	RoE	FFO/net debt	RoE	FFO/net debt
AGN SA	7.1%	6.44%	5.37%	9.55%
AGN Vic & Albury	7.3%	9.61%	7.30%	9.61%
Amadeus	7.1%	6.20%	5.00%	8.00%
APA Victorian Transmission System	7.3%	7.94%	7.30%	7.94%
Ausgrid Distribution	6.3%	5.95%	5.70%	5.62%
Ausgrid Transmission	6.3%	0.02%	5.70%	-1.08%
AusNet Distribution	7.5%	8.85%	5.12%	10.35%
AusNet Gas	7.3%	8.51%	7.30%	8.51%
AusNet Transmission	7.1%	9.67%	5.34%	8.93%
CitiPower	7.0%	9.95%	5.04%	11.14%

	2018		2021	
	RoE	FFO/net debt	RoE	FFO/net debt
Directlink			4.71%	7.34%
ElectraNet	7.4%	8.82%	7.40%	8.13%
Endeavour Energy	6.3%	7.16%	5.80%	6.74%
Energex	7.5%	6.98%	4.69%	5.71%
Ergon Energy	7.5%	7.76%	4.69%	6.53%
Essential Energy	6.3%	6.94%	5.80%	6.52%
Evoenergy Gas Distribution	7.1%	6.62%	5.07%	7.59%
Evoenergy (ActewAGL) Electricity Distribution	6.3%	12.25%	5.62%	11.71%
Evoenergy (ActewAGL) Electricity Transmission			5.62%	12.52%
Jemena Electricity	7.5%	11.60%	5.31%	10.61%
Jemena Gas			4.69%	5.39%
Multinet Gas	7.2%	9.56%	7.20%	9.56%
Murraylink	7.4%	10.42%	7.40%	10.42%
Power and Water Corporation	6.3%	8.13%	5.87%	7.85%
Powercor	7.0%	9.42%	5.04%	8.85%
Powerlink	7.4%	7.76%	5.19%	8.00%
Roma (Wallumbilla) to Brisbane Pipeline	7.0%	6.13%	7.00%	6.13%
SAPN	7.5%	11.80%	4.56%	12.47%
TasNetworks Distribution	6.3%	9.75%	5.80%	8.44%
TasNetworks Transmission	7.4%	10.96%	5.80%	7.46%
TransGrid	7.4%	8.21%	7.40%	7.62%
United Energy	7.5%	11.33%	5.04%	12.49%

Source: AER

Notes: The 2018 analysis estimated the FFO/net debt for businesses based on the return on equity from regulatory decisions and, for certain businesses, a return on equity under the 2018 Instruments. Where possible, this table uses the 2018 FFO/net debt estimate that is based on regulatory decisions.