Rate of return

Term of the rate of return

Draft working paper

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Amendment Record

Version	Date	Pages
1.0	21 May 2021	60

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
NPV=0	Net present value neutrality
NZCC	New Zealand Commerce Commission
Ofgem	Office of Gas and Electricity Markets (a UK regulator)
Ofwat	Office of Water Services (a UK regulator)
PTRM	Post-tax revenue model

SL CAPM	Sharpe-Lintner capital asset pricing model (or just CAPM)
STB	Surface Transportation Board (a US regulator)
UK	United Kingdom
USA	United States of America
WACC	Weighted average cost of capital

1 Overview

This working paper is part of a series that we have produced, and will produce, as part of our pathway to the 2022 Rate of Return Instrument (2022 Instrument). The outcomes from these working papers will feed in to the active phase of our 2022 Instrument review. This information will assist us to develop a 2022 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] In advancing consumers' interests we aim to promote efficient investment in and operation of regulated energy businesses.

1.1 What do we want to achieve through our working papers?

The aim of this working paper series is to consider technical aspects of the rate of return ahead of the active phase. 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 the issues in play.

The term of the rate of return relates to the expected time horizon of investors' investment in an asset. We employ terms in various places when setting the allowed revenue requirement for regulated businesses including the post-tax revenue model (PTRM), roll forward model (RFM), return on equity and return on debt. We identify where terms have a role in our decisions and considers the suitable term for the rate of return including whether the term chosen needs to be consistent across all those instances.

In this paper, we consider:

- A suitable term for setting an efficient rate of return.
- Whether the terms for return on equity, return on debt and expected inflation should align.

1.2 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.

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.

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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.

The best possible estimate of the expected rate of return—neither too high nor too low—will promote efficient investment in, and efficient operation and use of, energy network services. While the capital market transaction is between investors and networks/pipelines, the ultimate effects will flow through to consumers.

If the rate of return is set too high:

- Investors will be over compensated for the risk involved in supplying capital to networks, so will show increased 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.
- 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.

If the rate of return is set too low:

- Investors will be under compensated for the risk involved in supplying capital to networks, so will show reduced willingness to invest in regulatory assets in comparison with other investments in the economy.
- 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.
- Consumers of energy will pay lower prices, at least in the short term; but will wear 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.

Hence, the best possible estimate of the expected rate of return is necessary to promote efficient prices in the long term interests of consumers. We evaluate the two sources of funds for investment–debt and equity–to determine what return is just sufficient to attract the necessary capital investment.

1.3 Why this topic?

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

In this paper, we explore whether we can improve our current rate of return process so that it further contributes to the achievement of the NEO and NGO.

The 2018 Rate of Return Instrument (2018 Instrument) process set the term for the rate of return as ten years for both the return on equity and return on debt and we previously determined a ten-year estimate of the expected inflation. However, in the 2020 Inflation

Review we decided to match our estimate of expected inflation to the length of the regulatory period (typically five years).[3]

In the 2020 Inflation Review, our Consumer Reference Group (CRG) made a submission that we should employ a consistent approach to term across our inflation and rate of return estimates and therefore we should also change the term for our rate of return.[4] At the time, we were satisfied that we could consider the terms for inflation and rate of return separately, but we also indicated that we wanted to investigate the appropriate term for the rate of return further. In this draft working paper, we analyse the current evidence and consider whether any changes to the term of the rate of return should be implemented.

We noted that during the 2018 Instrument process, there was evidence supporting a five-year term. However, we found the evidence to be less persuasive than that of a ten-year term at that time.[5] We committed to reviewing the term of the rate of return in the 2020 Inflation Review.[6] Our considerations in that process highlighted a need to think more broadly about the matter. Therefore, as part of this working paper, we seek to:

- Identify a suitable term for setting an efficient rate of return that contributes to achieving the NEO and NGO.
- Examine if the terms for the return on equity, return on debt and expected inflation should align.
- Ascertain the effect of a trailing average return on debt on the choice of term.
- Work closely with a diverse range of stakeholders and seek submissions on the most appropriate term for the rate of return.

1.4 Possible options and preliminary views for 2022

In preparing this draft working paper, we have considered a range of evidence including previous academic work, previous expert reports, other regulators' practices and previous stakeholder submissions. In addition, we have obtained a report from Dr Lally building on his work for our 2020 Inflation Review. In assessing this evidence, we need to be mindful of underlying circumstances and assumptions, and the relative strengths and weaknesses of the evidence.

We have previously considered a reasonable proportion of the material currently before us. However, the 2020 Inflation Review has caused us to take a fresh look at that material and our thinking is evolving. In particular, the review highlighted the importance of focusing on investors being able to recover their initial investment but no more (the NPV=0 principle).[7]

In this draft working paper, we are seeking to raise questions and invite stakeholder comments on the topic. To better direct and encourage discussion, we have put forward preliminary views (where possible).

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3 AER, *Final position, Regulatory treatment of inflation*, December 2020, p. 35.

4 CRG, *Advice to the AER on the regulatory treatment of inflation response to the draft position paper on the regulatory treatment of inflation*, 6 November 2020, p. 2.

5 AER, *Rate of return instrument, Explanatory statement*, December 2018, p. 126.

6 AER, *Final position, Regulatory treatment of inflation*, December 2020, p. 46.

7 Ibid, p. 39.

A key consideration to answering our questions should be the application of the NPV=0 condition. We consider it is important to achieving our regulatory task–setting the allowed revenue requirement for regulated energy businesses for the length of the regulatory period (typically five years) that contributes to achieving the NEO and NGO (the objectives). It provides an efficient business in the supply of regulated services with a reasonable opportunity to recover at least its efficient financing costs.[8]

An initial question is whether we need to employ a consistent term across debt, equity and our estimate of expected inflation.

Our preliminary position is that the terms for the rate of return and expected inflation should be independently assessed and do not have to be the same value. Similarly, our preliminary position is that the term of equity and term of debt should be independently determined and do not have to adopt the same value. We note that this is consistent with views from both Professor Davis and Dr Lally.[9] Other regulators also make separate decisions when determining the term of equity and term of debt.[10]

This allows us to consider the appropriate term for equity, debt and inflation on their own merits without the need to be bound by a common term.

In the 2020 Inflation Review, we decided the appropriate term for our estimate of expected inflation should align with the length of the regulatory period. We reached this conclusion because it would:

- satisfy the NPV=0 principle.[11]
- better match the nominal rate of return set out in the rate of return instrument in expectation.[12]
- better align the inflation adjustments within the regulatory period and enhance ex-ante consistency with nominal debt costs.[13] This could lower financeability risks for service providers.
- allow for prices and revenues to continue to move along with inflation and maintain the current indexation of the RAB to allow intergenerational equity between consumers.[14]

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8 AER, *Draft rate of return guidelines, Explanatory statement*, July 2018, p. 76.

9 Kevin Davis, *Determining debt costs in access pricing, A report to IPART*, December 2010, p. 2; Dr Martin Lally, *The appropriate term for the allowed cost of capital*, April 2021, p. 4.
Professor Davis advised that the term of debt and term of equity should match to the length of the regulatory period in his 2010 paper and 2003 paper respectively. However, he noted in his 2010 paper that the use of a ten-year risk-free rate for estimating the market risk premium has no relevance for determining the term of debt.

10 ERAWA *Final gas rate of return guidelines, Explanatory statement, Meeting the requirements of the National Gas Rules*, December 2018, p. 26; Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 76, 79; Ofgem, *RIIO-2 Final determinations- Core document*, December 2020, pp. 26, 82; Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 111, 115.

11 AER, *Final position regulatory treatment of inflation*, December 2020, pp. 28 & 39.

12 Ibid, p. 35.

13 Ibid, p. 40.

14 Ibid, p. 41.

For the return on equity, we recognise that there are reasons supporting matching the term to either the length of the regulatory period or the underlying assets. This was also noted in the 2018 Instrument. With the evolution in our thinking, we have considered previous materials afresh as well as more recent materials. The choice of term should ultimately be based on contributing to achieving our regulatory task. This leads to two key criteria:

- Satisfying the NPV=0 condition.
- Setting the rate of return (as part of the revenue requirement) over a regulatory period.

Therefore, on the material before us at this time we are considering whether we should match the term on the return on equity with the length of the regulatory period. Reasons supporting this approach include:

- It would satisfy the NPV=0 principle (and hence contribute to achieving the NEO and NGO).[15]
- We set revenue for each forthcoming regulatory period (generally five years) rather than ten years specifically.[16] Matching the term of equity to the length of regulatory period means that we would be providing compensation that reflects the expected return and investors' expectation over the period, which is consistent with setting a return that will contribute to achieving the NEO and NGO.[17]
- It is still consistent with the long lives of the underlying assets, given the return on equity is expected to be reset each regulatory period over the period the assets remain within the regulatory asset base.[18]

However, we also recognise there are reasons for retaining a ten-year term, including:

- It may better match the long-lived nature of the underlying assets.
- The general market practice by financial practitioners is to use a ten-year term.[19]
- Other regulators' practice has often adopted a term of equity that is longer than the length of the regulatory period.[20]
- Maintaining a ten-year term would promote regulatory stability and predictability because we have adopted it since our 2009 Weighted Average Cost of Capital (WACC) Review.[21]

On the return on debt, Dr Lally has advised that the term should depend on the form of the return on debt and there is no clear best approach. Our preliminary position is to maintain the use of a trailing average return on debt. We consider this would provide certainty and stability

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15 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC, Prepared for the ACCC, August 2003*, pp. 9–10; Kevin Davis, *The debt maturity issue in access pricing*, December 2013, p. 13; Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 3.

16 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 21; NZCC, Input methodologies (Airport services), Reasons paper, December 2010, p. 228, 233–244.

17 NZCC, Input methodologies (Airport services), Reasons paper, December 2010, p. 228, 233–244.

18 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 21.

19 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 18; AER, *Rate of return instrument, Explanatory statement*, December 2018, p. 127.

20 This is covered in section 4 below.

21 This is covered in section 6.3.1.2 below.

for businesses and consumers. Further, evidence indicates that it is feasible for businesses to implement. However, we note that there are circumstances where a trailing average may not be suitable such as when a new firm enters the market or significant capital projects are planned (for example, the projects planned under the 2020 Integrated System Plan (2020 ISP)). We intend to consider the merits of possible modifications to the trailing average approach in our upcoming Debt Omnibus paper.

We are also considering matching the term of debt to that of an efficient firm's borrowing. We have been increasingly collecting and exploring the use of actual debt information from regulated businesses since the 2018 Instrument. Dr Lally noted that satisfying the NPV=0 condition would require matching the interest rate incurred by an efficient firm with the regulatory allowance which also entails matching of the term.[22]

We propose to consider using the Energy Infrastructure Credit Spread Index (EICSI) and corresponding weighted average term to maturity at issuance (WATMI) to inform the term of debt to better match that of an efficient firm's borrowing. We believe an efficient firm's borrowing is likely to be best approximated by an industry-wide measure such as the WATMI which would remove idiosyncratic decisions pertaining to a particular business. Our preliminary view is that the term of an efficient firm's borrowing could be less than the ten-year term currently imbedded in our trailing average approach.

In our *Energy Network Debt Data working paper*, we proposed adjusting the credit rating on the basis of our observation of the EICSI. In the forthcoming Debt Omnibus working paper we will consider whether our proposed adjustment remains the best option in light of our considerations on term.

We proposed a number of questions in section 6 to seek stakeholders' views on our preliminary views and thinking. For convenience, these are reproduced below.

Question 1: should the term for expected inflation match the term for the rate of return?

Question 2: should the term for equity match the term for debt?

Question 3: should the term for the return on equity align to the regulatory control period (typically five years) or a longer period more consistent with the life of the underlying asset life (e.g. ten years)?

Question 4: what is the appropriate form for the return on debt for businesses we regulate?

Question 5: what is the appropriate term of debt given the form of the return on debt (in your response to question 3)?

Question 6: should our index of network debt costs (EICSI) and the corresponding WATMI be used to adjust the benchmark debt term?

Question 7: what transitional arrangements would be required if a change in the debt term is implemented?

22 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 25.

1.5 Next steps

We invite stakeholder submissions in response to this working paper by 2 July 2021.

Our past practice was to hold a public forum in person during the consultation period, where stakeholders can ask questions of the AER and interact directly to hear each other's perspectives. However, our experience during the COVID-19 pandemic has demonstrated the practicality and value of online forums. Therefore, our current intent is to hold an online event during the consultation period. Information about the online forum will be available on the AER's website in due course.

Information about the online forum will be available on the AER's website in due course.

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

1.5.1 Making a submission

Written submissions should be emailed to the AER at RateOfReturn@aer.gov.au, by close of business, 2 July 2021.

Alternatively, submissions can be sent to:

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

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

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

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

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

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

2 Process background

2.1 What is the rate of return instrument?

The rate of return instrument 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.

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.

2.2 What is our 'Pathway to 2022'?

We use the term 'Pathway to 2022' to describe the process by which we will develop the 2022 Instrument. We consulted with stakeholders about what steps should be included and what role various reference groups should play.[23] We issued a position paper in March 2021 setting out the timeline and content of our upcoming working papers.[24]

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

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

We have published this draft paper simultaneously with our draft working paper on the *Rate of return and cashflows in a low interest rate environment*.[25] The paper on low interest rate environment explores whether we are allowing the appropriate compensation for Network Service Providers (NSPs), and whether there are difficulties in financing new projects under a low interest rate environment.

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

24 AER, *Pathway to the 2022 rate of return instrument, Position paper on 2021 working paper series*, March 2021.

25 AER, *Rate of return and cashflows in a low interest rate environment, Draft working paper*, May 2021.

We intend to publish three additional working papers in the second half of 2021, which will more broadly examine issues relating to equity, debt and the overall rate of return. We believe stakeholder contributions on the issues discussed in this draft working paper will be more effectively made through submissions to this paper rather than the subsequent omnibus papers. This would allow for more targeted feedback.

We will consult further on the process for the active phase of the review, including lower-level details not addressed in our May 2020 position paper, as we get closer to 2022.

2.3 What is the intent of the working papers series?

Our rate of return working papers discuss issues and evidence on key rate of return topics, and allow us to hear from stakeholders in response. We intend that all this material will feed in to the main phase of the review, providing a foundation for constructive discussion and helping alleviate time pressure in the active phase.

On each chosen topic, we expect to release a draft working paper (usually accompanied by an expert report), before a submission period. We will facilitate discussion with stakeholders. Our experience from the COVID-19-related restrictions in 2020 was that stakeholders welcomed online meetings. We will then release a final working paper with our response to submissions.

In selecting topics for working papers, we have had regard to whether topics could be constructively considered as discrete issues in advance of the active phase of the review.[26] We have also taken into account stakeholder feedback on the topics of interest or importance.[27]

The topic of this paper (term of the rate of return) was selected because our *2020 Inflation Review* changed the term of expected inflation from ten years to five years to match the length of the regulatory period. This, along with the lack of consensus in stakeholder views on the term for the rate of return, has prompted us to consider this topic in a standalone working paper.

2.4 How does this interact with other working papers?

We have published three working papers thus far in our suite of working papers:

- *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.
- *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.

26 AER, *Position paper, Pathway to the 2022 rate of return instrument*, 29 May 2020, pp. 9–10.
27 Ibid, p. 22.

- *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.

The Term of the Rate of Return working paper covers a relatively ‘stand-alone’ and overarching topic that will feed into the later papers.

3 Previous AER work

3.1 Background to the rate of return framework

We apply a 'building block' model to set regulated revenues for electricity and gas network service providers. The building blocks—return on capital, return of capital, operating expenditure and tax—reflect the expected costs that would be incurred by a benchmark efficient entity operating the network. This is a form of incentive regulation, as building blocks are estimated in advance for a regulatory control period (typically five years) and the network retains any benefit (or bears any detriment) where it is able to reduce costs below the AER's estimates. Revealed costs are then used to inform building block estimates for the following control period, so that efficiency gains are passed on to consumers. We also operate a number of incentive schemes in conjunction with the building block framework.

The return on capital building block is set by applying a rate of return on capital to the regulatory asset base each year. The AER currently estimates the allowed rate of return for regulated businesses using the approach set out in the 2018 Instrument. The rate of return instrument is binding under the National Electricity Law (NEL) and National Gas Law (NGL). This means that the AER and network businesses are required to set the rate of return according to the current Instrument.

The 2018 Instrument applies the following key characteristics when estimating a businesses' allowed rate of return:[28]

1. It use a nominal vanilla weighted average cost of capital (WACC) formulation.[29]
2. It assumes a 40% equity and 60% debt capital structure.
3. It uses a domestic capital asset pricing model (CAPM) to estimate the return on equity. This is implemented as:
   (a) The risk-free rate (RFR) is estimated from the yield on 10 year to maturity Commonwealth Government Securities (CGS) over a short averaging period (20 to 60 business days) prior to the commencement of the regulatory control period.
   (b) Equity beta of 0.6 (fixed for the life of the 2018 Instrument).
   (c) Market risk premium (MRP) of 6.1 per cent (also fixed for the life of the 2018 Instrument).
   (d) The return on equity is therefore the risk-free rate plus a fixed equity risk premium of 3.66 per cent.[30]
4. It uses a trailing average portfolio for the allowed return on debt, updating ten per cent of the portfolio estimate annually (i.e. a ten-year rolling window of annual debt observations).

28 AER, *Rate of return instrument, Explanatory Statement*, December 2018, pp. 13–16
29 Used in a post-tax revenue model, i.e. effect of the interest tax shield is considered in cashflows.
30 The equity risk premium is the product of beta and the market risk premium.

5. The annual return on debt is based on debt costs for the benchmark BBB+ credit rating at a ten-year term, estimated by weighting A rated and BBB rated benchmark curves (from a number of providers) over an averaging period.
6. Market data for the return on debt and risk-free rate is sourced from averaging periods nominated by the network businesses in advance.

3.2 What is the term of the rate of return

The term of the rate of return relates to the expected time horizon of investors' investment in an asset. Specifically, the term of the rate of return consists of the term of the return on equity and return on debt. We need to choose an appropriate term that contributes to achieving our legislative objectives (sets a rate of return that contributes to achieving the NEO and NGO).

The term of the return on equity determines how we estimate the risk-free rate and the MRP. It is also sometimes referenced as the term of the risk-free rate. The risk-free rate is an input to our equity pricing model which is used to estimate the allowed return on equity. The term of the return on debt determines the specific yields on corporate bonds, which will be used as an input for estimating the return on debt.

When the yield curve is upward sloping, the longer the term, the higher will be the risk-free rate and return on debt. The converse applies when the yield curve is downward sloping.

3.3 Previous considerations

3.3.1 2003 GasNet decision

The Australian Competition and Consumer Commission (ACCC) determined that the term of equity should match to the length of the regulatory period (5 years) in its 2003 final decision on access arrangements for GasNet Australia.[31] It considered that the expected regulatory return over the sequence of reviews should match the initial risk-free rate expected by the market over the life of the asset.[32]

The ACCC also determined that the term of debt should match the length of the regulatory period (5 years).[33] Given a five-year regulatory period, it considered that a five-year debt assumption was appropriate and that it should reflect market expectations of rates over that period. In addition, evidence provided by Macquarie Bank suggested that debt issued by projects tended to have a five-year term on average.

However, on appeal by GasNet, the Australian Competition Tribunal (Tribunal) determined that a ten-year term for the risk-free rate should be applied.[34] The Tribunal considered that it aligned with the conventional use of a ten-year bond rate by economists and regulators.

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31 ACCC, *Final Decision GasNet Australia access arrangement revisions for the Principal Transmission System*, 13 November 2002, p. 108.

32 Ibid, pp. 82, 85.

33 Ibid, p. 93.

34 Australian Competition Tribunal, *Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT 6, Addendum*, December 2003, p. 18.

Furthermore, it was of the view that the ten-year term was commensurate with the relevant market conditions and risks.

The Tribunal also stated that the ACCC misapplied the CAPM by adopting a ten-year risk-free rate to calculate the MRP at the same time it used a five-year risk-free rate to calculate the allowed return on equity.[35] It explained that, while the CAPM permits some flexibility in the choice of the inputs required by the model, the mathematical logic underlying the CAPM must remain true. In this context, it considered the use of different values for the risk-free rate in estimating the rate of return using the CAPM formula was neither true to the formula nor a conventional use of the CAPM.

3.3.2 2009 Review of WACC parameters

3.3.2.1 Term of the return on equity

The 2009 Review of Weighted Average Cost of Capital (WACC) parameters determined that a ten-year risk-free rate should be used to estimate the return on equity.[36] We concluded that there was insufficient evidence to justify a departure from a ten-year term for the risk-free rate. This was after considering evidence supporting matching the term to the length of the regulatory period. The use of a ten-year term for the risk-free rate was also based on the National Electricity Rules (NER), which largely adopted the approach taken by the Tribunal in its 2003 GasNet decision.[37]

3.3.2.2 Benchmark debt term

The 2009 Review of WACC parameters estimated the return on debt as the sum of the risk-free rate and the debt risk premium.[38] Both parameters in the return on debt were based on a ten-year term.[39] We initially considered there was evidence to adopt a debt term that aligned with the length of the regulatory period.[40] Data provided by Deloitte also supported a five-year debt term for the following reasons:[41]

- A five-year debt term would not impose additional costs in terms of illiquidity.
- Network businesses refinance every five years or less. Hence, a move to a five-year term would not impose additional refinancing risk.

However, our final decision in the 2009 Review of WACC parameters stated that a ten-year term for the return on debt was appropriate.[42] This was because a five-year risk-free rate may result in a significant shortening of debt on issue by the benchmark efficient entity.[43] We

35 Ibid, pp. 14, 17–18.
36 AER, *Final decision, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters*, May 2009, p. 48.
37 Ibid, p. 172.
38 Ibid, p. 19.
39 Ibid, p. 48.
40 Ibid, p. 141.
41 Ibid, p. 140.
42 Ibid, p. 48.
43 Ibid, p. 168.

considered a ten-year risk-free rate to be conservative and would ensure that refinancing risk was not increased for the sector.

At the time, we noted that, on average, a ten-year term assumption was expected to over-compensate the benchmark efficient entity on the return on debt.[44] The major source of this over-compensation was the term premium on the base interest rate component[45] of the return on debt. This component, via hedging instruments, was converted to a term matching the length of the regulatory period. A debt term which matched the length of the regulatory period would be expected to under-compensate the benchmark efficient entity. However, this could not be altered via hedging instruments.

3.3.3 2013 Guidelines

3.3.3.1 Term of the risk-free rate return on equity

The 2013 Rate of Return Guidelines (2013 Guidelines) adopted a ten-year term for the risk-free rate.[46] We considered that a ten-year risk-free rate reflects the long-term nature of cash flows in equity investments and the long-lived nature of the assets in an infrastructure business. A ten-year term also maintained our previous position, which would promote certainty and predictability in decision-making. It avoided practical complexities in the estimation of the MRP that would result from a change to a five-year risk-free rate.

3.3.3.2 Benchmark debt term

A ten-year benchmark debt term was adopted in the 2013 Guidelines for the following reasons:

- Regulated businesses aimed to match the length of the debt term to the asset life in order to minimise refinancing risk.[47]
- Regulated energy assets are depreciated for regulatory purposes over as long as 60 years.[48]
- By issuing longer-term debt, the entity would reduce the frequency with which it must approach the market, thereby reducing interest rate risk and refinancing risk.
- A benchmark efficient entity would likely enter into hedging contracts to manage its interest rate risk. A ten-year benchmark debt term and a ten-year transition period takes into account the period of time that is likely to be needed for the benchmark efficient entity to unwind its hedging contracts.[49]

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44 Ibid, p. 168.

45 The return on debt can be separated into two components—a risk-free rate (or base rate) component and a risk premium over the base rate. The risk premium is called the debt risk premium (DRP).

46 AER, *Better regulation, Explanatory statement, Rate of return guideline*, December 2013, p. 49.

47 Ibid, p. 147.

48 Ibid, p. 138.

49 Ibid, p. 124.

- We previously set a ten-year term for debt and considered that any changes to the benchmark debt term in response to updated debt portfolio information on the weighted average term-at-issuance would not be conducive to regulatory stability.

3.3.4 2018 Instrument

3.3.4.1 Term of the return on equity

The 2018 Instrument maintained a ten-year term for the return on equity.[50] We explained that a ten-year term contributed to the achievement of the NEO and NGO and reflected actual investor valuation practices and academic works. Furthermore, the term aligned with the Sharpe-Lintner CAPM theory, which estimated returns over a long-term investment horizon. We also considered that the lack of reliable and consistent data for longer term CGS prevented the use of CGSs with a term beyond ten years.[51]

At that time, we noted that there was evidence to support the application of a five-year term. However, we found the evidence to be less persuasive than that of a ten-year term.[52] Dr Lally outlined that using a CGS yield with a term equal to the length of the five-year regulatory period satisfied the NPV=0 principle better than a ten-year term.[53] We considered Dr Lally's advice and noted that using a five-year term required the assumption that the full recovery of the residual RAB (in cash) at the end of the term is guaranteed. This assumption would be difficult to achieve in reality because of the volatility of the stock market and the ability of regulated businesses to over or under perform their allowed rate of return.

3.3.4.2 Benchmark debt term

We maintained our current benchmark debt term of ten years in the 2018 Instrument.[54] At the time, we noted that a ten-year benchmark term had been adopted consistently over several regulatory cycles and that regulated networks had an incentive to match debt issuance to the ten-year term in order to minimise interest rate risk.[55]

We also observed that service providers' actual debt raising practices and relevant market circumstances over 2013 to 2017 did not allow us to draw firm conclusions as to the term for a benchmark entity.[56] This was because the sample period coincided with the period in which the transition to the trailing average return on debt approach was effected, which was considered likely to impact debt raising practices to some extent.

Accordingly, based on actual debt data collected from service providers, it was unclear whether the observed debt issuance patterns were temporary or a transient adjustment in response to the transition to a trailing average approach. In this context, it was difficult to draw conclusions from the sample of actual debt data, which suggested an average term of

50 AER, *Rate of return instrument, Explanatory statement*, December 2018, p. 126.
51 Ibid, p. 131.
52 Ibid, p. 126.
53 Dr Martin Lally (Capital Financial Consultants), *The risk-free rate and the present value principle*, August 2012.
54 AER, *Rate of return instrument, Explanatory statement*, December 2018, p. 300.
55 Ibid, p. 299.
56 Ibid.

7.4 years. Therefore, we retained our view that a ten-year benchmark term was appropriate. However, we considered that ongoing collection of actual cost of debt information would allow us to develop a longer-term EICSI value-weighted portfolio.[57]

3.3.5 2020 Debt network data working paper

Our debt network data working paper released last year considered the use of EICSI and the associated WATMI.

It identified our preferred approach for the 2022 Instrument is to use third-party data series to create the benchmark but use the EICSI to determine the blend of A and BBB data.[58] However, our preferred approach uses curves from external data providers. Hence, we require a benchmark debt term to be set which led to the creation of the WATMI.[59]

The WATMI weighs each debt instrument with regard to the value of that debt as a proportion of total debt and, depending on the scenario modelled, generated estimates ranging from 8 to 11 years.[60] We identified that there were still some difficulties with the WATMI but considered that the updated WATMI combined with the more detailed drawdown data that would be received in the coming round of data collection would be useful in determining a benchmark term.

3.3.6 2020 Inflation review

Our *2020 Inflation Review* changed the term for expected inflation from ten years to five years, matching the length of our regulatory period.[61]

We considered that this allows us to match the nominal rate of return set out in the rate of return instrument in expectation.[62] Adopting a shorter inflation term would better align the inflation adjustments within the regulatory period and enhances ex-ante consistency with nominal debt costs.[63] It could also reduce financeability risks for service providers. Moreover, the approach would allow prices and revenues to move along with inflation and maintain the current indexation of the RAB, preserving intergenerational equity for consumers over time.[64]

Advice from Dr Lally noted the AER's five-year regulatory period and recommended estimating expected inflation over a five-year term to satisfy the NPV=0 principle.[65] He highlighted that our previous use of a ten-year term for expected inflation aligned with the term of the risk-free rate but violated the NPV=0 requirement.[66] He suggested matching the

57 Ibid, p. 300.
58 AER, *Rate of return, Energy network debt data, Final working paper*, November 2020, pp. 34–35.
59 Ibid, November 2020, p. 36.
60 Ibid, p. 13.
61 AER, *Final position, Regulatory treatment of inflation*, December 2020, p. 35.
62 Ibid, p. 35.
63 Ibid, p. 40.
64 Ibid, p. 41.
65 Dr Martin Lally (Capital Financial Consultants), *Review of the AER's inflation forecasting methodology*, July 2020, p. 3.
66 Ibid, p. 6.

term of the risk-free rate to the length of the regulatory cycle and estimating expected inflation for each of the next five years.[67]

Furthermore, Dr Lally explained that a ten-year WACC does not warrant the use of a ten-year term for expected inflation.[68] He noted the term structure for WACC is generally upward sloping whilst that for expected inflation is as likely to be downward as upward sloping. Therefore, he concluded there to be no benefit in using a ten-year term of expected inflation compared to using a five-year term.

67 Ibid.
68 Ibid.

4 Other regulators

We are not the only regulator needing to consider the term of the rate of return. Other Australian regulators and those in many overseas jurisdictions also grapple with some of the same issues. A high-level comparison of regulatory approaches on the term used for the rate of return allows us to consider these other approaches and alternative views on setting the appropriate term.

4.1 Australian regulators

We considered the views of seven Australian regulators on the term of the rate of return and expected inflation. The key observations are:

- The domestic regulators that we reviewed generally adopted a ten-year term for both the return on equity and return on debt. The rationale was generally to reflect the long economic lives of regulated assets, and to promote investment.[69]
- The majority of the seven regulators used a ten-year term for expected inflation even though this did not align with the length of their regulatory period.
- The Independent Competition and Regulatory Commission (ICRC) and Economic Regulation Authority Western Australia (ERAWA) (gas decisions) adopted a five-year term for expected inflation, consistent with our current approach. The ICRC highlighted that a five-year term is consistent with regulatory practice.[70] The five-year term matches the term of the risk-free rate used by ERAWA.[71]

A summary of the seven domestic regulators' term of the rate of return and expected inflation is set out in Table 1.

69 Queensland Competition Authority, *Request for comments, Rate of return review*, November 2020, pp. 8–9, 16; ERAWA *Final determination, 2018 and 2019 weighted average cost of capital – For the freight and urban networks, and the Pilbara Railways,* August 2019, p. 9; ESCOSA, *SA water regulatory determination, Final determination: Statement of reasons*, June 2020, pp. 208–218.

70 ICRC, *Draft report, Review of methodologies for the weighted average cost of capital, Report 1 of 2021*, February 2021, p. 44.

71 ERAWA *Final gas rate of return guidelines, Explanatory statement, Meeting the requirements of the National Gas Rules*, December 2018, p. 248.

Table 1 Rate of return term used by Australian regulators

	Regulatory term	Risk-free rate term		Debt term	Inflation term	
		5 years	10 years	10 years	5 years	10 years
ACCC*	2.5 years		✓	✓		✓
ERAWA (Gas)	5 years	✓		✓	✓	
ERAWA (Railway)	1 year		✓	✓		✓
IPART	4 to 5 years		✓	✓	Matches length of regulatory period	
QCA**	3 to 5 years		✓	✓		✓
ICRC	5 years		✓	✓	✓	
ESCOSA	4 years		✓	✓		✓
ESCV	4 years		✓	✓		✓

* The ACCC's information in this table refers to its final decision on the public inquiry on the access determination for the Domestic Mobile Terminating Access Service.

** The QCA is currently undertaking a review into the appropriate data sources and approach for estimating inflation in future regulatory reviews. It has also started a review of its rate of return methodology with the publishing of a request for comment paper in November 2020.

4.2 International regulators

To help us understand overseas regulatory regimes, we commissioned expert advice from the Brattle Group (Brattle) which was released in 2020 alongside our draft working paper on *International regulatory approaches*.[72] Brattle reviewed the rate of return methodologies of seven international regulators.

Brattle's analysis on the Water Services Authority's (Ofwat's) decision was based on the Price Review 2019 (PR19) final decision made in December 2019.[73] However, regulated businesses disputed Ofwat's decision and appealed to the Competition and Markets Authority (CMA). Hence, we have also provided the CMA's provisional determination for the disputing companies.[74]

72 AER, *Rate of return, International regulatory approaches to rate of return, Draft working paper*, 27 August 2020; and The Brattle Group, *A review of international approaches to regulated rates of return, Prepared for the Australian Energy Regulator,* 30 June 2020.

73 Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 129.

74 CMA, *Anglian, Bristol, Northumbrian and Yorkshire water determinations, Provisional findings*, September 2020.

At the time the Brattle report was finalised, the Office for Gas and Electricity Markets (Ofgem) was also yet to publish its draft decision on the gas and electricity transmission network price controls for the 2021–2025 regulatory period.[75] For our analysis we have identified the rate of return term in Ofgem's final decision released in December 2020.

Our key observations are:

- Three regulators (the Authority for Consumer and Markets (ACM), New Zealand Commerce Commission (NZCC) and Ofgem) adopted the same term for both the return on debt and return on equity.[76] However, their decisions were based on separate considerations of the terms.
- Five regulators (FERC, STB, ARERA, Ofwat and CMA) adopted different terms for debt and equity. Of these, three regulators effectively used estimates of regulated businesses' actual term of debt.
- The NZCC was the only regulator that matched the term for the rate of return to the length of their regulatory period.[77] Its key rationale was to allow utilities to earn a normal return while being adequately compensated for interest rate risk.
- The Brattle report did not mention a specific expected inflation term for the majority of international regulators. The ACM and Ofgem adopted a term for expected inflation of 3 years and 1 year respectively.[78]

Table 2 provides a summary of the rate of return term used by international regulators.

75 Brattle, A review of international approaches to regulated rates of return, June 2020, p. 120.

76 Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 76, 79; Ofgem, *RIIO-2 Final determinations- Core document*, December 2020, pp. 26, 82; Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 111, 115.

77 Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 111, 114 –115.

78 Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 79; Ofgem, *RIIO-2 Final determinations- Finance Annex (Revised)*, February 2021, p. 7.

Table 2 Rate of return term used by international regulators

	Regulatory term (years)	Risk-free rate term (years)					Debt term (years)			
		5	10	15	20	30	Actual	5	10	20
ACM	5		✓						✓	
FERC	Varies*					✓	✓			
STB	1				✓		✓			
ARERA	6		✓				✓			
NZCC	5	✓						✓		
Ofgem	5				✓					✓
Ofwat	5			✓					✓	
CMA	5				✓**				17 to 22 years***	

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

** CMA determines the lower bound of the risk-free rate using a 20-year maturity index linked gilt and the upper bound of the risk-free rate using the average of the IHS iBoxx £ Non-Gilt AAA 10+ and 10-15 indices

*** CMA estimates the iBoxx A and BBB rated 10+ index. The long-term average length of maturity of the instruments in the A rated index is 21.7 years and 17.2 years for the BBB rated index

5 Findings from expert reports

As part of this paper, we reviewed previous reports on the term of the rate of return and how they should be set. This section contains a summary of the key findings in those reports.

5.1 Kevin Davis 2003

In his 2003 report for the ACCC, Professor Davis provided the following key advice on the term of the rate of return:

- The maturity chosen for the risk-free rate should be equal to the length of the regulatory determination period (5 years in the case under consideration).[79]
- It is necessary to determine the appropriate maturity for the risk-free asset which gives the best tracking portfolio, and which will ensure that the regulated asset has an initial NPV of zero (is fairly priced).[80]
- Use of an interest rate with maturity equal to the regulatory horizon (regulatory period) in deriving the required return for the regulated asset generates expected cash flows which are fairly priced.[81]
- Using a maturity for the risk-free asset which exceeds the regulatory horizon (regulatory period), provides excess returns for the regulated asset if it is believed that there typically is a positive term premium in the yield curve which is unrelated to interest rate expectations.[82]
- Historical estimates of the MRP have often been calculated as some historical average of the actual market return over some risk-free rate which is often the ten-year government bond rate.[83] However there are a number of arguments against this:
    - The MRP should be forward looking.
    - The method of estimation of historical MRP figures is subject to much debate.
    - The MRP can be expected to vary overtime.
    - The historical MRP estimates are derived primarily from a period without dividend imputation and reflect equity returns without franking credits.
    - Government securities markets have changed markedly over the past twenty years, and that historical MRP estimates are based largely on data prior to this time.
- In calculating the cost of debt, the maturity of the risk-free rate or the base rate component, should be set equal to the regulatory horizon (regulatory period). The credit

79 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC, Prepared for the ACCC*, August 2003, p. 4.
80 Ibid, p. 7.
81 Ibid, p. 9.
82 Ibid, p. 10.
83 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC*, Prepared for the ACCC, August 2003, pp. 10–12.

spread added to the risk-free rate should reflect that prevailing in the market for issues of that maturity and the agreed appropriate level of credit rating for the regulated entity.[84] The allowable cash flows should incorporate an allowance for cost of refinancing debt with a maturity equal to the regulatory horizon.

5.2 CEG 2009

The Competition Economists Group (CEG) provided the following key advice on the term of debt in its 2009 report for the Joint Industry Association (JIA):

- An observed average remaining life (term to maturity) of debt of five years is consistent with firms issuing debt that has a term to maturity of ten years.[85] However, if the debt issuance had not been evenly spread over time, it would not necessarily follow that the term to maturity at issue was double the term to maturity. Therefore, on average it will be true that the term to maturity at issue will be double the term to maturity of an existing debt portfolio.
- Deloitte's assessment of term to maturity for existing debt portfolios carries limitations in its report for the AER.[86] It is not possible to derive an accurate estimate of the average time to maturity for the total debt portfolio without point estimates of the average time to maturity of debt for all the categories.
- Evidence of the actual debt portfolios of government owned businesses should be discounted to the extent that it is materially different to the evidence from private firms.[87]
- Privately owned regulated businesses firms tend to issue debt that, on average, has a term to maturity closer to ten years than five years.[88] It should be presumed that this reflects the outworking of competitive forces in capital markets. That is, total risk adjusted costs are minimised by issuing debt of a maturity that is longer than five years.
- Application of the logic set out in the AER draft decision leads to the conclusion that moving to a five-year term in the NER would result in under-compensation for the efficient costs incurred by a benchmark firm.[89]

5.3 Kevin Davis 2010

In his 2010 report for IPART, Professor Davis provided the following key advice in his report on the cost of debt:

- Regulatory practice in access pricing in Australia has been to adopt a cost of debt based on a ten-year maturity even though the regulatory horizon is typically for five years.[90] The justification for such an approach is typically based on two arguments – neither of which have merit.

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84 Ibid, p. 12.
85 CEG, *Term of the risk-free rate under the NER a report for the Joint Industry Association*, January 2009, p. 7.
86 Ibid, pp. 8–11.
87 Ibid, p. 12.
88 Ibid, p. 13.
89 Ibid.
90 Kevin Davis, *Determining debt costs in access pricing, A report to IPART*, December 2010, p. 1.

- The first argument is that a ten-year maturity is used for the risk-free rate in historical calculations of the MRP. Therefore, consistency requires use of the ten-year bond rate.[91] However, the use of the ten-year bond rate in calculating the MRP has no relevance for the determination of the appropriate maturity of debt in estimating the appropriate cost of debt.
- The second common argument used is that interest rate risk management considerations imply that the maturity of debt should attempt to match the maturity of the real assets being financed. However, the real assets involved in access pricing generate a future cash flow stream, which is reset every five years (at regulatory determinations) in line with movements in market interest rates. Thus the duration of the real assets is five years or less.[92] Consequently, interest rate hedging would require a duration of debt equal to (or less than) the length of the regulatory period of five years.

- The debt maturity should match the regulatory horizon (regulatory period).[93] An example was provided to show that the choice of the one period rate (i.e. maturity equal to the regulatory horizon (regulatory period)) leads to the desired outcome of a zero NPV. The use of a debt maturity greater than the regulatory period for estimating the cost of debt is inconsistent with achieving a zero NPV (except in the unrealistic situation of the yield curve being always horizontal).[94]

5.4 CEG 2011

CEG in its 2011 report for South East Queensland water business provided the following key points on the term of the rate of return:

- A ten-year term should be chosen for the risk-free rate for the following reasons:[95]
  - Consistency with how the MRP has been estimated
  - Consistency with the objective of limiting volatility in the cost of capital allowance (protecting both customers and businesses from this volatility)
  - Consistency with the objective of not underestimating the cost of equity
  - Consistency with the long life of the underlying assets (and the non-CAPM risks shared by those assets and long-lived Government debt).
- CEG disagreed with Dr Lally's conclusion that, if a regulator resets the cost of equity (and debt) every three years, it must also be true that the risk-free rate used in the CAPM to reset the cost of equity is the three-year Government bond rate:[96]
  - Dr Lally implicit assumes that capital markets are perfectly efficient and liquid, and that the Commonwealth Government is expected to be a perpetually risk-free debt provider. This is violated both in the market for long-term Government bonds and, in particular, in the market for equity.

91 Ibid, p. 2.
92 Ibid.
93 Ibid.
94 Ibid, p. 4.
95 CEG, *WACC estimation a report for South East Queensland water businesses*, February 2011, p. 4.
96 Ibid, pp. 18–25.

- Equity returns are risky and this fundamentally alters the relevance of the hypothetical example undertaken with a risk-free Government bond. Importantly, one must assume that equity investors use the three-year risk-free rate to arrive at their CAPM cost of equity.
- Dr Lally's conclusion ignores the complexity of the regulatory objectives and regime.
- These considerations combine to demonstrate that Dr Lally's proposition can be rejected on the basis of a reductio ad absurdum test. That is, the proposition underlying the Lally conclusion can be rejected on the basis that it leads to absurd outcomes.

- The cost of ten-year debt has been appropriately estimated by the QCA.[97] However, CEG disagreed with the QCA that the cost of debt should be estimated to include a cost reduction associated with hedging risk-free rates to the three-year CGS rate. CEG did not consider that the hypothetical hedging contract used by the QCA actually does this. CEG considered that adopting this strategy would increase the risk faced by the businesses, and hence their cost of equity, by more than the saving estimated by the QCA. For these reasons CEG recommended that the QCA not assume any hedging strategy when estimating the cost of debt.

5.5 Kevin Davis 2013

In his 2013 report published in the Economic Record, Professor Davis provided the following key advice on the term of debt:

- Under the Australian approach to access pricing, given the objectives of regulators, the assumed debt maturity should correspond to the regulatory reset period (typically five years).[98]
- Regulatory attitudes on the appropriate debt maturity to be used have varied across regulators and over time.[99] Some Australian regulators have moved to a ten-year term of debt while others have used a five-year term. International regulators appears to place more emphases on actual debt costs.
- Use of actual debt costs rather than an assumed maturity debt cost changes the relevance of the Australian debt maturity debate. Whether access providers then have adequate incentives to choose a debt structure which minimizes the cost of debt financing is open to question.[100]
- The debt maturity used in cost of debt capital estimation in access pricing should correspond to the regulatory reset period because it would satisfy the following two conditions:[101]

97 Ibid, pp. 5–6.
98 Kevin Davis, *The debt maturity issue in access pricing*, December 2013, p. 3. Published in Economic Record, Vol 90, No 290, September 2014, 271-281.
99 Ibid, p. 4.
100 Ibid, p. 6.
101 Ibid, p. 14.

    - Allowable expected cash flows should be set such that after making allowance for required debt repayments, the expected return to equity should equal its required return.
    - The allowable debt repayments should be the minimum possible the access provider can achieve without creating additional risk for itself beyond that which is allowed for in the regulatory determination.
- Three factors needed be considered when determining the term of debt:[102]
    - How the assumed choice of debt maturity affects the sharing of interest rate risk of financing long-term assets between access providers and customers?
    - Whether access providers may be unable to match their debt portfolios to the regulatory assumptions and thus incur additional costs and/or risks?
    - Use of a ten-year bond rate as the risk-free rate in determining the regulatory cost of equity via the CAPM (or other asset pricing model) implies use of a ten-year cost of debt on ground of consistency.
- There may be three alternatives to the current Australian approach for term of debt:[103]
    - Set the allowable cost of capital component of cash flows over the entire life of the asset at the time of its purchase using a debt maturity equal to the asset life, and never resetting the cost of capital component of allowable cash flows
    - Use the remaining expected life of access assets at reset dates to determine debt financing costs would also achieve regulatory goals
    - Actual (and forecast) cost of debt of the access provider plays a larger role
- Regulatory judgement on acceptable debt portfolios and borrowing costs of regulated entities for determining access prices seems inevitable – although whether the Australian approach of using solely the costs of a specific assumed debt maturity is optimal is worthy of further debate.[104]

5.6 Incenta 2013

Incenta Economic Consulting (Incenta) provided the following key advice in its 2013 report for the ENA:

- It has been proposed in material advanced previously in regulatory matters that investors are unlikely to evaluate regulated assets with reference to a five-year bond because – unlike the case of a bond – the residual value at the end of each five-year period is inherently risky.[105]
- Interviews with 14 market practitioners indicated the following views:[106]

102 Ibid, pp. 16–17.
103 Ibid, p. 18.
104 Ibid, p. 19.
105 Incenta Economic Consulting, *Report for the Energy Networks Association Term of the risk-free rate of the cost of equity*, June 2013, p. 7.
106 Ibid, p. 8.

- The ten-year risk-free rate should be used to estimate the cost of equity for regulated energy businesses.
- None of those interviewed stated that they would use a different risk-free rate (to 10 years) to estimate the cost of equity for non-regulated infrastructure (such as a toll road).
- Regulatory re-sets do not neutralise risks.
- Moving from a ten-year to a five-year risk-free rate would reduce the market valuation of the regulated energy networks.
- Application of the Sharpe-Lintner CAPM by market analysts and independent experts is not at all mechanistic. The SL CAPM is a starting point, but the results are adjusted by judgement that is informed by observed market behaviour (e.g. cross-referencing to the Dividend Growth Model (DGM)), until a cost of equity number is derived that reflects the market's behaviour.

- If the MRP is adjusted for the contemporaneous difference in the yield difference then it would appear that changing from a ten-year risk-free rate to a five-year risk-free rate would not result in a material differential in the estimated rate of return on equity.[107]
- A shorter-term risk-free rate exacerbates the known problems of the CAPM with respect to low beta assets, which are observed to have higher returns than predicted by the theory.[108]
- If a mechanistic Sharpe-Lintner CAPM is applied by a regulator, the use of a shorter-term risk-free rate (such as five years) will lead to:[109]
  - Greater volatility in estimation of the cost of equity, or
  - A greater potential for the cost of equity to be mis-estimated during particular events – such as during the current period of very low government interest rates relative to their historical average.

5.7 SFG 2014

SFG Consulting (SFG) in their 2014 report for Dampier and Bunbury gas pipeline provided the following key advice on the term of the rate of return:[110]

- The present value principle (NPV=0 condition) suggests that the term of the allowed return should be matched to the length of the regulatory period where the market value of the regulated asset at the end of the regulatory period is known for sure from the outset. This is because the asset can be valued as the present value of cash flows over the regulatory period only (one of which is the known end-of-period market value of the asset).
  - If the end-of-period market value of the asset is not known for certain from the outset, the present value principle does not imply that the term of the allowed

107 Ibid, p. 12.
108 Ibid.
109 Ibid.
110 SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2.

return should match the length of the regulatory period. This is because the asset cannot be valued as the present value of the cash flows over the regulatory period.

- Instead, the asset would be valued as the present value of the cash flows to be generated over the life of the asset. In this case a long-term discount rate would be used and therefore the allowed return should be set on the basis of a long-term rate.
- The dominant commercial practice is to use a long-term discount rate, even when valuing regulated infrastructure assets where the regulator sets allowed returns based on a shorter-term rate.
- The vast majority of regulated infrastructure assets in Australia have their allowed return set on the basis of a long-term (ten-year) rate.
- The ERA argued that its (currently low) five-year allowed return is consistent with the (currently higher) ten-year required return used by investors. The ERA argued that investors actually require a low return over the next five years (the same as what the ERA currently allows) and a much higher return on cash flows thereafter. However, there is no mechanism whereby the high future returns that the ERA says investors require can ever be delivered by the ERA's rate-setting process. The more likely outcome is that, at every determination, the ERA simply uses this term structure argument to explain why its current regulatory allowance is below the return that investors require.
- If the ERA does adopt a five-year risk-free rate, consistency requires that the same rate must be used in the two places it appears in the CAPM formula.

5.8 Frontier 2015

Frontier Economics (Frontier) in its 2015 report for Dalrymple Bay Coal Terminal Pty Ltd (DBCT) advised against matching the risk-free rate to the length of the regulatory period with the following key views:[111]

- The present value principle, which is not set out in any rules or legislation, is designed to ensure that the regulated firm receives at most a return that is commensurate with the risk involved. The *Queensland Competition Authority Act* requires that the allowed return be at least commensurate with the risk involved.
- The present value principle only suggests that the term of the allowed return should be matched to the length of the regulatory period in the case where the market value of the regulated asset at the end of the regulatory period is known for certain from the outset. In this case only, the asset could be valued as the present value of cash flows over the regulatory period (one of which is the known end-of-period market value of the asset)
- If the end-of-period market value of the asset is not known for certain from the outset, the present value principle does not imply that the term of the allowed return should match the length of the regulatory period. This is because the asset cannot be valued as the present value of the cash flows over the regulatory period–cash flows beyond the end of the regulatory period would have to be considered in the analysis.

[111] Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4

- Where the end-of-period market value of the asset is not known for certain from the outset, the asset would be valued as the present value of the cash flows to be generated over the life of the asset. In this case a long-term discount rate should be used and therefore the allowed return should be set on the basis of a long-term rate. This is the standard approach for valuing assets.
- The uniform commercial practice is to use a long-term discount rate when analysing regulated infrastructure assets–consistent with market practitioners being of the view that the end-of-period value of regulated assets is not known with certainty from the outset, and consequently that the use of a shorter-term rate would be inappropriate.
- The vast majority of regulated infrastructure assets in Australia have their allowed return set on the basis of a long-term (ten-year) rate–consistent with other regulators being of the view that the end-of-period value of regulated assets is not known with certainty from the outset, and consequently that the use of a shorter-term rate would be inappropriate.
- If the QCA does adopt a short-term risk-free rate, consistency requires that the same rate must be used in the two places it appears in the CAPM formula.

5.9 Partington and Satchell 2016

Partington and Satchell provided the following key advice in their 2016 report for the AER:

- The NPV=0 condition meets the requirements of the NEO and NGO to achieve efficient investment and efficient operation in the long term interest of consumers, while the revenue and pricing principles allow for the recovery, by the regulated businesses, of efficient costs including a return on capital and having regard for the costs and risks of overinvestment.[112]
- The theory of finance (and common practice) is that the WACC for use in NPV calculations is the current required returns on debt and equity that should be used for the WACC. Thus with respect to the cost of debt it is the current cost of debt (as currently required in the market), not the historic cost of debt.[113]
- The use of the opportunity cost of capital is also consistent with the criterion that investment in regulated assets should ex-ante be a zero NPV activity.[114]
- The problem with the trailing average approach is that it is substantially disconnected from current market required returns. It looks backwards rather that forwards, other than for the one tenth of the trailing average cost of debt that gets updated to the current cost of debt each year. [115]
- Another potential problem is that firms are being compensated on the basis of a financing practice, that they may not follow, having given rise to an allowed cost of debt, which may differ from that which they have incurred.[116]

112 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.
113 Ibid.
114 Ibid, p. 15.
115 Ibid, p. 17.
116 Ibid.

5.10 Martin Lally 2021 report

We engaged Dr Martin Lally to provide expert advice on the term of the rate of return as part of the development of this working paper. The key points from his report are:

- For the term of equity:
    - The appropriate term for the risk-free rate must match the length of the regulatory period, which is typically five years, because it satisfies the NPV=0 principle.[117]
    - Market practitioners' use of a longer term to reflect the underlying asset life is for a different purpose. Regulators are only concerned with the cash flows over the next regulatory period and the regulatory asset book value in five years.[118]
- For the term of debt, Dr Lally noted that the appropriate debt term is dependent on the form of the return on debt and indicated:[119]
    - A number of factors must be considered when determining the appropriate approach to the return on debt including in terms of reliability, simplicity and materiality. Dr Lally did not provide views on the relative importance of the criteria and did not state a view on the best estimation methodology for the return on debt and benchmark debt term.[120]
    - In respect of satisfying the NPV=0 principle, the return on debt must match that incurred by the benchmark efficient firm.[121] This can be achieved in principle by using the trailing average approach or hybrid approach.
- The trailing average return on debt in the 2018 Instrument constitutes the actual borrowing costs of the firm only in an "ideal" scenario.[122] He suggested two possible responses to non-ideal scenarios:
    - Vary the weights of the trailing average to reflect the circumstances of each regulated business, but this may be cumbersome.[123]
    - Investigate whether variations from the 'ideal' scenario described above produce significant differences between the regulatory allowance and the actual costs incurred by the business. This would depend upon the extent to which borrowing rates vary over time, and therefore actual data from a long historical series should be used in any analysis or application.
- There may be further grounds for the continued use of the trailing average in the return on debt.[124] He noted that there would be problems with adopting a different return on debt methodology during the AER's current transition to the trailing average approach. If

117 Dr Martin Lally, *The appropriate term for the allowed cost of capital*, April 2021, p. 3.
118 Ibid, p. 19.
119 Ibid, p. 4.
120 Ibid.
121 Ibid, p. 3.
122 Ibid, p. 27.
123 Ibid.
124 Ibid, p. 40.

the AER elects to switch from the trailing average approach, Dr Lally stated that a transition would be required.

- He disagreed with our proposal in the *Energy network debt data* working paper to use the EICSI to adjust the credit rating. He recommended the AER decompose the total difference between the EICSI and the debt allowance into three parts: credit rating, debt term and the residue.[125]
- He noted our proposal to use EICSI data to modify our use of the RBA, Bloomberg and Thomson Reuters indexes. However, he considered that the technical features of the indexes need to match to avoid differences in the debt risk premium estimates that arise purely from differences in such features.[126] Similarly, the EICSI should exclude subordinated bonds to match the majority of technical features in RBA, Bloomberg and Thomson Reuters indexes.[127]
- The term for the return on equity, return on debt and expected inflation should all determined separately from each other.[128] As the regulatory cycle changes, both the term of the risk-free rate and expected inflation should change to match it. Both terms are separable consequences of the NPV=0 principle.

125 Ibid, p. 55.
126 Ibid, p. 51.
127 Ibid, pp. 51–52.
128 Ibid, p. 4.

6 Discussion and preliminary views

This section sets out our preliminary views on the following key questions:

- Should the terms between equity, debt and expected inflation align?
- What is a suitable term for setting an efficient rate of return that contributes to achieving the NEO and NGO (our regulatory task)?

Central to answering these questions is the NPV=0 condition which we discuss in sections 6.1 and 6.3.

Based on an evolution in our thinking and the current evidence available to us, we have arrived at the following preliminary views and thinking:

- The term for expected inflation and the term for the rate of return should be independently assessed and do not need to align with each other.
- Similarly, the term for the rate of return on debt and the return on equity should be independently assessed and do not need to align with each other.
- For the term of equity, we are considering whether we should change to one that matches the length of the regulatory period.
- We have been advised that the term of debt depends on the form of the return on debt. We propose to maintain the trailing average approach for the return of debt.
- Given the preliminary view to maintain the trailing average, we are considering matching the term for the return on debt to that of an efficient firm's borrowing.

We discuss each of these points in their respective sections below. We also intend to consider the term for the return on debt further in the Debt Omnibus paper.

6.1 Our regulatory task and the NPV=0 condition

A suitable rate of return (including the term of debt, term of equity and term of expected inflation) needs to contribute to achieving our regulatory task. This involves setting the allowed revenue requirement for regulated energy businesses that contributes to achieving the NEO and NGO (the objectives). In support of the objectives, the National Electricity Law and National Gas Law set out Revenue and Pricing Principles.[129] Each of these principles has an important guiding role when determining an appropriate way to calculate the rate of return.

As noted in the 2018 Instrument, there is a balance involved in having regard to these principles.[130] We aim to determine a rate of return and a value for imputation credits that will provide the appropriate investment incentives that will not lead to over or under investment in assets, and achieve an appropriate balance of sustainable long term consumer outcomes in respect of price, quality, safety, reliability and security of supply. This task requires the exercise of judgement looking to future outcomes. The objectives and principles guide our assessment of the evidence.

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129 NEL, s. 7A; NGL, s. 24.

130 AER, *Rate of return instrument explanatory statement*, December 2018, p. 31.

On this basis, the rate of return needs to reflect the cost of capital of an efficient firm in the supply of regulated energy services. Economists typically think of efficiency in three dimensions: productive, allocative and dynamic. Table 3 sets out how this applies in the context of the rate of return.

Table 3 Application of efficiency concepts to rate of return

Dimension of efficiency	Economic meaning	Application to rate of return estimation
Productive efficiency	Achieved when output is produced at minimum cost. This occurs where no more output can be produced given the resources available, that is, the economy is on its production possibility frontier. Productive efficiency incorporates technical efficiency. This refers to the extent that it is technically feasible to reduce any input without decreasing the output or increasing any other input.	Refers to least cost financing (that is, the lowest required return on debt and equity) subject to any constraints, such as risk. For our determinations to be productively efficient we need to incentivise service providers to seek the lowest cost financing (all else being equal).
Allocative efficiency	Achieved when the community gets the greatest return (or utility) from its scarce resources.	Allocative efficiency can be achieved by setting an allowed return consistent with the expected return in the competitive capital market (determined by demand and supply) for an investment of similar degree of risk as a service provider supplying regulated services.
Dynamic efficiency	Refers to the allocation of resources over time, including allocations designed to improve economic efficiency and to generate more resources. This can mean finding better products and better ways of producing goods and services.	Refers to the existence of appropriate investment incentives. We can encourage dynamic efficiency by setting an allowance that does not distort investment decisions. Dynamic efficiency is advanced through incentive regulation rather than cost of service regulation that compensates a service provider for its actual costs no matter how inefficient.

Source: AER analysis; Productivity Commission, On efficiency and effectiveness: Some definitions, May 2013; AER, Better regulation: Rate of return guidelines consultation paper, May 2013.

As the regulatory regime is ex-ante,[131] we consider a rate of return that meets the objectives must provide ex-ante compensation for efficient financing costs. This is a zero net present value (NPV) investment condition (also known as NPV neutral (NPV=0) condition), which is described as follows:[132]

> 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.

This condition is vital to the regulation of infrastructure with monopoly characteristics such as the businesses we regulate.[133]

It is important for allocative and dynamic efficiency that the allowed rate of return provides an opportunity for service providers to recover their efficient costs, consistent with the NPV=0 condition.[134] An NPV=0 investment condition provides an efficient entity in the supply of regulated services with a reasonable opportunity to recover at least its efficient financing costs.[135] In the 2018 Instrument, experts from the concurrent evidence session agreed that setting an allowed return to achieve NPV=0 condition achieves efficient investment incentives and is in the long-term interest of consumers.[136]

Apart from the NPV=0 condition, we also need to consider other factors. In our 2020 Inflation Review, we decided the appropriate term for our estimate of expected inflation should align with the length of the regulatory period for the following key reasons:

- It would better satisfy the NPV=0 condition.
- It would better align with the intended nominal rate of return over the regulatory period.
- It would better reflect current market expectations over the regulatory control period.

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131 The AEMC describes, 'allowed revenues for network businesses are now set using the expenditure required by prudent, efficient operators as a benchmark. Companies have incentives to beat the benchmarks so they can keep some of their savings and pass the rest on to customers'. See AEMC, Overview 2014–15.

132 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14. We note that Partington and Satchell supported a prevailing (that is, an on-the-day) approach for the return on debt which differs from our trailing average return on debt.

133 Marshal, W., Yawitz, J. And Greenberg, E. (1981), '*Optimal Regulation Under Uncertainty*', The Journal of Finance, vol 36, pp. 913–14.

134 AER, *Rate of return instrument explanatory statement*, December 2018, p. 32.

135 AER, *Draft rate of return guidelines, Explanatory statement*, July 2018, p. 76.

136 AER, *Final position, Regulatory treatment of inflation*, December 2020, p. 35; AER, *Concurrent Evidence Session 1 – Proofed Transcript*, p.15.

6.2 Whether the terms needs to align between equity, debt and expected inflation?

Having considered the available evidence, including previous submissions, we do not think it is necessary to align the term of equity, debt and expected inflation. The focus should be on independently identifying the most suitable term for each parameter.

6.2.1 Whether the term of the rate of return needs to align with that of expected inflation?

We propose that the term of rate of return and term for expected inflation should be independently assessed.

If we arrive at the same value for both we consider that it should be because of independent considerations of each parameter primarily satisfying the NPV=0 condition. In section 6.3.1.3, we noted that we are considering whether the term of equity should match the length of the regulatory period. This is based on our assessment of the material available to us rather than making the adjustment purely because the 2020 Inflation Review changed the term for expected inflation to match the length of the regulatory period.

We observe approximately half of the domestic regulators we reviewed set a different term of the rate of return to the term of expected inflation. The ICRC, IPART and ERAWA gas decisions use a different term for the rate of return compared to the term for expected inflation.[137] The QCA, Essential Services Commission of South Australia (ESCOSA) and ERAWA railway decisions implement a ten-year term for the rate of return and expected inflation. However, there was no decision to adopt a ten-year term for the rate of return because a ten-year term was adopted for expected inflation.[138] We note that the QCA is currently reviewing its methodology for expected inflation and the ERAWA's railway decision is for setting third party access conditions.[139]

The Essential Services Commission of Victoria (ESCV) also adopted the same value for the rate of return term and the term for expected inflation. However, it did not provide specific reasoning.[140]

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137 ICRC, *Draft report, Review of methodologies for the weighted average cost of capital, Report 1 of 2021*, February 2021, pp. 24, 28; ICRC, *Draft report, Review of methodologies for the weighted average cost of capital, Report 1 of 2021*, February 2021, p. 2; IPART, *Review of our WACC method*, February 2018, pp. 24, 41, 75; ERAWA *Final gas rate of return guidelines, Explanatory statement, Meeting the requirements of the National Gas Rules*, December 2018, p. 26, 253.

138 Queensland Competition Authority, *Request for comments, Rate of return review*, November 2020, pp. 4–5, 8–9, 16; ESCOSA, *SA water regulatory determination, Final determination: Statement of reasons*, June 2020, pp. 5, 208–218; ERAWA *Final determination, 2018 and 2019 weighted average cost of capital – For the freight and urban networks, and the Pilbara Railways,* August 2019, pp. 9, 23, 79–80.

139 QCA, *Issues paper inflation forecasting*, March 2021; available at: https://www.qca.org.au/project/inflation-forecasting/inflation-forecasting-review-2021/; ERAWA, R*eview of the Railways (Access) Code 2000 Final Report,* December 2015, p. ii; ERAWA, *Determination on the 2020 weighted average cost of capital for the freight and urban railway networks, and for Pilbara railways*, 11 August 2020, p. ii.

140 Essential Services Commission Victoria, *Goulburn-Murray water price review 2020, Guidance on price submission under the WCIR*, October 2018, p. 32; Essential Services Commission Victoria, *Goulburn-Murray water final decision, 2020 water price review,* June 2020, p. 20.

Question 1: should the term for expected inflation match the term for the rate of return?

6.2.2 Whether the term of equity and debt should align?

Our preliminary view is that the term of equity and the term of debt do not need to align. We consider that it should be based on independent consideration (primarily of satisfying the NPV=0 condition–see section 6.3 for more detail).

We observe that the majority of Australian regulators that we reviewed adopted a ten-year term for both the return on debt and return on equity. However, this was generally based on independent considerations of the terms (and aligning with the underlying asset lives) rather than an explicit decision to align the two terms.

The NZCC, ACM and Ofgem set the same value for the term of the return on debt and the term of the return on equity.[141] However, their decisions were based on independent considerations of the terms. The remaining international regulators we reviewed did not use the same term for the return on debt and return on equity. The NZCC matched both the equity term and debt term with the length of their five-year regulatory period.

We note that the arguments have been put forward by experts for aligning the term of debt and term of equity for consistency.[142] However, Professor Davis, CEG and Dr Lally also supported that the terms of return on equity and return on debt do not have to be the same.[143] Dr Lally also noted that the return on equity term should match the length of the regulatory period, while the return on debt term is dependent on the form of the return on debt.

Question 2: should the term for equity match the term for debt?

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141 Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 111, 115; Brattle, *A review of international approaches to regulated rates of return*, June 2020, pp. 76, 79; Ofgem, *RIIO-2 Final determinations- Core document*, December 2020, pp. 26, 82.

142 SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2; Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4; Kevin Davis, *Determining debt costs in access pricing, A report to IPART*, December 2010, p. 2.

143 CEG, *WACC estimation a report for South East Queensland water businesses*, February 2011, p. 2; Dr Martin Lally, *The appropriate term for the allowed cost of capital*, April 2021, p. 4; Kevin Davis, *Determining debt costs in access pricing, A report to IPART*, December 2010, p. 2. We note that Professor Davis supported the use of an on-the-day approach for the return on debt which differs from our current trailing average approach. Professor Davis also noted that the choice of the risk-free rate in the MRP estimation should have no bearing on the choice of the term of debt. Therefore, it stands to reason that the term of equity should have no bearing on the term of debt.

6.2.3 Response to previous stakeholder submissions

During the 2020 Inflation Review, the Australian Pipelines and Gas Association (APGA), Energy Networks Association (ENA) and CRG provided contrasting views on the link between the term of the rate of return and the term for expected inflation:

- The APGA stated that there is no link between the inflation term and rate of return term.[144] It believed that a five-year term for expected inflation ensures that the PTRM and RFM are internally consistent, but this rationale does not apply to the rate of return which is intended to reflect efficient financing practices.
- The ENA considered that an inflation term that is the same length as the relevant regulatory period would match regulatory asset base (RAB) indexation and that the term of the allowed return in the rate of return instrument is not relevant.[145]
- The CRG submitted that the estimation of inflationary expectations is connected with the rate of return.[146] It explained that blending ten-year nominal bond rates with five-year estimates of expected inflation implies that the geometric mean of inflationary expectations embedded in years 6 to 10 of the nominal bond rate is equal to the geometric mean of inflationary expectations in years 1 to 5.[147] The CRG considered this implied assumption is inconsistent with the AER's explicit assumption that inflationary expectations will converge back to the RBA's mid-point by year 5. Therefore, adopting a five-year inflation term and a ten-year term for the rate of return undermines the integrity of the framework and consumers' confidence in it.

We agree with the view that the term for the rate of return and the term for expected inflation should be independently assessed. As discussed in section 6.2.1, these two do not need to have the same value.

Section 6.2.2 discussed that the term of debt and term of equity do not need to have the same value. Based on the evolution in our thinking, we found ourselves considering whether to move the term of equity to match the length of the regulatory period.

Our preliminary view is that the trailing average return on debt should be maintained (as noted in section 6.3.2.1). Dr Lally's view is in the presence of relatively steady capex, a trailing average cost of debt allowance should approximately satisfy the NPV=0 test across the entire regulated activities of the firm, which includes activities in place at the time regulation commenced, capex events preceding the current one, and capex events to come.[148] He considers a trailing average return on debt requires a term matching an efficient firm's borrowing. In this context, we note that an efficient firm's term of debt may differ from the length of the regulatory period. However, we note that other experts, for example

144 APGA, *APGA submission to the AER, Draft position paper on the regulatory treatment of inflation*, November 2020, p. 14.
145 ENA, *Review of the regulatory treatment of inflation, Response to AER draft position*, November 2020, pp. 24, 40.
146 Consumer Reference Group, *Advice to the AER on the regulatory treatment of inflation – Response to the draft position paper on the regulatory treatment of inflation*, November 2020, p. 13.
147 Consumer Reference Group, *Advice to the AER on the regulatory treatment of inflation – Response to the draft position paper on the regulatory treatment of inflation*, November 2020, pp. 12–13.
148 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 33.

Partington and Satchell, consider only forward looking costs can achieve an NPV=0 condition.[149]

6.2.4 Clarification of Dr Lally's advice

In the 2020 Inflation Review, Dr Lally stated that a five-year term for expected inflation is appropriate to satisfy the NPV=0 principle.[150] He outlined that a five-year term for expected inflation remains appropriate even if a ten-year term is adopted for the rate of return.[151]

Dr Lally's 2021 advice also explained further that 'nothing in the conclusion of the term for the risk-free rate bears directly on the appropriate term for expected inflation'.[152] He stated that, regardless of which approach is adopted for the return on debt, the NPV=0 principle implies that the appropriate term for expected inflation is the length of the regulatory cycle.[153]

6.3 What is a suitable term for the rate of return?

Our thinking in section 6.2 is that the term of equity, debt and expected inflation need not align. This leads us to consider the appropriate term for equity, debt and inflation on their own merits without the need to be bound by a common term.

We consider what is a suitable term for equity and term for debt below.

6.3.1 Term of the return on equity

We note that there are typically two options for the term of equity:

- Match to the length of the regulatory period (typically five years).
- Match the underlying asset lives (typically ten years is used as it is considered to better reflect long asset lives).

We recognise there are reasons supporting the choice of either option. We consider the choice of term should ultimately be based on contributing to achieving our regulatory task. Therefore, we are considering whether to change the term of equity to match the length of the regulatory period and our assessment of the evidence available indicates that doing so may better satisfy our regulatory task.

6.3.1.1 Reasons supporting matching to the length of the regulatory period

We observe a number of reasons supporting a term of equity that matches the length of the regulatory period (typically five years) from our review of other regulators' practice and expert reports:

- It would satisfy the NPV=0 condition.

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149 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.
150 Dr Martin Lally (Capital Financial Consultants), *Review of the AER's inflation forecasting methodology*, July 2020, p. 4.
151 Ibid, p. 6.
152 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 21.
153 Ibid, p. 4.

- As noted in section 6.1, the NPV=0 condition is central to our regulatory task and thus the term of equity. This is shared by both Professor Davis and Partington and Satchell.[154]
- We set revenue requirement for the length of the regulatory period (typically five years). The appropriate discount rate for equity would be one that matches the length of the regulatory period. This is because the discount rate applied to a set of cash flows should reflect the risk, and the term, of those cash flows. The appropriate return on equity should therefore also match the length of the regulatory period for the same reasons. Otherwise, the NPV=0 condition would be violated. When the term of equity exceeds the length of the regulatory period, there would typically be excess return for owners of the regulated assets.[155]
- Professor Davis advised that an interest rate with maturity equal to the regulatory period, in deriving the required return for the regulated asset, generates expected cash flows which are fairly priced and hence satisfy the NPV=0 condition.[156]
- Dr Lally has advised that the term of equity should match the length of the regulatory period to satisfy the NPV=0 condition.[157] This is because the appropriate discount rate for equity would be one that matches the length of the regulatory period. He noted that our return on equity can be thought of as a long-term floating rate bond with a coupon that resets at the start of every regulatory period. Thus, the duration of the cashflow (and consequently the discount rate) is the length of the regulatory period. The expected return on equity allowance (and term) needs to match to the length of the regulatory period to satisfy the NPV=0 condition in expectation.[158]

- We set the return on equity at the outset of each regulatory period for the length of the regulatory period. The yield curve is typically upward sloping which means a longer-term risk-free rate will lead to higher regulatory cash flows than if a short term rate is used. This corresponds to the premise that the implied forward interest rate (which will be the rate available in the market for futures or forward contracts) exceeds the expected value of the spot rate for that future date, by a term premium which is, on average, positive.[159] Matching the term of equity to the length of regulatory period means that we would be providing compensation that is consistent with our regulatory task and investors' expectation over the same period.[160] Otherwise, regulated businesses and investors

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154 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC, Prepared for the ACCC*, August 2003, p. 7; Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

155 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC, Prepared for the ACCC*, August 2003, p. 10; Kevin Davis, *The debt maturity issue in access pricing*, December 2013, p. 13. We note that Professor Davis supported the use of the on-the-day approach for the return on debt. However, we consider the principle he noted can equally apply to the term of equity.

156 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC*, Prepared for the ACCC, August 2003, p. 9.

157 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 3.

158 Ibid, p. 21.

159 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC*, Prepared for the ACCC, August 2003, p. 5.

160 NZCC, *Input methodologies (Airport services), Reasons paper*, December 2010, pp. 228, 233–244.

would be over compensated for risks they do not bear when the term of equity exceeds the length of the regulatory period.[161] If the yield curve is downward-sloping, regulated businesses and investors would be under-compensated.[162]

- A return on equity term that matches the length of the regulatory period is consistent with the underlying long asset lives. Dr Lally noted that our return on equity can be thought of as a long-term floating rate bond with a coupon that resets at the start of every regulatory period. He advised that the correct discount rate to use would be the five-year rate because that was the length of the regulatory period.[163] The NZCC further noted that the focus should be the regulatory period and not the life of the asset for the term of equity. This position was upheld by the New Zealand High Court.[164]
- The market practice of using a ten-year term differs from our regulatory task, which is to set revenue for each forthcoming regulatory period (typically five years) that contributes to achieving the NEO and NGO. We set revenue for each forthcoming regulatory period rather than ten years specifically. Hence, we are concerned about cash flows and expected return over the next regulatory period (typically five years) and not over a longer ongoing period. Dr Lally stated that the market practice of using a ten-year risk-free rate is based on valuing firms on an ongoing basis, which differs from our legislative role.[165]

6.3.1.2 Reasons supporting matching to underlying asset lives

We also note that there are arguments to support matching the term of equity to the underlying asset lives (typically ten years is used) for the following reasons:

- It would better match the long-lived nature of the underlying assets.
    - SFG, Frontier and CEG have made this argument in their reports.[166]
    - The majority of Australian regulators follow this reasoning when adopting a ten-year term for the return on equity. The rationale is that businesses would match financing to the length of the asset lives. Therefore, equity investors in businesses with long asset lives would tend to have a long investment horizon. This is typically deemed to be a ten-year term by Australian regulators. A ten-year term would consequently better reflect the returns an investor expects over their (long-term) investment horizon.
- There is reliable and consistent data for ten-year CGS.[167]

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161 Ibid, p. 110.
162 Ibid.
163 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 21.
164 NZCC, *Input methodologies (Airport services), Reasons paper*, December 2010, p. 228; High Court of New Zealand, *Wellington Airport & others v Commerce Commission [2013] NZHC 3289*, para 1261.
165 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 19.
166 CEG, *WACC estimation a report for South East Queensland water businesses*, February 2011, p. 4; Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4; SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2; CEG, *Term of the risk-free rate under the NER a report for the Joint Industry Association*, January 2009, p. 13.
167 AER, *Rate of return instrument, Explanatory statement*, December 2018, p. 131.

- The general market practice appears to use a ten-year term of equity.[168]
- A shorter-term risk-free rate exacerbates the known problems of the CAPM with respect to low beta assets, which are observed to have higher returns than predicted by the theory.[169]
- The use of a shorter-term risk-free rate (such as five years) will lead to greater volatility in estimation of the cost of equity, or a greater potential for the cost of equity to be mis-estimated during particular events.[170]
- A ten-year term for the risk-free rate and the return on debt is necessary to match the rate typically used for estimating the historical MRP.[171]
- For regulated assets, there is uncertainty with their value at the end of the regulatory period. Therefore, a longer-term discount rate should be used to reflect that the assets should be valued as the present value of the cashflows to be generated over the life of the asset.[172] [173]
- It is consistent with most common regulatory practice. All but one of the Australian regulators examined use a ten-year term for the risk-free rate. Furthermore, Brattle's analysis on seven international regulators found that the majority of regulators adopted a risk-free rate term longer than the length of their regulatory period.
- Maintaining a ten-year term would promote regulatory stability and predictability because we have adopted it since the 2009 WACC Review.

6.3.1.3 Preliminary thinking

Having considered all of the evidence, we accept that a case can be made for either option. This point was recognised when we made the 2018 Instrument.

We previously matched the term of equity and term of debt to the underlying asset lives based on a number of different considerations as noted in section 3.3. However, our 2020 Inflation Review has prompted us to consider the two terms through a new lens.

In the 2020 Inflation Review, we considered the term for expected inflation and found that our regulatory task should take precedence.[174] Matching the term of expected inflation to the length of the regulatory period would deliver this outcome by:

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168 SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2; Incenta Economic Consulting, *Report for the Energy Networks Association Term of the risk-free rate of the cost of equity*, June 2013, p. 8; Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4.

169 Incenta Economic Consulting, *Report for the Energy Networks Association Term of the risk-free rate of the cost of equity*, June 2013, p. 12.

170 Incenta Economic Consulting, *Report for the Energy Networks Association Term of the risk-free rate of the cost of equity*, June 2013, p. 12; CEG, *WACC estimation a report for South East Queensland water businesses*, February 2011, p. 4.

171 SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2; Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4.

172 Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4

173 SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2.

174 AER, *Final position regulatory treatment of inflation*, December 2020, p. 9.

- Satisfying the NPV=0 principle.[175]
- Allowing regulated businesses to, on expectation, receive the same allowance during RAB indexation in the RFM as the amount (expected inflation) deducted from total revenue in the PTRM. Thus, businesses are expected to receive the nominal return set in the rate of return instrument over the regulatory period.[176]
- Being responsive to changes in market circumstances. This increases the extent to which our approach depends on specific RBA forecasts and diminishes reliance on the assumption that investors anchor expectations to the mid-point of the RBA's target band in the long-term.[177]
- Better align the inflation adjustments within the regulatory period and enhance ex-ante consistency with nominal debt costs.[178] This could lower financeability risks for service providers.

This led us to change the term for expected inflation to the length of the regulatory period (among other changes) which prompted us to review the term of the rate of return in this working paper.[179]

Our assessment in section 6.1 indicated that satisfying the NPV=0 condition is central to our regulatory task. Our preliminary view is also to propose that the term of equity and term of debt should be independently determined (in section 6.2).

Given this evolution in our thinking, we have looked at the previous evidence on the term of equity. We found ourselves considering whether to move the term of equity to match the length of the regulatory period having regard to the following considerations:

- We have looked at previous material from Professor Davis, Partington and Satchell, NZCC and the ERA.[180] These papers indicate a relatively higher priority for satisfying the NPV=0 condition which would be better met by matching the term of equity to the length of the regulatory period.
- Our task is to set revenue and provide compensation for the length of the regulatory period (typically five years). Matching the term of equity to the length of regulatory period means that we would be providing compensation that reflects the expected return and investors' expectation over the corresponding period. This would be consistent with our regulatory task of setting a rate of return over a regulatory period that will contribute to achieving the NEO and NGO.[181]

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175 Ibid, pp. 28 & 39.
176 Ibid, pp. 38, 48.
177 Ibid.
178 Ibid, p. 40.
179 Ibid, pp. 28, 35.
180 Kevin Davis, *Risk-free interest rate and equity and debt beta determination in the WACC, Prepared for the ACCC*, August 2003, p. 7; Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14; NZCC, *Input methodologies (Airport services), Reasons paper*, December 2010, pp. 228 & 233–234; ERAWA, *Final decision on proposed revisions to the Access arrangement for the Dampier to Bunbury Natural Gas Pipeline*, October 2011 (as amended on December 2011), p. 130; ERAWA, *Draft decision on proposed revisions to the Access arrangement for the Dampier to Bunbury Natural Gas Pipeline*, March 2011, pp. 187–188.
181 NZCC, *Input methodologies (Airport services), Reasons paper*, December 2010, p. 228, 233–244.

- We note that the ERA and the NZCC both matched the term of equity to the length of the regulatory period. The Australian Competition Tribunal and the High Court of New Zealand upheld each of these respective decisions.[182]
- The uncertainty with the value of an asset at the end of its life is mentioned as a reason against matching the term of equity to the length of the regulatory period.[183] However, we note that capital expenditure (once approved) is added to the RAB. It is shielded from writedowns and allow the return of capital (depreciation), return on capital and associated operating expenditure. Therefore, investors can reasonably expect that they will be able to recover their investment over the life of the assets.
- A return on equity term that matches the length of the regulatory period may not be inconsistent with the underlying long asset lives. The NZCC noted that the focus should be the regulatory period and not the life of the asset for the term of equity which was upheld by the New Zealand High Court.[184]
- A factor in the choice of term in the 2018 Instrument was liquidity in the market for the relevant Australian government issued bonds). An indicator of liquidity is the amount of bonds outstanding.[185] Data from the Australian Office of Financial Management (AOFM) indicate that CGS with term to maturity of one to ten years have similar levels of outstanding debt.[186]

Further, the latest report from Dr Lally has provided additional support for the importance of the NPV=0 condition and matching to the length of the regulatory period:

- The decision on the term of the rate of return should be primarily be based on satisfying the NPV=0 condition.
- Consistent with previous views from Professor Davis, Partington and Satchell, NZCC and the ERA, Dr Lally advised that the term of equity would need to match the length of the regulatory period to satisfy the NPV=0 condition.[187] He noted that this is in terms of expected revenues and does not assume the value of the regulated assets at the end of the current regulatory period is known now for certainty.[188]
- The market practice of using a ten-year term is based on valuing firms on an ongoing basis which differs from our role which is to set revenue for each forthcoming regulatory period (typically five years).[189]

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182 High Court of New Zealand, *Wellington Airport & others v Commerce Commission [2013] NZHC 3289*; Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*.

183 SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2; Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4.

184 NZCC, *Input methodologies (Airport services), Reasons paper*, December 2010, p. 228; High Court of New Zealand, *Wellington Airport & others v Commerce Commission [2013] NZHC 3289*, para 1261.

185 AER, *Explanatory statement rate of return instrument*, December 2018, p. 137.

186 https://www.aofm.gov.au/securities/treasury-bonds; accessed 30 April 2021.

187 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 3.

188 Ibid, p. 9.

189 Ibid, p. 19.

- A term of equity that matches the length of the regulatory period is consistent with the long-lived nature of the underlying assets.[190]

We consider that all regulatory decisions involve a degree of judgement. This was noted by Professor Davis and Incenta.[191] [192]

As seen in sections 6.3.1.1 and 6.3.1.2, there are reasons supporting matching to the length of the regulatory period and matching to the underlying asset lives. Ultimately, it is for the regulator to make a decision, in accordance with the relevant legal requirements, based on the information available at the time. The same set of evidence, when assessed by different regulators at different points in time, can potentially lead to different conclusions. Our review of a number of regulators' differing approaches to the term on equity demonstrates this.

We also note that the length of the regulatory period is typically five years for businesses we regulate, but there have been instances where it differed from five years.[193] Consistent with the view earlier, we note that this would likely entail the use of a corresponding term of equity. During the recent Victorian distribution resets, the 2016–20 five-year regulatory period was extended by six months to move the businesses from a calendar-year to a financial-year regulatory year. However, we do not expect this to be a consistent occurrence.

We note that if we were to change the term of equity, the estimation of the MRP parameter may be affected. This was noted in a number of expert reports[194] and is because the estimation of historical excess returns and dividend growth model outputs require the use of a risk-free rate estimate. Matching to the length of the regulatory period would entail the use of a five-year risk free rate (compared to the current use of a ten-year rate) which would typically increase the resulting MRP estimate.

Question 3: should the term for the return on equity align to the regulatory control period (typically five years) or a longer period more consistent with the life of the underlying asset life (e.g. ten years)?

6.3.2 Term of the return on debt

On the return on debt, we consider that the term should depend on the form of the return on debt. Our preliminary position is to maintain the use of a trailing average return on debt.

We have been increasingly collecting and exploring the use of actual debt information from regulated businesses since the 2018 Instrument. We also note Dr Lally's advice that

190 NZCC, *Input methodologies (Airport services), Reasons paper*, December 2010, p. 228; High Court of New Zealand, *Wellington Airport & others v Commerce Commission [2013] NZHC 3289*, para 1261.

191 Kevin Davis, *The debt maturity issue in access pricing*, December 2013, p. 19.

192 Incenta Economic Consulting, *Report for the Energy Networks Association Term of the risk-free rate of the cost of equity*, June 2013, p. 8.

193 See previous AER regulatory decisions on TasNetworks; AER, *Final decision, TasNetworks distribution determination 2017–18 to 2018–19, Overview,* April 2017, p. 7; AER, *Directlink Joint Venturers' application for conversion and revenue cap decision,* 3 March 2016, p. vii.

194 SFG Consulting, *The term of the allowed return report for DBP NGP Pty Ltd*, 23 December 2014, pp. 1–2; Frontier Economics, *the term of the risk-free rate report prepared for DBCT Management Pty Ltd*, September 2015, p. 3–4.

satisfying the NPV=0 condition for a trailing average return on debt would require matching the interest rate incurred by an efficient firm with the regulatory allowance. This entails matching the term of debt to the term incurred by an efficient firm.

We propose to consider using the EICSI (and the corresponding the WATMI) to inform the term of debt to better match that of an efficient firm's borrowing. This will be discussed further in our forthcoming Debt Omnibus paper.

6.3.2.1 Term of debt and form of the return on debt

We note that Australian regulators typically consider the following three permutations when estimating the return on debt:

- On-the-day–the return on debt for the forthcoming regulatory period is calculated based on a selected averaging period prior to the start of the regulatory period.
- Hybrid trailing average–the base rate component[195] is an on-the-day rate calculated based on a selected averaging period prior to the start of the regulatory period. The debt risk premium component is based on an average (simple or weighted) of previous years' prevailing debt risk premium.
- Trailing average–the entire return on debt is based on an average (simple or weighted) of previous years' prevailing return on debt.

When considering a suitable term of debt, Dr Lally has advised that it should be dependent on the form of the return on debt (see Table 4).[196]

Table 4 Form and term of return on debt

Form of the return on debt	Term
On-the-day	Match to the length of the regulatory period (typically 5 years)
Hybrid trailing average	Term of the base rate match to the length of the regulatory period Term of the debt risk premium match to the term of an efficient firm's debt
Trailing average	Match to the term of an efficient firm's debt

We note that each return on debt approach carries its own advantages (see Table 5).

[195] The return on debt can be separated into two components—a risk-free rate (or base rate) component and a risk premium over the base rate. The risk premium is called the debt risk premium (DRP).

[196] Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 4.

Table 5 Advantages of each form of return on debt

On-the-day[197]	Hybrid trailing average	Trailing average[198]
- It provides a reasonable opportunity to recover its efficient financing costs over the life of its assets. - Better reflects prevailing (and forward looking) cost of debt financing. - Unbiased since the averaging periods nominated are in the future and avoids a bias that can arise from a historical approach. - Was previously extensively used by Australian regulators including the AER. - Can avoid practical problems with the use of historical data when estimating the return on debt during events such as the global financial crisis. - It remains the standard approach adopted by several other Australian regulators and is supported by advice from an academic perspective (Dr Martin Lally).	- Can reflect the forward-looking return on debt that would be incurred by the benchmark efficient entity for debt raised incrementally.[199] - Compared to on-the-day approach: - Lowers cashflow and price volatility for regulated businesses and consumers respectively - Lower interest rate and refinancing risks - Better reflects our regulated businesses' actual financing practices compared to on-the-day approach	- Provides a service provider with a reasonable opportunity to recover its efficient financing costs over the life of its assets. - Unbiased—at the time averaging periods are nominated they are in the future and so avoids a bias in regulatory decision making that can arise from choosing an approach that uses historical data after the results of that historical data is already known. -Lowers cashflow and price volatility for regulated businesses and consumers respectively compared to the other two approaches.[200] -Reduces risk for service providers by providing a regulatory benchmark that they can more readily match in each regulatory period[201] - Reduces the consequences of a single measurement error.[202] - Does not assume use of hedging practices unlike a hybrid trailing average approach.[203]

We note that Partington and Satchell have previously advised that a prevailing cost of debt (that is, an on-the-day approach) should be used for estimating the return on debt.[204] Professor Davis has also previously advised that the term of debt should match the length of

197 AER, *Final decision SA Power Networks determination 2015–16 to 2019–20 Attachment 3 – Rate of return*, October 2015, pp. 162–163.
198 Ibid, p. 166.
199 AER, *Better regulation explanatory statement draft rate of return guideline*, August 2013, pp. 82–83.
200 AER, *Explanatory statement to the final rate of return guideline*, December 2013, pp.108–110; AER, *Draft decision–TransGrid–Transmission determination–Attachment 3*, November 2014, pp. 123–124.
201 AER, *Better regulation explanatory statement rate of return guideline*, December 2013, pp.108–110.
202 Ibid.
203 Ibid.
204 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

the regulatory period to satisfy the NPV=0 condition assuming use of an on-the-day interest rate.[205]

However, on balance our current position is to maintain the use of a trailing average return on debt for the following reasons:

- Maintaining a trailing average return on debt would provide certainty and stability for businesses and consumers.
    - We first adopted a trailing average return on debt in the 2013 Guidelines, which was continued in the 2018 Instrument. Regulated businesses would have faced and likely acted upon incentives to formulate their debt portfolio and strategies to match the trailing average approach.
    - The industry will still be transitioning to the ten-year trailing average return on debt, which was first introduced in the 2013 Guidelines. Our analysis shows that regulated businesses will still be part way through their transition when the 2022 Instrument begins application. Arguably it is appropriate to wait at least until businesses have finished transitioning before considering whether a different return on debt approach should apply.
    - We are starting to collect and consider more debt information from regulated businesses to inform our decisions. Given regulated businesses will still be transitioning during the 2022 Instrument, we believe more time is needed to collect information about businesses' actual debt practices under a trailing average return on debt before considering whether to change from this approach.
- We previously noted and continue to hold the view that a consistent application of either the on-the-day or the trailing average approach over the life of a regulated asset would allow, on average, an allowed return on debt commensurate with the efficient financing costs of a benchmark efficient entity.[206] We did recognise that changing from an on-the-day approach to a trailing average (without a transition) is unlikely to result in the NPV=0 condition being met automatically, with the potential for over-compensation or under-compensation.[207] However, a full transition (which we have applied) would largely avoid this outcome and lead to a trailing average return on debt that would be consistent with the NPV=0 condition.[208] We also note that a trailing average return on debt is different from the prevailing cost of capital, which SFG indicated may distort investment decisions.[209]
- A trailing average approach would lower cashflow and price volatility for regulated businesses and consumers respectively. [210]

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205 Kevin Davis, *Determining debt costs in access pricing, A report to IPART*, December 2010, p. 4.
206 AER, *Final decision SA Power Networks determination 2015–16 to 2019–20 Attachment 3 – Rate of return*, October 2015, p. 176.
207 Ibid, p. 182;
208 Ibid.
209 SFG Consulting, *Preliminary analysis of rule change proposals report for AEMC*, 27 February 2012, p. 41.
210 AER, *Better regulation explanatory statement rate of return guideline*, December 2013, pp. 108–110.

- Professor Davis has previously noted that regulatory judgement may ultimately be required on the form of the return on debt and term of debt.[211]
- Dr Lally has advised that a trailing average is feasible for businesses to implement.[212]
- Choosing the form of the return on debt depends on a number of factors and the weighting of those factors–there is no clear 'best' answer.[213] We regulate existing businesses and Dr Lally has advised that a trailing average return on debt would 'yield very small divergences from the NPV=0' test for these businesses and would satisfy the NPV=0 criteria in terms of matching the allowed and incurred costs of debt.[214] We consider that exact matching to individual firms' debt weighting and allowance would be unnecessary since our focus should be an efficient firm in the supply of regulated energy network services. In the 2013 Guidelines, a reason for adopting a trailing average approach was that it better reflected actual industry practice. [215]

We note that a trailing average return on debt may not be appropriate in all instances. For example:

- For a new market entrant with new assets, all of its debt would likely be raised at the outset and at the same time to finance the asset purchase. An on-the-day return on debt allowance would likely better match its actual cost of debt and hence better achieve the NPV=0 condition.
- For existing businesses with future capital projects (or new assets) that would make up a significant proportion of their RAB, our current trailing average may not be appropriate because it assumes a moderate amount of capital projects (and hence RAB growth) each year. An example would be the planned transmission projects in the Australian Energy Market Operator's (AEMO) 2020 ISP where they compromise approximately 46 per cent of the RAB.[216] We would need to assess what a suitable approach would be in such a situation. Dr Lally noted one potential solution is to have multiple RABs with the additional RAB(s) representing the new significant capital project(s).[217] The new RAB(s) would start with an on-the-day approach to reflect the new debt that was raised and gradually transition to a trailing average return on debt.

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211 Kevin Davis, *The debt maturity issue in access pricing*, December 2013, pp. 17–19.

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

213 Ibid, pp. 32 & 39.

214 Ibid, pp. 26 & 32.

215 AER, *Better regulation explanatory statement rate of return guideline*, December 2013, pp. 108–110.

216 AEMO, *2020 Interconnector projects: Transmission cost estimate summary,* March 2021; available at: https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-isp-transmission-projects-cost-summary.pdf?la=en; Transmission projects that involve Victoria go through a competitive tender process and have been excluded from our calculations: https://www.aer.gov.au/system/files/AER%20-%20Regulation%20of%20large%20transmission%20projects%20-%20Forum%20on%20draft%20guidance%20note%20-%20Questions%20%26%20Answers%20-%20March%202021%2812063828.1%29.pdf. The QNI Minor project has also been excluded from our calculations because the project is treated as committed. We have estimated using the cost estimates in the *2020 ISP Interconnector projects: Transmission cost estimate summary*. Based on the region, we have matched the interconnector projects with a regulated electricity transmission businesses and have obtained the relevant opening RAB from the regulated business' current decision document. If interconnector projects involve multiple regions, we have taken the sum of the opening RABs for each relevant decision associated with the regions. The estimate is calculated as the sum of the ISP projects' cost divided by the total opening RAB of the regulated businesses.

217 Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, p. 44.

- For businesses that are conducting asset sales, the proceeds from the sale would presumably be used to repay the debt that was financing those assets. A trailing average return on debt would no longer appropriately reflect the ongoing actual costs of the business and would consequently depart from the NPV=0 principle. Further, when the trailing average return on debt is higher than the prevailing rates, there may be reasons for either holding or selling the asset. Principally, holding the asset can yield a return above the prevailing rate while selling the asset would yield higher prices (because the sale price would presumably be at the lower prevailing/on-the-day rate).

6.3.2.2 Preliminary view on term of debt

Given our preliminary view to maintain a trailing average return on debt in section 6.3.2.1, we propose to match the term of debt to that of an efficient firm's borrowing.

We note that we have been increasingly collecting and exploring the use of actual debt information from regulated businesses since the 2018 Instrument. We discussed this in our *2020 Energy Network Debt Data* paper and found that the data may be useful in determining our benchmark debt term.[218] We found that international regulators have made some use of actual debt information in their regulatory decisions. Dr Lally has also advised that satisfying the NPV=0 condition would require matching the interest rate incurred by an efficient firm with the regulatory allowance which would entail matching of the term of debt.[219]

In the 2018 Instrument, we developed the EICSI and the corresponding WATMI to analyse debt information from regulated businesses, which has seen further work in our *2020 Energy Network Debt Data* paper.

We propose to consider using the EICSI and corresponding WATMI to inform the return on debt term to better match that of an efficient firm's borrowing. We believe an efficient firm's borrowing is likely to be best approximated by an industry-wide measure such as the WATMI which would remove idiosyncratic decisions pertaining to a particular business.

However, we do recognise potential limitations with our proposal. For example, Professor Davis has noted that businesses' incentives to choose a debt structure which minimizes the cost of debt financing may be open to question.[220]

In our *2020 Network Debt Data* paper, we extended previous work on industry data and provided permutations of WATMI which ranged from 8 to 11 years depending on the scenario modelled. This indicates that the term of an efficient firm's borrowing may be slightly shorter than the ten-year term currently imbedded in our trailing average approach.

In the same paper, we also signalled our preference to adjust the debt risk premium on the basis of our observations of the EICSI. The ENA has instead suggested that we consider whether to adjust the term to the extent there is a variation between our index and the 2018 Instrument. The issues raised are outside the intent of this paper and we require further investigation and analysis to determine the appropriate role of the EICSI (and any resulting

[218] AER, *Rate of return, Energy network debt data, Final working paper*, November 2020, p. 36.
[219] Dr Martin Lally (Capital Financial Consultants), *The appropriate term for the allowed cost of capital*, April 2021, pp. 23–26.
[220] Kevin Davis, *The debt maturity issue in access pricing*, December 2013, p. 6.

adjustments) in informing the allowed return on debt. We will consider the ENA's views and Dr Lally's advice on the EICSI more substantively in the upcoming Debt Omnibus paper.

We also note that Dr Lally's report for the 2020 Inflation Review stated that the term of the rate of return should match the length of the regulatory period.[221] It needs to be clarified that Dr Lally's advice was based on the scenario of a new firm entering the market after purchasing new assets.[222] Dr Lally expanded in his latest report stating that, for existing firms and moderate capex spending, satisfying the NPV=0 principle requires a trailing average return on debt which entails a term of debt matching an efficient firm's borrowing.[223]

Question 4: what is the appropriate form for the return on debt for businesses we regulate?

Question 5: what is the appropriate term of debt given the form of the return on debt (in your response to question 3)?

Question 6: should our index of network debt costs (EICSI) and the corresponding WATMI be used to adjust the benchmark debt term?

Question 7: what transitional arrangements would be required if a change in the debt term is implemented?

ENA's memo on debt data

The ENA submitted a memorandum in response to the final *Energy network debt data working paper* which outlined their views on the appropriate benchmark debt term.[224] We will consider this memo substantively in the Debt Omnibus working paper. In brief, the ENA outlined that there is no outperformance of businesses' actual return on debt (as measured by the EICSI) compared to allowances in revenue determinations.[225] This is because the cost of debt issued by networks is consistent with the cost of BBB+ at all terms. The ENA stated that the outperformance identified by the AER is due to a reduced term at issuance caused by the issuance of shorter-term debt by some businesses for two reasons:[226]

- Shorter term debt could be used to fill short-term funding gaps in a firm’s individual financing approach.
- This issuance of shorter term debt could be a conscious individual business' decision to depart from the AER efficient benchmark approach.

The ENA was open to the AER considering the benchmark debt term with an appropriate transition if the AER found it to be necessary.[227] It noted that a shorter benchmark debt term would:

221 Dr Martin Lally (Capital Financial Consultants), *Review of the AER's inflation reforecasting methodology*, 8 July 2020, p. 6.
222 Ibid, p. 4.
223 Ibid, pp. 26 & 32.
224 AER, *Memorandum, Final working paper – Energy network debt data*, December 2020.
225 Ibid, p. 1.
226 Ibid, p. 2.
227 Ibid, p. 6.

- lead to lower benchmark debt costs for customers but higher price volatility associated with a less stable trailing average return on debt
- allow networks which follow the benchmark debt management strategy to recover their efficient costs as it is internally consistent
- enable the observed asset betas for listed networks to reflect the changed term benchmark depending on the AER's future approaches in relation to estimating beta
- result in the AER accounting for the net increase in refinancing risk in other ways until the increase in risk is reflected in beta estimates.

7 Glossary

Below are accessible explanations of some specialised financial terms used in this paper.

- **Averaging period** – The specified days (or weeks or even months) when we observe market data to inform our estimate of specific rate of return parameters.
- **Benchmark term** – This is the term to maturity of government bonds or debt we set that is used to calculate specific rate of return parameters. The term to maturity at issuance is the time between when an instrument is issued and its maturity date.
- **Capital Asset Pricing Model (CAPM)** – The CAPM is a model that estimates the required return on equity using three parameters: the risk-free rate, beta and the market risk premium. It says that the required return on an investment will be related to the systematic risk of the investment. Here 'systematic risk' means risk that cannot be diversified away (by multiple investments in different companies across the market). An investment with higher risk will have a higher required return.
- **Consumer Price Index (CPI)** – The CPI is a common measure of inflation published by the Australian Bureau of Statistics (ABS). It measures quarterly changes in the price of a 'basket' of goods and services which account for a high proportion of expenditure by the CPI population group (i.e. metropolitan households).[228]
- **Consumer Price Index including owner occupiers' housing costs (CPIH)** – The CPIH is a measure of consumer prices and is more comprehensive than the CPI. The CPIH includes owner occupiers' housing costs and council tax, and therefore, their inclusion captures a major component of household spend.[229] Ofgem and Ofwat use the CPIH to determine their real rate of returns.
- **Commonwealth Government Securities (CGS)** – Bonds and notes issued by the Australian federal government to borrow money from investors.
- **Cross checks** – This can be a role assigned to piece of information or a step in the estimation process. It involves comparing estimates against other relevant information sources. It may provide assurance that the calculated estimates are reasonable and consistent with other sources of information.
- **Debt raising costs** - These costs are the transaction costs incurred each time debt is raised or refinanced. These costs may include underwriting fees, legal fees, company credit rating fees and other transaction costs.
- **Dividend Growth Model (DGM)** – The DGM is a valuation model which uses the share price, dividend (or cash flow) forecasts and the expected growth rate of the dividends to infer the required return on equity.
- **Energy Infrastructure Credit Spread Index (EICSI)** – the EICSI was created jointly between Chairmont and the AER in 2018. It reports unadjusted actual debt costs (as a spread over the swap rate) from networks using a 12 month rolling window. The EICSI dataset also allows calculation of debt term and credit rating.

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228 Australian Bureau of Statistics, *Consumer price index, Australia methodology*, September 2020, <https://www.abs.gov.au/methodologies/consumer-price-index-australia-methodology/sep-2020>

229 Ofgem, *RIIO-2 Sector specific methodology Annex: Finance*, December 2018, p. 66

- **Equity beta** – This is a key parameter within the standard (Sharpe- Lintner) CAPM. It measures the 'riskiness' of a firm compared with that of the market and should only reflect the systematic risk. Systematic risk is risk that is inherent to the entire market and cannot be eliminated through holding a well-diversified portfolio (i.e. diversified away).
- **Financeability** – service provider's ability to achieve the benchmark credit rating applied in the estimation of the rate of return.
- **Gearing** – the proportion of debt in total financing
- **Market risk premium (MRP)** – This is the difference between the expected return on a market portfolio and the return on the risk-free asset. It compensates an investor for the systematic risk of investing in the market portfolio or the 'average firm' in the market.
- **Net present value (NPV) –**The difference between the present value of cash inflows and the present value of cash outflows over a period of time at a selected point in time. Depending how it is applied, it can be used in a forward-looking context or a backward looking context.
- **Post-tax revenue model (PTRM)** – The post-tax revenue model is a model used by the AER to estimate the annual revenue requirement for each year of a regulatory control period. It brings together the various building block costs that make up the annual revenue requirement for each regulatory year, including the rate of return on capital.
- **Rate of return (or weighted average cost of capital)** – The rate of return on capital is a forecast of the additional return (above the initial investment amount) required to induce investment in its network. It is a combination of the return on debt and return on equity, weighted according to the proportions of debt and equity investment. In the current rate of return instrument, we estimate a make-up of 60% debt and 40% equity. As such, the weighted average cost of capital is formed of 60% return on debt and 40% return on equity. From the investor's perspective it is the return on the funds invested, but from the network's perspective this is the cost of obtaining the funds.
- **Rate of return instrument** – The Instrument is a binding document which sets out the way the AER will calculate the rate of return in regulatory determinations. Neither the AER nor the regulated businesses have the ability to depart from the instrument. The current instrument was published in December 2018 and its replacement is scheduled for December 2022.
- **Reference groups** – Reference groups are appointed by the AER and consist of representatives from various stakeholders including consumers, investors and retailers. Their role is to allow stakeholders to be involved in the rate of return process and contribute to our consultation.
- **Regulated network (or entity)** – a direct control network service for the purposes of the National Electricity Law or a reference service for the purposes of the National Gas Law. Essentially energy businesses that the AER sets revenue allowances for.
- **Regulated control period –** We set the revenues regulated businesses can earn over a certain timeframe in our regulatory determinations which is typically for a 5 year period. This period is called the 'regulatory control period' under the National Electricity Rules or an 'access arrangement period' under the National Gas Rules.

- **Regulatory determinations** – Regulatory determinations are decisions published by the AER and specify the amount of allowed revenue that network businesses can recover from customers during a regulatory control period.
- **Return on debt** – The return on debt is the AER's forecast of the interest costs of maintaining a debt portfolio for a regulated energy network.
- **Return on equity** – The return on equity is the AER's forecast of the return that equity investors (e.g. shareholders) require in order to induce them to invest in a regulated energy network.
- **Risk-free rate –** This is a parameter within the CAPM which is a model for estimating the return on equity. The risk-free rate measures the return an investor would expect from a 'riskless' investment where there is guaranteed return on the invested capital.
- **Total market return** – The total market return is the overall return expected by investors from investing in a diversified benchmark stock market index.
- **Trailing average** – The trailing average is calculated as the simple average of values over a specified number of estimation period which is updated overtime. For example, the 10 year trailing average for the return on debt for the forthcoming year would be calculated as the simple average of the annual return on debt for that year and the annual return on debt estimates for the 9 previous years.
- **Weighted Average Term to Maturity at Issuance (WATMI)** – The WATMI is derived from the EICSI and weighs each debt instrument with regard to the value of that debt as a proportion of total debt.
- **Weighted average cost of capital (WACC)** – See rate of return.