DRAFT DECISION
TasNetworks distribution determination
2017–18 to 2018–19

Attachment 3 – Rate of return

September 2016

AUSTRALIAN ENERGY REGULATOR

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Note

This attachment forms part of the AER's draft decision on TasNetworks' distribution determination for 2017–19. It should be read with all other parts of the draft decision.

The draft decision includes the following documents:

Overview

Attachment 1 – Annual revenue requirement

Attachment 2 – Regulatory asset base

Attachment 3 – Rate of return

Attachment 4 – Value of imputation credits

Attachment 5 – Regulatory depreciation

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Contents

Shortened forms

Shortened form	Extended form
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ARORO	allowed rate of return objective
CAPM	capital asset pricing model
CCP	Consumer Challenge Panel
NEL	national electricity law
NEO	national electricity objective
NER	national electricity rules
NGL	national gas law
NGO	national gas objective
NGR	national gas rules
RAB	regulatory asset base, herein also refers to a capital base as defined in the NGR
RBA	Reserve Bank of Australia
regulatory period	refers to regulatory control periods and access arrangement periods
regulatory proposal	includes revenue proposals and proposed access arrangements
regulated services	refers to electricity distribution direct control services, prescribed electricity transmission services, and/or gas pipeline reference services
RPP	revenue and pricing principles
service provider	refers to an electricity distribution network service provider, electricity transmission network service provider, and/or gas pipeline operator
Tribunal	Australian Competition Tribunal

3 Rate of return

The allowed rate of return provides a network service provider a return on capital that a benchmark efficient entity would require to finance (through debt and equity) investment in its network.[1] The return on capital building block is calculated as a product of the rate of return and the value of the regulatory asset base (RAB). The rate of return is discussed in this attachment.

3.1 Draft decision

We are satisfied that the allowed rate of return of 5.48 per cent (nominal vanilla) we have determined achieves the allowed rate of return objective (ARORO).[2] That is, we are satisfied that this allowed rate of return is commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to TasNetworks in providing standard control services.[3]

This allowed rate of return of 5.48 per cent will apply to TasNetworks for 2017–18. A different rate of return value will apply to TasNetworks for 2018–19 regulatory year. This is because we will update the return on debt component each year to partially reflect the prevailing debt market conditions. We discuss this annual update further below.

Our allowed rate of return is a weighted average of our return on equity and return on debt estimates determined on a nominal vanilla basis that is consistent with our estimate of the value of imputation credits. We are to determine the allowed rate of return such that it achieves the ARORO. Also, in arriving at our decision we have taken into account the revenue and pricing principles (RPPs) and are also satisfied that our decision will or is likely to contribute to the achievement of the National Electricity Objective (NEO).

We have determined our rate of return based on the methodology set out in our Rate of Return Guideline (Guideline). TasNetworks adopted our Guideline approach in its regulatory proposal,[4] but noted it does not endorse our methods.[5]

We have accepted TasNetworks' proposal to apply our Guideline, although components have been updated to account for prevailing market conditions. Differences in the value of TasNetworks' proposed rate of return and our draft decision are due to movements in market conditions between the time of TasNetworks'

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1 The term service provider relates to network service providers that provide gas and electricity transmission and distribution services.

2 NER, cl. 6.5.2(b); cl. 6A.6.2(b).

3 NER, cl. 6.5.2(c); cl. 6A.6.2(c).

4 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, pp. 114, 116.

5 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, pp. 114, 116.

proposal and this decision. We do not agree with TasNetworks that departures from our Guideline may better achieve the ARORO, for the reasons set out in section 3.4. Our rate of return and TasNetworks' proposed rate of return are set out in table 3-1.

Table 3-1 Draft decision on TasNetworks' rate of return (% nominal)

	Our previous decision (2012–17)	TasNetworks' proposal (2017–18)	Our draft decision (2017–18)	Allowed return over 2017–19 regulatory period
Return on equity (nominal post–tax)	8.69	7.30	6.50	Constant (6.5%)
Return on debt (nominal pre–tax)	8.00	5.20	4.79	Updated annually
Gearing	60	60	60	Constant (60%)
Overall rate of return (nominal, vanilla)	8.28	6.04	5.48	Updated annually for return on debt
Forecast inflation	2.60	2.50	2.45	Constant (2.45%)

Source: AER analysis; TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117AER, *Final Distribution Determination: Aurora Energy Pty Ltd 2012-13 to 2016-17*, April 2012, p. 29.

Our return on equity estimate is 6.5 per cent. This rate will apply to TasNetworks in each regulatory year. Our return on debt estimate for the 2017–18 regulatory year is 4.79 per cent. This estimate will change each year as we partially update the return on debt to reflect prevailing interest rates over TasNetworks' debt averaging period in each year. Our return on debt estimate for future regulatory years will be determined in accordance with the methodology and formulae we have specified in this decision. As a result of updating the return on debt each year, the overall rate of return and TasNetworks' revenue will also be updated.

We accept TasNetworks' application of our Guideline return on equity approach. We have applied this approach and updated it for prevailing market conditions. Our return on equity point estimate and the parameter inputs are set out in the table 3-2. We note that since we published the guideline in December 2013, we have applied the guideline approach to estimating return on equity in our decisions for NSW electricity transmission, NSW electricity distribution, ACT electricity distribution, SA electricity distribution, Vic electricity distribution, NSW gas distribution, SA gas distribution, ACT gas distribution, and NT gas transmission. The Australian Competition Tribunal (Tribunal) recently upheld the use of our Guideline approach for estimating return on equity.[6]

[6] For example, see Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 717.

Table 3-2 Draft decision on TasNetworks' return on equity (nominal)

	Our previous decision (2012–17)	TasNetworks proposal (2017-19)[a)]	Our draft decision (2017–19)
Nominal risk free rate (return on equity only)	3.89%	2.75%	1.95%
Equity risk premium	5.20%	4.55%	4.55%
Market risk premium	6.50%	6.50%	6.50%
Equity beta	0.8	0.7	0.7
Nominal post–tax return on equity	8.69%	7.3%	6.50%

Source: AER analysis; TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117AER, *Final Distribution Determination: Aurora Energy Pty Ltd 2012-13 to 2016-17*, April 2012, p. 29.

(a) TasNetworks used an indicative averaging period of 20 business days to 30 September 2015.

We accept TasNetworks' application of our Guideline return on debt approach and of our proposed transitional trailing average approach used in our most recent decisions.[7] That is to:

- estimate the return on debt using an on-the-day approach (that is, based on prevailing market conditions near the commencement of the regulatory period) in the first year (2017–18) of the 2017–19 regulatory period, and
- gradually transition this approach into a trailing average approach (that is, a moving historical average) over 10 years.[8]

This gradual transition occurs through updating 10 per cent of the entire return on debt each year to reflect prevailing market conditions in that year (a full transition).[9]

In the Guideline, we proposed to use one or more third party data series to estimate the return on debt.[10] At that time, however, we had not formed a view on which data series to use. Our April 2014 issues paper outlined how we would make this choice and sought submissions from service providers.[11] Following our recent decisions,

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7 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, pp. 114–117.

8 This draft decision determines the return on debt methodology for the 2017-19 regulatory period. This period covers the first two years of the 10 year transition period. This decision also sets out our intended return on debt methodology for the remaining eight years. However, we do not have the power to determine in this decision the return on debt methodology for those years. Under the NER, the return on debt methodology must be determined in future decisions that relate to that period.

9 By entire return on debt, we mean 100% of the base rate and debt risk premium components of the allowed return on debt.

10 AER, *Explanatory statement—Rate of return guideline*, December 2013, pp. 23–24.

11 AER, *Issues Paper - Return on debt: Choice of third party data service provider*, April 2014.

TasNetworks, used a simple average of the RBA and Bloomberg data series.[12] We adopt this approach for reasons discussed in section 3.4.2.

Consequently, the return on debt in each regulatory year is estimated with reference to:

- a benchmark credit rating of BBB+
- a benchmark term of debt of 10 years
- independent third party data series—specifically, a simple average of the broad BBB rated debt data series published by the Reserve Bank of Australia (RBA) and Bloomberg, adjusted to reflect a 10 year estimate and other adjustments[13]
- an averaging period for each regulatory year of between 10 business days and 12 months (nominated by the service provider), with that period being consistent with certain conditions that we proposed in the Guideline.[14]

It is worth noting that the Tribunal recently reviewed several aspects of our approach to estimating the allowed return on debt in recent decisions for ActewAGL, Jemena Gas Networks and Networks NSW. Specifically, the Tribunal was asked to review:

- Whether a benchmark efficient entity would have a credit rating of BBB rather than BBB+. It upheld our decision to define a benchmark credit rating as a BBB+ credit rating.[15]
- Whether we should estimate the allowed return on debt using the RBA data series alone or a simple average of the RBA and Bloomberg data series. It upheld our decision and found that, 'averaging of the two curves was an acceptable measure of the DRP [debt risk premium]'. [16]
- Whether we should transition all of the return on debt[17] from an on-the-day approach in the first regulatory year to a trailing average by updating 10 per cent of the debt portfolio over 10 years (a full transition). It remitted the determination back to us to make a constituent decision on introducing the trailing average approach in

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12 For example, see AER, *Final decision: AusNet Services determination 2015 -16 to 2019–20, Attachment 3—Rate of return*, May 2016.

13 For the RBA curve, our draft decision is to interpolate the monthly data points to produce daily estimates, to extrapolate the curve to an effective term of 10 years, and to convert it to an effective annual rate. For the Bloomberg curve, our draft decision is to extrapolate it to 10 years using the spread between the extrapolated RBA seven and 10 year curves (where Bloomberg has not published a 10 year estimate), and to convert it to an effective annual rate. While we do not propose estimating the return on debt by reference to the Reuters curve, we do not rule out including doing so in future determinations following a proper period of consultation.

14 AER, *Rate of return guideline*, December 2013, pp. 21–2; AER, *Explanatory statement—Rate of return guideline*, December 2013, p. 126.

15 For example, see Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 993.

16 For example, see Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 983.

17 For clarity, that is 100% of the base rate and debt risk premium components of the allowed return on debt.

accordance with several reasons outlined in its decision.[18] We note the Tribunal's decision in section 3.4.2 and Appendix A.

Our formula for automatically updating the return on debt annually is set out in section 3.4.2 of this decision.

While acknowledging that some matters relating to our Guideline are currently before the Tribunal and Federal Court for consideration, we consider that the rate of return set out in this decision achieves the ARORO and promotes the NEO and RPP.

3.2 TasNetworks' proposal

TasNetworks proposed a return on equity estimate of 7.3 per cent.[19] This is based on TasNetworks' adoption and application of our Guideline approach.[20] In its regulatory proposal, TasNetworks adopted our Guideline return on debt approach and our proposed transitional trailing average approach used in our most recent decisions. As such, TasNetworks proposed a return on debt estimate of 5.2 per cent for regulatory year 2017–18.[21] TasNetworks also adopted our Guideline benchmark gearing level of 60 per cent.

While TasNetworks adopted our Guideline approach in its regulatory proposal, it noted it does not endorse our methods.[22]

3.3 AER's assessment approach

The National Electricity Law/National Gas Law (NEL/NGL) and rules (NER/NGR) form our framework for determining the rate of return. The key components of this framework include:

- national electricity/gas objective (NEO/NGO) and the RPPs in the NEL/NGL.
- the overall rate of return—consisting of the allowed return on equity and debt
- the ARORO and its elements
- return on debt factors
- considering interrelationships within the rate of return
- use of the Guideline

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18 For example, see Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 1,227. The Tribunal's reasons are set out in paras 870 to 940.

19 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

20 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

21 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

22 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, pp. 114, 116.

- consideration of information before us.

3.3.1 National electricity and gas laws

In performing or exercising an economic regulatory function or power, we must do so in a manner that will or is likely to contribute to the NEO.[23] The NEO states:

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to —
>
> (a) price, quality, safety, reliability and security of supply of electricity;
>
> (b) and the reliability, safety and security of the national electricity system.

When we make a determination and set the rate of return we are exercising economic regulatory functions or powers.

In addition, we must take into account the RPPs when we exercise discretion.[24] In the context of the rate of return decision, we take particular account of the following RPPs:

- A service provider should have a reasonable opportunity to recover at least the efficient costs the operator incurs in providing direct control network services.[25]
- A service provider should have effective incentives to promote economic efficiency in the direct control network services that it provides. That economic efficiency should include efficient investment in the electricity system, efficient provision of electricity network services, and the efficient use of the electricity system.[26]
- A price or charge should allow for a return that matches the regulatory and commercial risks involved in providing the regulated service to which that charge relates.[27]
- The economic costs and risks of the potential for under or over investment by a service provider in a distribution or transmission system that the service provider uses to provide regulated network services.[28]
- The economic costs and risks of the potential for under or over utilisation of a distribution or transmission system that the service provider uses to provide regulated network services.[29]

3.3.2 The overall rate of return

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23 NEL, s. 16(1)(a), NGL, s. 23.
24 NEL, s. 16(2); NGL, s. 28(2)(a)(i).
25 NEL, s. 7A(2); NGL, s. 24(2)(a).
26 NEL, s. 7A(3); NGL, s. 24(3).
27 NEL, s. 7A(5); NGL, s. 24(5).
28 NEL, s. 7A(6); NGL, s. 24(6).
29 NEL, s. 7A(7); NGL, s. 24(7).

The rules require we determine the allowed rate of return for a regulatory year as a weighted average of the return on equity for the regulatory period in which that regulatory year occurs and the return on debt for that regulatory year. This must be determined on a nominal vanilla basis that is consistent with the estimate of the value of imputation credits.[30] In determining the allowed rate of return, we must have regard to the desirability of consistent application of financial parameters that are relevant or common to the return on equity and debt.[31]

The rules require that we estimate the return on equity for a regulatory period such that it contributes to the achievement of the ARORO. In estimating the return on equity, we have regard to the prevailing conditions in the market for equity funds.[32]

We must determine the return on debt for a regulatory year such that that it contributes to the achievement of the ARORO.[33] We may estimate the return on debt using a methodology which results in the return on debt (and consequently the allowed rate of return) being or potentially being, different for different regulatory years in the regulatory period.[34] In estimating the return on debt we have regard to the following factors:

- the desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the ARORO.
- the interrelationship between the return on equity and the return on debt.
- the incentive that the return on debt may provide in relation to capital expenditure over the regulatory period, including as to the timing of capital expenditure.
- any impacts (including in relation to the costs of servicing debt across regulatory periods) on a benchmark efficient entity referred to in the ARORO that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory period to the next.[35]

3.3.3 Allowed rate of return objective

We are to determine the allowed rate of return such that it achieves the ARORO. The objective is:[36]

> …that the rate of return for a distribution network service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the distribution network service provider in respect of the provision of standard control services.

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30 NER, cl. 6.5.2(d); NER, cl. 6A.6.2(d); NGR, r, 87(4).
31 NER, cl. 6.5.2(e), NER cl, 6A.6.2(e); NGR, r. 87(5).
32 NER, cl 6.5.2(g); NER, cl 6A.6.2(g); NGR, r. 87 (7).
33 NER, cl. 6.5.2 (h); NER, cl. 6A.6.2(h); NGR, cl. 87(8).
34 NER, cl. 6.5.2 (i); NER, cl. 6A.6.2(i)(2); NGR, cl. 87(9)(b).
35 NER, cl. 6.5.2 (k)(4); NER, cl. 6A.6.2(k)(4); NGR, cl. 87(11)(d).
36 NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR r. 87(3).

The regulatory regime is an ex-ante (forward looking) regime.[37] As such, we consider a rate of return that meets the ARORO must provide ex-ante compensation for efficient financing costs.[38] This return would give a benchmark efficient entity a reasonable opportunity to recover at least its efficient financing costs. This is a zero net present value (NPV) investment condition, which can be described as follows:[39]

> 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.

Under our regulatory framework, a benchmark efficient entity's assets are captured in its RAB. The return on capital building block allows a benchmark efficient entity to finance (through debt and equity) investment in its network.[40] Because investments usually carry a degree of risk, to satisfy the zero NPV condition the allowed rate of return must be sufficient to compensate a benchmark efficient entity's debt and equity investors for the risk of their investment.[41]

Elements of the ARORO—efficient financing costs

A key concept in the ARORO is 'efficient financing costs'. Because the market for capital finance is competitive, a benchmark efficient entity is expected to face competitive prices in the market for funds. Therefore, we consider efficient financing costs are reflected in the prevailing market cost of capital for an investment with a similar degree of risk as that which applies to a service provider in respect of the provision of regulated services.[42] As Alfred Kahn stated, 'since the regulated company must go to the open capital market and sell its securities in competition with every other would-be issuer, there is clearly a market price (a rate of interest on borrowed funds, an expected return on equity) that it must be permitted and enabled to pay for the capital it requires'.[43]

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37 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*.

38 See section 2.1 of appendix A.

39 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

40 This includes both new and existing investment.

41 This risk is based on the risk of the underlying assets (that is, the RAB). See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 18, 22.

42 See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 15. We note the cost of capital (from a firm's perspective) is also known as investors' required rate of return (from an investors' perspective).

43 Kahn, A.E., 'The economics of regulation: Principles and institutions', The MIT Press, Massachusetts, 1988, p. 45.

We consider employing a rate of return that is commensurate with the prevailing market cost of capital is consistent with the zero NPV investment condition (see above). We also consider economic efficiency more generally is advanced by employing a rate of return that reflects rates in the market for capital finance.[44] Similarly, Partington and Satchell interpret efficient financing costs as the opportunity cost of capital, which is a market rate of return for assets with a given level of risk.[45]

Elements of the ARORO—benchmark efficient entity

A key concept in the ARORO is a 'benchmark efficient entity'. It is essential to recognise the context in which this term is used. The ARORO aims at setting *the efficient financing costs* of a benchmark efficient entity *with a similar degree of risk as that which applies to the service provider in respect of the provision of standard control services*. Given this, three important concepts to consider are: 'risk', 'similar' and 'standard control services'. Having understood these concepts, we can better understand a benchmark efficient entity to give effect to the ARORO.

'Risk'

The risk of a benchmark efficient entity is a core element of the rate of return due to the important relation between risk and required returns in finance theory. Risk is the degree of uncertainty about an event—such as the uncertainty around the expectation of the return on an investment.[46] It is strictly a forward looking concept as no event is uncertain after it has occurred.

'Risk' has a specific meaning in finance theory. As such, it is important to apply this specific meaning in setting a rate of return that achieves the ARORO. In finance, there are two distinct types of risk—systematic (market or non-diversifiable) and non-systematic (firm-specific or diversifiable). That is, in finance:[47]

> The risk of any share can be broken down into two parts. There is the *unique risk* that is peculiar to that share, and there is the *market risk* that is associated with market-wide variations. Investors can eliminate unique risk by holding a well-diversified portfolio, but they cannot eliminate market risk. *All* the risk of a full diversified portfolio is market risk.

Similarly, McKenzie and Partington advise:[48]

> modern finance theory specifies that the risk to be compensated via the WACC is the non-diversifiable, or systematic, component of total risk (in simple terms,

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44 See sections 1.1 and 2.1 of appendix A.

45 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 15.

46 Bishop, S., Faff, R., Oliver, B., Twite, G., 'Corporate Finance', Ed. 5 Pearson Prentice Hall, 2004, p. 577.

47 Brealey, R., Myers, S., Partington, G., Robinson, D., 'Principles of corporate finance', 2007, The McGraw-Hill Companies Inc., 2007, p. 201.

48 McKenzie, M., Partington, G., *Risk, asset pricing models and WACC*, June 2013, p. 10.

that risk which cannot be eliminated by holding stocks in a well diversified portfolio). This risk is measured as covariance, or equivalently beta, risk.

The rate of return allows a benchmark efficient entity to compensate investors for the risk of committing capital to fund investments in its network. We do not consider investors require compensation for all risk facing a benchmark efficient entity. In setting the allowed return on equity, we provide compensation for the systematic risk that a benchmark efficient entity would face through the equity beta (see section 3.4.1). The equity beta under the Sharpe–Lintner capital asset pricing model (CAPM) measures systematic risk as the sensitivity of an asset or business[49] to the overall movements in the market. It does this by measuring the standardised correlation between the returns on this asset or business with that of the overall market.[50] The key risks for debt holders are systematic (beta) risk, credit risk (the risk of default and credit rating downgrades) and liquidity risk.[51] In setting the allowed return on debt, we provide compensation for a benchmark efficient entity's efficient costs from facing these risks. This is because such costs are included in the promised returns we observe using Bloomberg and RBA data.[52]

As such, when looking at the risks of supplying standard control services, we differentiate between risk compensated through the allowed rate of return (compensable risk) and non-compensable risk. When developing the Guideline, we commissioned Frontier to explore these risks and provide advice on what risks we should compensate service providers for through the allowed rate of return.[53]

We accept the ARORO requires us to set an allowed rate of return that compensates for the efficient financing costs of a benchmark firm for bearing a similar degree of compensable risk as that which applies to the service provider in respect of the provision of the relevant regulated services. This reflects an ex-ante return that includes a risk premium over the risk free rate for bearing this level of compensable risk.

'Similar'

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[49] Theoretically, this asset or business is 'a benchmark efficient entity'. In practice, we use a sample of businesses we consider comparable to a benchmark efficient entity to calculate equity beta (see section 3.4.1).

[50] McKenzie, M., Partington, G., *Risk, asset pricing models and WACC*, June 2013, p. 21; Brealey, R., Myers, S., Partington, G., Robinson, D., 'Principles of corporate finance', 2007, The McGraw-Hill Companies Inc., 2007, p. 107.

[51] McKenzie, M., Partington, G., *Risk, asset pricing models and WACC*, June 2013, p. 14.

[52] We observe the promised returns of debt issued by a sample of firms we consider comparable to a benchmark efficient entity based on the benchmark credit rating and term. In practice, we may overcompensate a benchmark efficient entity for these risks as we observe broad BBB debt whereas we consider a benchmark efficient entity would issue BBB+ debt.

[53] Frontier, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia*, July 2013.

A benchmark efficient entity is to have a similar degree of risk as that which applies to the service provider in respect of the provision of the relevant regulated services.[54] As such, when developing the Guideline, we looked at the concept of 'a similar degree of risk' in some detail. We also sought advice from Frontier Economics on the risks to which energy network service providers are exposed in delivering regulated services.[55] We concluded the compensable risks facing the different service providers[56] were 'similar' for the purposes of characterising a benchmark efficient entity.[57] For this analysis, see chapter three of the Guideline's explanatory statement.[58]

'Standard control services'

The allowed rate of return is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect to the provision of standard control services.[59] As such, it is important to understand how the rules characterise 'standard control services'.

The rules define standard control services as a direct control service that is subject to a control mechanism based on a service provider's total revenue requirement.[60] The rules define a direct control service as a direct control network service within the meaning of section 2B of the NEL.[61] The NEL then specifies (underline added):[62]

> A direct control network service is an electricity network service—
>
> (a) the Rules specify as a service the price for which, or the revenue to be earned from which, must be regulated under a distribution determination or transmission determination; or
>
> (b) if the Rules do not do so, the AER specifies, in a distribution determination or transmission determination, as a service the price for which, or the revenue to be earned from which, must be regulated under the distribution determination or transmission determination.

Risk, regulation and a benchmark efficient entity

54 NER, cll. 6.5.2(c), 6A.6.2(c); NGR, r. 87(2)(3).

55 Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia*, June 2013.

56 That is, gas, electricity, transmission and distribution service providers.

57 As discussed under the above heading 'similar', compensable risk refers to risk that is to be compensated through the allowed rate of return.

58 AER, *Better regulation: Explanatory statement to the rate of return guideline*, December 2013, pp. 32–45.

59 See NER cl. 6A.6.2(c). Instead of 'prescribed transmission services', the distribution rules refer to 'standard control services' and the NGR refers to 'reference services'. See NER, cl. 6.5.2(c), NGR r. 87(3).

60 See NER v. 79, Chapter 10: 'Glossary', p. 1224. The NER describes 'prescribed transmission services under NER v. 79, Chapter 10: 'Glossary', p. 1201.

61 NER v. 79, Chapter 10: 'Glossary', p. 1151.

62 NEL, s. 2B.

The rules specify that the allowed rate of return is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies:[63]

- to the service provider in which the decision relates (which will always be a business that is regulated under the rules and NEL/NGL)
- in respect to the provision of standard control services, which can only be provided by businesses regulated under the rules.

As discussed under 'Risk' above, risk is the degree of uncertainty about an event.[64] For instance, investing in the share market is risky because there is a spread of possible outcomes. The usual measure of this spread is the standard deviation or variance.[65] Similarly, the risk of a benchmark efficient entity would be the uncertainty around its expected return. More specifically, the systematic or market risk of a benchmark efficient entity would be the uncertainty around its expected return relative to the expected returns on the market. We would measure this as the standardised correlation between a benchmark efficient entity's returns with that of the overall market (measured by the equity beta in the CAPM).[66]

Brealey et.al. use the figure we have presented as figure 3-1 to illustrate the following.[67]

> Investments A and B both have an expected return of 10%, but because investment A has the greater spread of possible returns, it is more risky than B. We can measure this spread by the standard deviation. Investment A has a standard deviation of 15%; B, 7.5%. Most investors would prefer B to A. Investments B and C both have the same standard deviation, but C offers a higher expected return. Most investors would prefer C to B.

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63 See NER, cl. 6.5.2(c), NER 6A.6.2(c), NGR 87(3). Also see section 2B of the NEL.

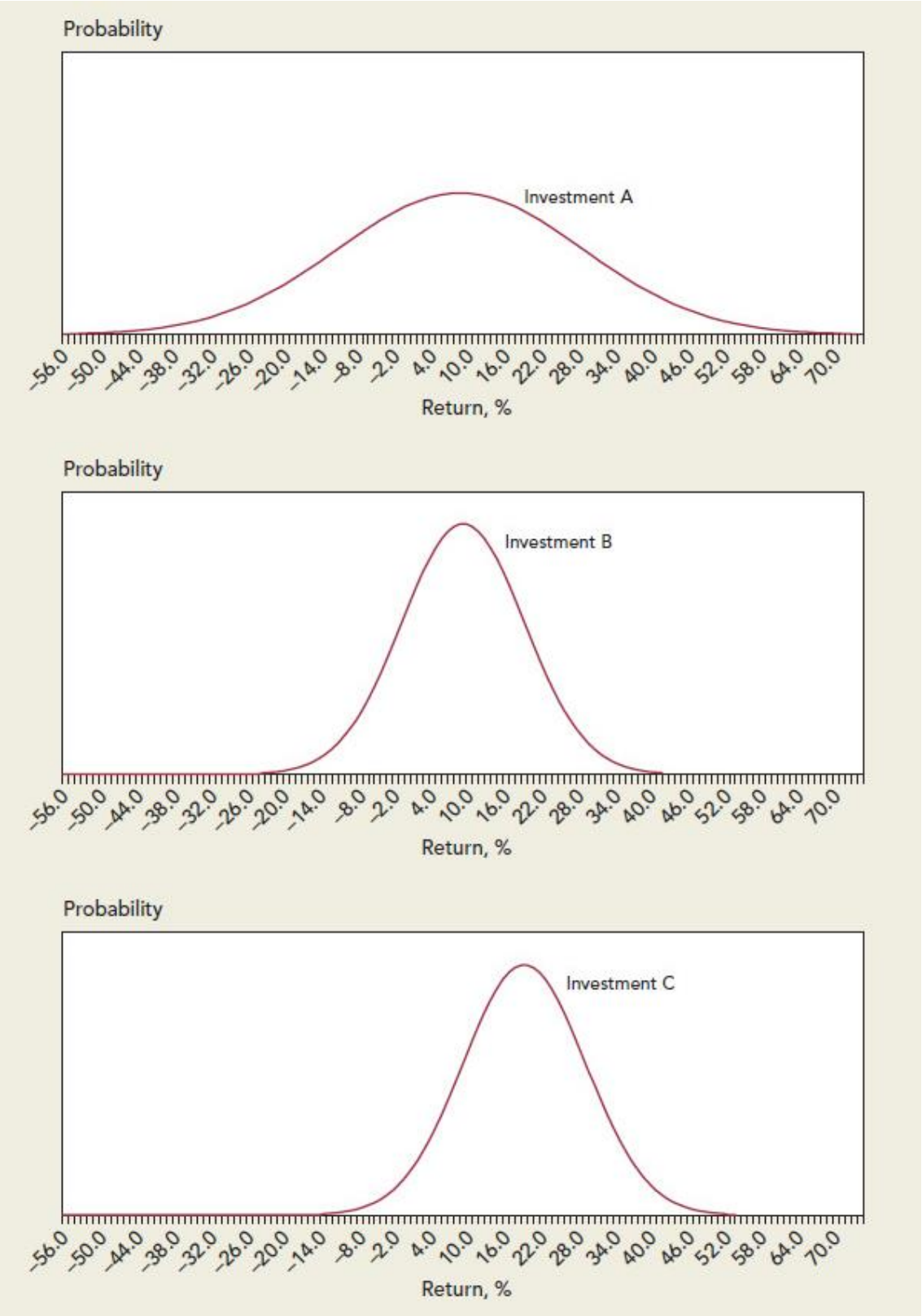
64 Bishop, S., Faff, R., Oliver, B., Twite, G., 'Corporate Finance', Ed. 5 Pearson Prentice Hall, 2004, p. 577.

65 Brealey, R., Myers, S., Partington, G., Robinson, D., 'Principles of corporate finance', 2007, The McGraw-Hill Companies Inc., 2007, p. 201.

66 McKenzie, M., Partington, G., *Risk, asset pricing models and WACC*, June 2013, p. 21; Brealey, R., Myers, S., Partington, G., Robinson, D., 'Principles of corporate finance', 2007, The McGraw-Hill Companies Inc., 2007, p. 107.

67 Brealey, R., Myers, S., Allen, F., 'Principles of corporate finance', 2011, Ed. 10, McGraw-Hill Irwin, Figure 8.2, p. 187.

Figure 3-1 Risk versus expected return



Source: Brealey, Myers, Allen (2011), Figure 8.2.

We use the above example to explain the relationship between risk and return for a single investment. Investors are generally assumed to prefer an investment with a lower variance for a given expected return under the assumption that investors are risk averse. However, we note that for an investment that is to be included in an investment portfolio the risk that is relevant to its price is the risk it will add to this portfolio. Therefore, under the assumption that investors hold fully diversified 'efficient' market portfolios, it is an investment's non-diversifiable (or systematic) risk that is relevant. In the case of equity investments, as discussed above, this is measured by the equity beta of the investment.

We consider a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in the provision of its regulated services would be 'a pure play, regulated energy network business operating within Australia' acting efficiently.[68] To understand this position, it is essential to understand the relationship and distinction between risk and expected returns. All else being equal, we consider an unregulated monopoly will have higher risk and higher expected returns than a regulated monopoly. This is because regulation:

- mitigates monopolies from being able to extract monopoly rents, thereby constraining potential profits
- increases the certainty of the revenue stream, thereby reducing risk.

For clarity, regulation reduces both risks that are compensated through the rate of return (for example, demand risk) and risks that would not be compensated through the rate of return (for example, by allowing cost pass throughs for unsystematic risks such as industry-specific tax changes or geographic-specific natural disasters). We only focus on risks that are compensated through the rate of return (compensable risks).

Incentive regulation affects compensable risks by allowing service providers to earn more stable cash flows with periodic resets of revenues to better reflect actual expenditure. Most unregulated businesses do not have these same protections or restrictions, and so are likely to have a different systematic risk profile. We carefully considered this role when developing the Guideline when considering whether a benchmark efficient entity referred to in the context of the ARORO is likely to be regulated.[69] Frontier has also recognised the role of regulation in affecting risk in advising:[70]

> The form and nature of regulation applicable to Australian energy networks mitigates most of the business risks they face as compared to the business risks faced by other types of firms in the economy. Regulated revenues are set

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[68] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013,ch.3; AER, *Better regulation: Rate of Return Guideline,* December 2013, section 3.

[69] AER: *Better regulation: Explanatory statement to the rate of return guideline*, December 2013, pp. 32–45.

[70] Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia*, July 2013, p. 4.

> on a periodic basis and changes in volumes may only affect the timing of revenues (under a revenue cap). Even where revenues fall short of expectations due to lower volumes (as under a price cap), the lower volumes imply that costs would probably also have been lower than expected. Unanticipated or poorly-managed changes in costs are partly borne by customers and only partly by the network business through the building block form of incentive regulation that applies. Stranding and optimisation risks are minimal for energy networks, a complete contrast to businesses operating in other sectors.

Several members of our Consumer Challenge Panel (CCP) also recognised this in highlighting the need to take into account the protections provided under the regulatory framework when making assessments about a benchmark efficient entity with a similar degree of risk as a service provider. These included risk reductions arising from:[71]

- a revenue cap, which removes volume risk
- the indexation of the RAB, which protects the value of the underlying assets even when they might otherwise be written down in a commercial environment
- the progressive transition to a 10-year trailing average, including annual updating of the return on debt.

Many of the risks that the regulatory regime affects are systematic and therefore affect the cost of capital (or rate of return). From being inherently less exposed to systematic risk, regulated service providers have lower equity betas than if they were unregulated and therefore lower costs of equity. Also, given their lower risk cash flows, regulated service providers might issue a higher proportion of debt than if they were unregulated. This reduces their cost of capital if debt is cheaper than equity, for example due to taxes or other market imperfections. As a result, we consider a benchmark efficient entity faces lower compensable risk than would otherwise be the case absent regulation. As such, it would have a lower cost of capital.

Some systematic risks that regulation reduces include:

- Demand risk: the revenue or price setting mechanism mitigates demand risk. Under a price cap, service providers may mitigate the risk of forecast error by restructuring tariffs, such that higher fixed charges are set to offset falls in demand. Under a revenue cap, where forecast quantity demanded differs from actual quantity demanded, service providers are made whole for any variation through price adjustments in subsequent years. Further, in most cases, a service provider will determine prices based on historical demand which reduces intra year revenue variations. This effectively mitigates the risk associated with demand volatility.

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[71] CCP (David Headberry, Bev Hughson and David Prins), *Submission to the AER: An Overview — Response to AER Preliminary Decisions and revised proposals from Victorian electricity DNSPs for a revenue reset for the 2016-2020 regulatory period*, 22 February 2016, p. 31.

- Inflation risk: Regulated service providers face less inflation risk than unregulated businesses. Under the regulatory framework, they effectively expect to receive a real return on their investments in their RABs and to also have their RABs indexed for actual inflation.
- Interest rate risk: Both regulated and unregulated service providers are exposed to interest rate risk. The regulatory framework effectively moves risk of interest rate movements impacting financing costs onto customers. Where service providers raise capital during the averaging period/s that they know in advance they can further limit their exposure to this risk. To the extent they are unable to raise capital over the averaging period/s, they can still materially reduce their exposure to interest rate risk by hedging the base rate.

Table 3-3 summarises a selection of provisions in the rules that have the effect of mitigating various systematic and non-systematic risks.

Table 3-3: Key clauses in the rules that mitigate systematic risk

Rule	Effect on risk
6.3.2(b) 6A.4.2(c)	The term of each regulatory period is at least 5 years, providing a fixed duration in which a service provider has a regulated return on its assets, revenue certainty, and fixed terms of access for its services.
6.2.6 6A.3	The AER adopts a control mechanism formula to calculate the total revenue that service providers may collect over a regulatory period (and for each year of a regulatory period). This control mechanism automatically accounts for indexation and annual increases in efficient input costs. The control mechanism that the AER adopts (typically in the form of a revenue cap), also ensures a service provider has a guaranteed level of total revenue that it may collect across the regulatory period, regardless of unexpected changes in demand. This significantly limits risks to revenue.
6.5.9 6A.6.8	X factors in the control mechanism smooth revenues across the regulatory period and limit shocks from the last year of a regulatory period before the start of the next. The AER sets X factors, among other things, to allow service providers to recover a revenue shortfall in one year in a subsequent year. Through X factors, service providers have a stable and certain level of revenue over each regulatory period, with reduced risks of short term revenue volatility.
6.18 6A.23	The prices service providers may charge annually are certain. They are set through a regulatory process to approve annual pricing proposals.
6.4.3(a)(1)-(3), 6.5.1, 6.5.2, 6.5.5, S6.2.1, S6.2.2B, S6.2.3, 6A.5.4(a)(1)-(3), 6A.6.1, 6A.6.2, 6A.6.3, S6A.2.1, S6A.2.2B, S6A.2.4	The total revenue that the AER determines incorporates a return on and of the service provider's asset base. The historical asset base rolls forward from one regulatory period to the next and from year to year within each regulatory period. The NER guarantees recovery of historical asset costs through depreciation, the earning of a return on the asset base, indexation and recovery of future efficient capex. This substantially lessens risks in capital investment that might otherwise apply to a business operating in a workably competitive market. An asset that is not utilised or productive may still provide a return under the NER through the setting and rolling forward of the asset base, the return on and of the asset base and the application of indexation.
6.5.2 6A.6.2	The AER sets the rate of return on the asset base by reference to the risks faced by the service provider. The AER updates this each regulatory period to account for changed market conditions.
6.5.3 6A.6.4	Provision for tax in determining total revenue is required regardless of whether the service provider pays tax.
6.5.6 and 6.5.7	The AER assesses expenditure requirements for each service provider by reference to the amount necessary to meet a set of standards and objectives. These include the need to meet the

6A.6.6 and 6A.6.7	expected demand for services and to meet quality, reliability, security, and safety standards. The AER does not assess expenditure by reference to the capacity of consumers to pay. This removes risks that could otherwise arise in providing a reliable and safe service. The AER reassesses the requirements of service providers for each regulatory period to account for changes in market conditions and trends.
6.5.10 6A.6.9	Allows service providers to pass through certain costs to consumers in circumstances where this might not be possible in a workably competitive market. For instance, the pass through provisions provide for a pass through of costs that arise through regulatory change.
6.5.7(f), 6.6A, chapter 5 6A.6.7(g), 6A.8, chapter 5	Establishes a planning regime for service providers that assists in predicting future costs and appropriate planning for changes in the commercial environment. This includes provision for contingent projects during a regulatory period and longer term projects through the RIT-D and RIT-T process.
6.20, 6.21, 6.6.1(a1)(d), and RoLR provisions 6A.27, 6A.28, 6A.7.3	Provides for a statutory billing and settlements framework with prudential requirements (and other similar provisions) to minimise financial risk associated with providing and charging for services. There is also provision for dealing with potential risks associated with retailer insolvency.

Source: NER, AER analysis.

Outcomes of a workably competitive market

For clarity, we consider the regulatory regime should seek to replicate the outcomes of a workably competitive market to the extent possible (notwithstanding that this is not an explicit requirement of the rules nor the NEL/NGL). We consider that this would entail replicating (to the extent possible while achieving the objectives of regulation) outcomes that a workably competitive market would theoretically produce with respect to efficiency and the resulting prices and service levels.[72] Incentive regulation aims to replicate these outcomes where competition is not available to achieve this. We are in an environment where competition is not viable as energy network service providers are natural monopolies. Consistent with economic theory, 'the essence of natural monopoly is that there are increasing returns in production and that the level of demand is such that only a single firm can be profitable'.[73]

Incentive regulation aims to replicate workably competitive market outcomes by:

[72] The basis for desiring a competitive market outcome in microeconomic theory stems from the theorems that a competitive equilibrium is Pareto-efficient and any Pareto-efficient allocation can be decentralised as a competitive equilibrium. This is where, in microeconomic theory, a 'competitive market equilibrium' is where firms' maximise their profits, consumers maximise their utilities and the market clears (there is no waste or undersupply). See Mas-Colell, A., Whinston, M.D., Green, J.R., *Microeconomic theory*, Oxford University Press, 2006, p. 314. It is worth noting that these theorems are derived from strong assumptions including an absence of externalities and market power, price taking behaviour and symmetric information. See for example Varian, H.R., *Intermediate micro economics: A modern approach*, ed. 7, W.W. Norton &Company, 1987, pp. 585; Hindriks, J., Myles, G.D., *Intermediate public economics*, The MIT Press, 2006, pp. 12–13.

[73] Hindriks, J., Myles, G.D., *Intermediate public economics*, The MIT Press, 2006, p. 232.

- Constraining monopoly rents by seeking for customers to only pay for efficient costs of providing the service. This results in service providers having a lower rate of return than if they were unregulated.
- Incentivising service providers to operate efficiently.

Applying the first point to the allowed rate of return, the allowed rate of return should be consistent with the efficient financing cost of providing regulated services.[74] As we discuss above and in Appendix A, we consider the current (or prevailing) cost of capital to be the efficient cost of capital. Prevailing market rates for capital finance are expected to be competitive.[75] Prevailing market rates also represent the costs that other service providers will face to enter the market.[76]

Applying the second point to the allowed rate of return, we encourage service providers to operate efficiently by setting an allowed rate of return that:

- Does not distort investment decisions. This differs from cost of service regulation, which entails compensating service providers for their actual costs no matter how inefficient.
- Is 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.
- Incentivises service providers to seek the lowest cost financing (all else being equal).

For clarity, promoting an efficient competitive outcome would not necessarily entail assuming a benchmark efficient entity would conduct all of its activities as we would imagine an unregulated firm would. As before, an unregulated benchmark efficient entity would be a natural monopoly. As Partington and Satchell advise, an unregulated benchmark with monopoly power is not appropriate because 'if the benchmark entity is an unregulated firm which has monopoly power, then it will be extracting economic rents'.[77]

3.3.4 Return on debt factors in the rules

The rules require that we must have regard to the following factors in estimating the return on debt:[78]

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74 That is, standard control services as referred to in NER, cl. 6.5.2(c), prescribed transmission services as referred to in NER, cl. 6A.6.2(c), or 'reference services' as referred to in NGR, r. 87(3).

75 Kahn, A.E., 'The economics of regulation: Principles and institutions', The MIT Press, Massachusetts, 1988, p. 45.

76 In a competitive market, prices are theoretically constrained by entry or the threat of entry. See HoustonKemp, *Memo: Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 1. This is also implied in Chairmont, *Cost of debt comparative analysis*, November 2013, p. 4.

77 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 49.

78 NER, cl. 6.5.2(k) and cl. 6A.6.2(k); NGR, r.87(11).

- The desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the ARORO.[79] We understand this factor to mean the difference between the return on debt allowance and the cost of debt a benchmark efficient entity would incur. For clarity, we do not consider this factor relates to minimising the difference between the return on debt allowance and the actual cost of debt incurred by an actual service provider. The actual cost of debt of an actual service provider is relevant only to the extent it reflects the cost of debt incurred by a benchmark efficient entity.
- The interrelationship between the return on equity and the return on debt.[80]
- The incentives that the return on debt may provide in relation to capital expenditure over the regulatory period, including as to the timing of any capital expenditure.[81]
- Any impacts (including in relation to the costs of servicing debt across regulatory periods) on a benchmark efficient entity referred to in the ARORO that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory period to the next.[82]

Of these factors above, the latter is particularly relevant. This is because the methodology for estimating the return on debt in this decision is a change from the methodology used in the previous regulatory period.[83]

Our transition between the two methodologies is 'revenue neutral' in a present value sense. It prevents 'wealth transfers'[84] flowing between a benchmark entity and its consumers because of the change in methodology. This mitigates any impacts on a benchmark efficient entity that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory period to the next.

If we change our method for estimating the return on debt without a transition, this would change the allowed return on capital cash flows relative to a continuation of the current (on-the-day) approach. This would change the present value of a benchmark efficient entity (which is based on the present value of these expected future cash flows), and this change would only arise due to a change in methodology. Changing the value of a benchmark efficient entity would only contribute to the achievement of the ARORO if it would be under- or over-valued under the continuation of the current

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79 NER, cl.6.5.2(k)(1) and cl.6A.6.2(k)(1); NGR, r.87(11)(a).

80 NER, cl.6.5.2(k)(2) and cl.6A.6.2(k)(2); NGR, r.87(11)(b).

81 NER, cl.6.5.2(k)(3) and cl.6A.6.2(k)(3); NGR, r.87(11)(c).

82 NER, cl.6.5.2(k)(4) and cl.6A.6.2(k)(4); NGR, r.87(11)(d).

83 AER, *Final decision—Queensland distribution determination 2010–11 to 2014–15*, May 2010, pp. 252–253; AER, *Final decision—Victorian electricity network distribution service providers: Distribution determination 2011–2015*, p. 496; AER, *Final decision— Envestra Ltd: Access arrangement proposal for the SA gas network,* June 2011, pp. 55, 58; AER, Final decision— *Access arrangement proposal: ACT, Queanbeyan and Palerang gas distribution network*, March 2010, pp. 40, 57; AER, *Final decision—NT Gas: Access arrangement proposal for the Amadeus Gas Pipeline August 2011 to June 2016*, July 2011, p. 78.

84 See Partington, G., Satchel, S., *Report to the AER: Discussion on the allowed cost of debt*, 5 May 2016, pp. 41, 52.

(on-the-day) methodology. There is no evidence before us to indicate the on-the-day approach would have, or would continue to, under- or over-value a benchmark efficient entity. Rather, we consider the on-the-day approach contributes to the achievement of the ARORO. This means it would not have, nor would it continue to, under- or over-value a benchmark efficient entity. On this basis, we consider any transition must be revenue neutral relative to the continuation of the on-the-day methodology.

Further, the rules require that if the return on debt methodology results in an estimate that is, or could be, different for different regulatory years, then the resulting change to the service provider's total revenue must be effected through the automatic application of a formula that is specified in the decision for that regulatory period.[85] We address this in our section on debt implementation.

3.3.5 Rate of return Guideline

This section sets out the role and key elements of the Guideline. The explanatory statement (and appendices) to the Guideline explain our proposed approach in detail which we adopt for this section.[86]

Role of the Guideline

Our task is to estimate an allowed rate of return that achieves the ARORO rather than to merely apply the Guideline. Nevertheless, the Guideline has a significant role because any decision to depart from the Guideline must be a reasoned decision.[87] Similarly, service providers must provide reasons for any proposed departures from the Guideline.[88] In practice, we have considered submissions on the rate of return made during this determination process anew so that we are satisfied that our estimate of the rate of return achieves the ARORO. Where we receive no new material or there is no reason to change our Guideline approach, we maintain our view and reasons set out in the Guideline.

Further, whilst the legislative framework allows us to depart from the Guideline, we would not do so lightly. This is because departing from it may undermine the certainty and predictability that stakeholders have said they value.[89] However, we would depart from the Guideline if we are satisfied that doing so would result in an outcome that better achieves the ARORO. We consider our approach is consistent with the AEMC's

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85 NER cl. 6.5.2(l) and cl. 6A.6.2(l), NGR, r. 87(12).

86 The full suite of documents associated with the guideline including the explanatory statements, relevant appendices and expert reports are available at http://www.aer.gov.au/node/18859.

87 NGR, cl. 87(18); NER, cl. 6.2.8(c); NER, cl.6A.2.3(c).

88 NER, cll. S6.1.3(9),(9A),(9B); NER, cll.S6A.1.3.(4A), (4b), (4c).

89 A group of investors and ENA again raised the importance of certainty in Financial Investors Group, *Submission on AER's equity beta issues paper*, 29 October 2013; ENA, *Response to the Draft Rate of Return Guideline of the AER*, 11 October 2013, p. 1.

view that, 'the regulator would, in practice, be expected to follow the guidelines unless there had been some genuine change in the evidence'.[90]

Consistent with the rules, we published the Guideline setting out the estimation methods, financial models, market data and other evidence that we propose to take into account in estimating the allowed return on equity, allowed return on debt and the value of imputation tax credits.[91] The Guideline specifies:[92]

- the methodologies we propose to use to estimate the allowed rate of return (derived from the allowed return on equity and debt) for electricity and gas network businesses
- the method we propose to use to estimate the value of imputation tax credits used to establish a benchmark corporate income tax allowance (see attachment on the value of imputation credits)
- how these methods will result in an allowed return on equity and return on debt which we are satisfied achieves the ARORO.

Due to this, the Guideline provides transparency and predictability for service providers, users and investors as to how we consider changes in market circumstances and make decisions. At the same time, it allows sufficient flexibility for us to account for changing market conditions at the time of each regulatory determination or access arrangement.

In developing the Guideline, we also undertook an extensive consultation process that resulted in addressing the relevant issues. We summarised this consultation process in several recent decisions.[93] Details of the Guideline development process are also on our website.[94]

Key elements of the Guideline

The Guideline provides transparency on how we propose to estimate key components of the allowed rate of return. We summarise these below.

Application of criteria for assessing information

We developed a number of criteria and applied these to inform our regulatory judgement when evaluating material put before us. The criteria are subordinate to the

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90 AEMC, *Final Position Paper, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, 15 November 2012, p. 28.

91 NER, cl. 6..5.2 (n)(2); NER, cl. 6A.6.2(n)(2); NGR, cl. 87(14)(b). See http://www.aer.gov.au/node/18859.

92 NER, cl. 6.5.2 (n), NER, cl. 6A.6.2(n); NGR, cl. 87(14).

93 For example, see AER, *Final decision: Energex determination 2015–16 to 2019–20, Attachment 3—Rate of return*, October 2015, pp. 22–24.

94 The full suite of documents associated with the Guideline including the explanatory statements, relevant appendices and expert reports are available at http://www.aer.gov.au/node/18859.

law, the rules and especially the ARORO. We developed them to provide stakeholders greater certainty as to how we intend to exercise our regulatory judgement whilst keeping sufficient flexibility to make decisions consistent with changing market conditions.[95]

We proposed to apply assessment criteria to guide our selection and use of estimation methods, models, market data and other evidence which inform our assessment of the overall rate of return. Not all the various estimation methods, financial models, market data and other evidence (information) will be of equal value in determining the rate of return by reference to a benchmark efficient entity with a similar degree of risk to the service provider in relation to the provision of its regulated services. For example, some information may be more relevant, more feasible to construct, or more reliable than others. We considered that our decisions on the rate of return are more likely to contribute to the achievement of the ARORO because we use estimation methods, financial models, market data and other evidence that are:

(1) where applicable, reflective of economic and finance principles and market information

    (a) estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data

(2) fit for purpose

    (a) the use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose

    (b) promote simple over complex approaches where appropriate

(3) implemented in accordance with good practice

    (a) supported by robust, transparent and replicable analysis that is derived from available credible datasets

(4) where models of the return on equity and debt are used these are

    (a) based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation

    (b) based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale

(5) where market data and other information is used, this information is

    (a) credible and verifiable

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[95] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.2.

(b) comparable and timely

(c) clearly sourced

(6) sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.

We applied these criteria in this decision to guide us in deciding on the merits of the material before us and the best place to employ the material (if at all).

Benchmark efficient entity

We generally see a benchmark efficient entity with a similar degree of risk as that applying to the service provider in respect of the provision of regulated services as being 'a pure play, regulated energy network business operating within Australia'. This includes the following components:[96]

- Pure play: An entity that offers services focused in one industry or product area. In this context, the industry is energy network services and, in particular the services are regulated energy network services.
- Regulated: An entity is subject to economic regulation (that is, revenue or price cap regulation) that makes it comparable for the purposes of assessing risk in the provision of regulated services. Comparable risk is an important component of the ARORO.
- Energy network business: Energy network refers to a gas distribution, gas transmission, electricity distribution or electricity transmission business.
- Operating in Australia: An entity operating within Australia as the location of a business determines the conditions under which the business operates. This includes the regulatory regime, tax laws, industry structure and broader economic environment.

Gearing

We base the weight to give to the point estimates of the return on equity and the return on debt to derive the overall rate of return on our gearing ratio point estimate of 60 per cent. We give 60 per cent weight to debt and 40 per cent to equity.[97]

Return on equity

We determined the allowed return on equity by applying our foundation model approach set out in the flow chart in figure 3-2. The foundation model approach was developed after extensive consultation during the formation of our Rate of Return Guideline in December 2013.

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[96] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.3; AER, *Better regulation: Rate of Return Guideline,* December 2013, section 3.

[97] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, Appendix F.

For the reasons for adopting this process, see the documents and submissions considered during the different stages of developing the Guideline. These include our issues paper and consultation paper and draft and final explanatory statements to the Guideline.[98]

For the avoidance of doubt, we note that:

- The foundation model approach identifies one model as the foundation model, but this is just a starting point and does not prevent other models, or combinations of multiple models, from being adopted. As set out in the Guideline:[99]

  > The use of regulatory judgement may also result in a final estimate of the return on equity that is outside the foundation model range. This recognises that, ultimately, our rate of return must meet the allowed rate of return objective. In these circumstances, we may reconsider the foundation model input parameter estimates, or more fundamentally, we may also reconsider the foundation model itself.

- The foundation model approach has six steps, but this does not mean that material considered in earlier steps are given more weight than material considered in later steps.
- Identifying material as being valuable in the estimation of one parameter (eg. market risk premium) does not prevent us from considering the value of that parameter for the estimation of other parameters (eg. overall return on equity). However, in using certain material to inform the estimation of multiple parameters, it is important to consider that the weight being afforded to the material reflects the relative merits of the material and is not in effect being 'double-counted'.
- We do not consider that having regard to relevant material requires running all the equity models put before us. Rather, the need to run these models depends on how valuable we consider they are in estimating a return on equity commensurate with the efficient financing costs given the systematic risk associated with service providers' regulated services.

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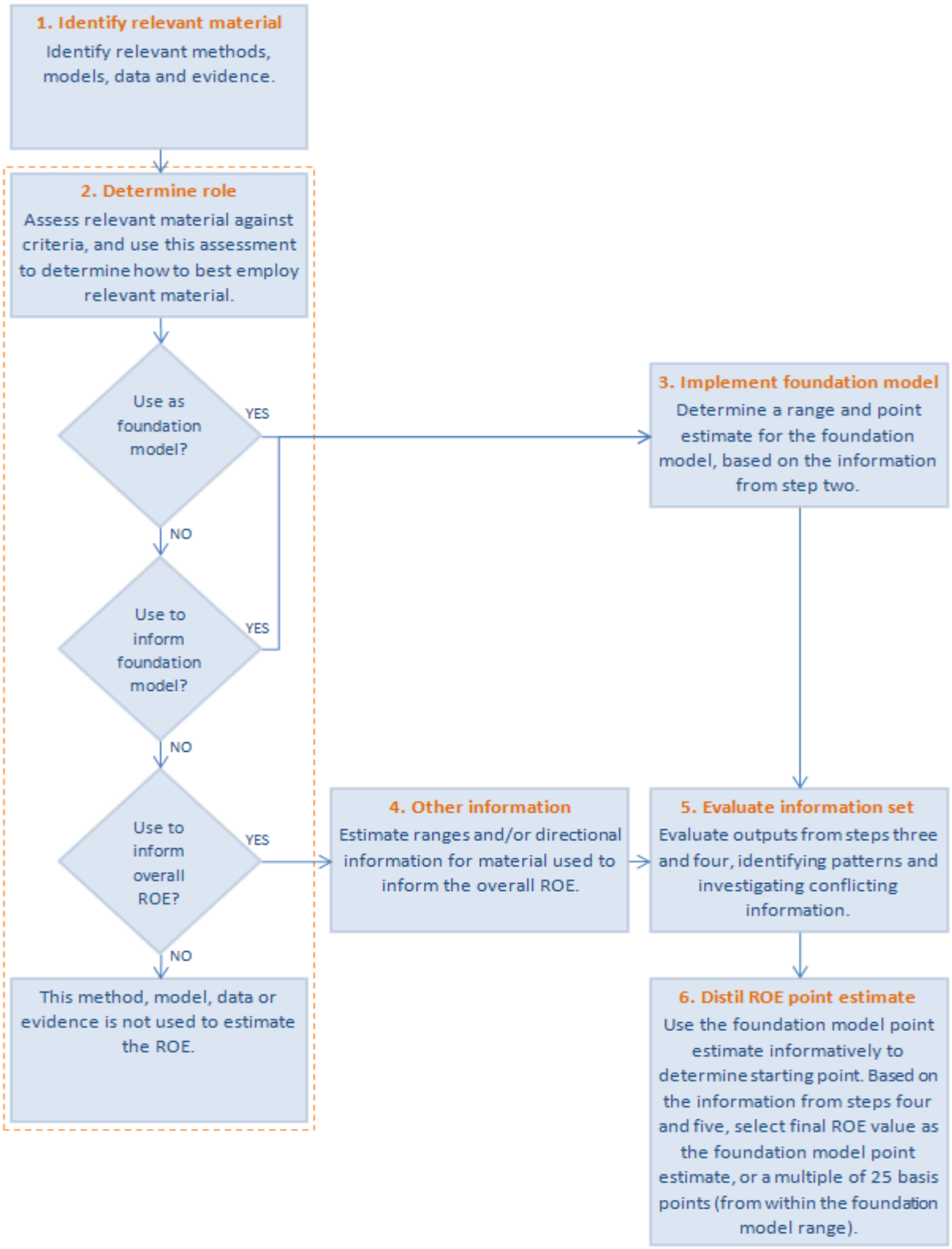
98 Available at, http://www.aer.gov.au/node/18859.

99 AER, Rate of Return Guideline: Explanatory Statement, December 2013, p. 62.

Figure 3-2 Flowchart of the AER's proposed approach to estimating the allowed return on equity



Return on debt

We proposed to:

- estimate a return on debt using the on-the-day approach (that is, based on prevailing market conditions near the commencement of the regulatory period) in 2017–18 of the 2017–19 regulatory period, and
- gradually transition this approach into a trailing average (that is, a moving historical average) over 10 years by annually updating 10 per cent of the return on debt to reflect prevailing market conditions in that year.[100]

We also proposed to estimate the return on debt in each regulatory year by reference to:

- a benchmark credit rating of BBB+
- a benchmark term of debt of 10 years
- independent third party data series—specifically, a simple average of the broad BBB rated debt data series published by the RBA and Bloomberg, adjusted to reflect a 10 year estimate and other adjustments[101]
- an averaging period for each regulatory year of between 10 business days and 12 months (nominated by the service provider), with that period being as close as practical to the start of each regulatory year and also consistent with other conditions that we proposed in the Guideline.[102]

Mid period rate of return adjustment

We proposed to annually update the overall rate of return estimate because we are required to update the return on debt annually.[103] We recently published amendments to the transmission and distribution post tax revenue model (PTRM) to enable applying annual updates.[104]

3.3.6 Interrelationships

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100 This final decision determines the return on debt methodology for the 2017–19 period. This period covers the first two years of the 10 year transition period. This decision also sets out our intended return on debt methodology for the remaining eight years. However, we do not have the power to determine in this decision the return on debt methodology for those years. Under the NER, the return on debt methodology must be determined in future decisions that relate to that period.

101 In the Guideline, we proposed to use one or more third party data series to estimate of the return on debt. However, at that time we had not formed a view on which data series to use. We form our view following a separate consultative process. This consultative process started with the release of an issues paper in April 2014. We do not propose estimating the return on debt by reference to the Reuters curve that was first proposed in the recent revised proposals. However, we will consider using this new source of information in future determinations following a proper period of consultation.

102 AER, *Rate of return guideline*, December 2013, pp. 21–22; AER, *Explanatory statement—Rate of return guideline*, December 2013, p. 126.

103 NER, cl. 6.5.2(i); NER, cl. 6A.6.2(i); NGR r. 87(9).

104 Available at http://www.aer.gov.au/node/27616.

In determining the allowed rate of return, we must have regard to any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.[105] In this section, we discuss the key interrelationships in our rate of return decision. The Guideline also describes these interrelationships in detail where we have had regard to them in developing our approach. The manner in which we consider these interrelationships is also set out as part of our reasoning and analysis in appendices to this attachment.

We estimate a rate of return for a benchmark efficient entity which is then applied to a specific service provider, rather than determining the returns of a specific service provider based on all of its specific circumstances.[106] This is the same whether estimating the return on equity or return on debt as separate components. We set a rate of return that is commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as the service provider in respect of the provision of regulated services. This provides a reasonable opportunity to recover at least the efficient financing costs of providing those services.[107] The service providers' actual returns could differ from those of a benchmark entity depending on how efficiently it operates its business. This is consistent with incentive regulation. That is, our rate of return approach drives efficient outcomes by creating the correct incentive by requiring service providers to retain (fund) any additional income (costs) by outperforming (underperforming) the efficient benchmark.[108]

We apply a benchmark approach and an incentive regulatory framework. One should not view any component or relevant parameter adopted for estimating the rate of return in isolation. In developing our approach and implementing it to derive the overall rate of return we are cognisant of a number of interrelationships relating to the estimation of the return on equity and debt and underlying input parameters.

A benchmark

In the Guideline and for this decision, we have adopted a hypothetical benchmark efficient entity that is common across all service providers. In deciding on a benchmark we considered the different types of risks and different risk drivers that may have the potential to lead to different risk exposures for different businesses in the provision of their services. We also noted that the rate of return compensates investors only for non–diversifiable risks (systematic risks) while other types of risks are compensated via cash flows and some may not be compensated at all.[109] These interrelationships between the types of risk and the required compensation via the rate of return are an important factor.[110] After careful analysis, our view is that a benchmark efficient entity would face a similar degree of risk to each of the service providers irrespective of the:

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105 NER, cl. 6.5.2(e); NER, cl. 6A.6.2(e); NGR r. 87(9).

106 See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch. 3.

107 NEL, s. 7A(2); NGL s. 24(2)(a).

108 NEL, s. 7A(3); NGL s. 24(2)(b).

109 See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, p. 33.

110 See AER, *Better regulation: Rate of return guideline explanatory statement,* December 2013, ch.3.3

- energy type (gas or electricity)
- network type (distribution or transmission)
- ownership type (government or private)
- size of the service provider (big or small).

Domestic market

We generally consider that the Australian market is the market within which a benchmark efficient entity would operate to make it properly comparable in degree of risk to a service provider. This recognises that the location of a business determines the conditions under which the business operates and these include the regulatory regime, tax laws, industry structure and broader economic environment. As most of these conditions will be different from those prevailing for overseas entities, the risk profile of overseas entities is likely to differ from those within Australia. Consequently, the returns required are also likely to differ. Hence, when estimating input parameters for the Sharpe-Lintner CAPM we place most reliance on Australian market data whilst using overseas data informatively.

Benchmark gearing

We apply a benchmark efficient level of gearing of 60 per cent, as noted above. This benchmark gearing level is used to:

- weight the allowed return on debt and equity to derive the overall allowed rate of return
- re-lever asset betas for the purposes of comparing the levels of systematic risk across businesses which is relevant for the equity beta estimate.

We adopt a benchmark credit rating which is BBB+ or its equivalent for the purposes of estimating the return on debt. To derive this benchmark rating and the gearing ratio, we reviewed a sample of regulated service providers. Amongst a number of other factors, a regulated service provider's actual gearing levels have a direct relationship to its credit ratings. Hence, our findings on the benchmark gearing ratio of 60 per cent and the benchmark credit rating are interrelated given we derive the underlying evidence from a sample of regulated service providers.[111]

Term of the rate of return

We adopt a 10 year term for our overall rate of return.[112] This results in the following economic interdependencies that impact on the implementation of our return on equity and debt estimation methods:

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[111] AER, *Better Regulation, Rate of return guideline explanatory statement*, December 2013, ch.8.34 and appendix F.

[112] See AER, *Better regulation: Explanatory statement rate of return guideline,* December 2013, ch.4.3.4.

- the risk free rate used for estimating the return on equity is a 10 year forward looking rate
- the market risk premium (MRP) estimate is for a 10 year forward looking period
- we adopt a 10 year debt term for estimating the return on debt.

3.3.7 Consideration of relevant material

In making regulatory decisions, we are to have regard to information provided in regulatory proposals and submissions.[113] We also consider a broad range of material more generally. This is consistent with the rate of return framework that requires we have regard to a wide range of relevant estimation methods, financial models, market data and other evidence.[114] This is also consistent with statements of the AEMC that consider the rules are intended to permit us to take account of a broad range of information to improve the required rate of return estimate.[115]

In the following sections, we summarise how we have considered a large range of material. This includes, but is not limited to:

- service provider proposals
- expert reports
- stakeholder submissions
- recent Tribunal decisions.

Service providers' proposals

While TasNetworks adopted our Guideline approach in its regulatory proposal, it noted it does not endorse our methods.[116]

Expert reports

We commissioned expert advice from the following finance experts to assist us in making our decisions:

- Professor Michael McKenzie, University of Liverpool.[117]
- Professor Stephen Satchell, Trinity College, Cambridge University[118]

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[113] NER, cl. 6.11.1(b); NER, cl. 6A.13.1(a1). NGR, cl. 59(1), 62(1) states we are to consider submissions before making our regulatory decisions NGR, cl, 64(2) states that our proposal for an access arrangement or revisions is to be formulated with regard to the service providers proposal (among other things).

[114] NGR, r. 87(5)(a) and NER clause 6.5.2(e).

[115] AEMC, *Rule determination: National electricity amendment (Economic regulation of network service providers) Rule 2012: National gas amendment (Price and revenue regulation of gas services) Rule 2012*, 29 November 2012, p. 67 (AEMC, *Final rule change determination*, November 2012).

[116] TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, pp. 114, 116.

[117] McKenzie, M., Partington, G., *Report to the AER Part A: Return on Equity*, October 2014.

- Associate professor Graham Partington, University of Sydney.[119]
- Associate professor John Handley, University of Melbourne.[120]
- Dr Martin Lally, Capital Financial Consultants.[121]
- Chairmont, a financial market practitioner.[122]

We received advice from Professor Olan Henry, University of Liverpool, on estimating the equity beta. We commissioned this during the Guideline development process and published the final report in April 2014.[123] We also received advice on return on debt estimation from the ACCC Regulatory Economic Unit (REU).[124] Additionally, we sought and received a substantial amount of expert advice during the Guideline development process including from the REU. These reports have also assisted us in making our decision.

Stakeholder submissions

Stakeholders made submissions specific to TasNetworks which we have considered. In making this decision, we have also considered material that was submitted for the recent decisions published in April, June and October 2015 and in May 2016. Overall, in making these recent decisions we received a large number of submissions on the original proposals, preliminary decisions and revised rate of return proposals.[125] [126] A

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118 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016; Partington, G., Satchell, S., *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016; Partington and Satchell, *Report to the AER: Analysis of criticisms of 2015 determination,* October 2015; Partington, G., Satchell, S., *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015.

119 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016; Partington, G., Satchell, S., *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016; Partington, G., Satchell, S., *Report to the AER: Analysis of criticisms of 2015 determination,* October 2015; Partington, G., Satchell, S., *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015; Partington, G., *Report to the AER: Return on equity (Updated), April 2015*; McKenzie, M., Partington, G., *Report to the AER Part A: Return on Equity*, October 2014.

120 Handley, J., Further a*dvice on return on equity, April* 2015; Handley, J., *Advice on return on equity, Report prepared for the AER*, 16 October 2014; Handley, J., *Report prepared for the Australian Energy Regulator: Advice on the value of imputation credits*, 29 September 2014.

121 Lally, M., *Gamma and the ACT decision*, May 2016; Lally, M., *Review of submissions on implementation issues for the cost of debt*, October 2015; Lally, M., *Review of submissions on transition issues for the cost of debt*, October 2015; Lally, M., *Review of submissions on the cost of debt*, April 2015; Lally, M., *Transitional arrangements for the cost of debt*, November 2014; Lally, M., *Implementation issues with the cost of debt*, November 2014.

122 Chairmont, *Cost of debt: Transitional analysis*, April 2015; Chairmont, *Financial practices under regulation: past and transitional*, October 2015.

123 Henry, O., *Estimating β: An update*, April 2014.

124 REU, *Return on debt estimation: a review of the alternative third party data series*, August 2014.

125 Recent regulatory determinations are for the following service providers: ActewAGL, Ausgrid, Endeavour Energy, Energex, Ergon Energy, Essential Energy, Directlink, Jemena Gas Networks, SA Power Networks, TasNetworks, TransGrid, Citipower, Powercor, United Energy, AusNet Services (distribution), ActewAGL, AGN & APTNT.

126 Appendix F of our October and November 2015 decisions list submissions relating to our recent decisions. We have also received and considered a number of new submissions since the October and November 2015 decisions. , CCP (David Prins and Robyn Robinson), *Advice to AER from Consumer Challenge Panel sub-panel 8*

range of submissions, including those on TasNetworks' proposal had commentary relating to the rate of return.[127]

Consideration of recent Tribunal decisions

The Tribunal recently reviewed and upheld several aspects of our approach to estimating the rate of return. These included:[128]

- our approach to estimating the return on equity by applying the Guideline approach referred to as the foundation model approach
- our approach to specifying the benchmark credit rating at BBB+ rather than BBB as preferred by some of the service providers

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regarding the AER Draft Decision and Australian Gas Networks' (SA) revised access arrangement 2016–2021 proposal, 32 March 2016, p. 2.

127 For example, see page 143 of our October 2015 final decision for SA Power Networks; CCP (Bruce Mountain), *Advice on AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks*, July 2015, p. 11; Consumer Utilities Advocacy Centre, Re: Victorian electricity distribution pricing review (EDPR), 2016 to 2020, 13 July 2015, p. 2; Victorian Energy Consumer and User Alliance, Submission to the AER, Victorian Distribution Networks' 2016-20 Revenue Proposals, July 2015, p. 3; Business SA, *Submission to AER on their preliminary decision, 3 July 2015*, p. 2; Alternative Technology Association, ActewAGL Access Arrangement Proposal, 10 August 2015, p. 10; Energy Retailers Association of Australia, *Preliminary Decisions for Ergon Energy and Energex determinations 2015-16 to 2019-20*, 3 July 2015, p. 1; Energy Consumers Coalition of South Australia, *AER SA Electricity Distribution Revenue Reset, The AER preliminary decision - A response*, 3 July 2015, p. 38; Origin Energy, *Submission on ActewAGL's revised access arrangement for 2016–21*, 4 February 2016, p. 3; Origin Energy, *Submission on AGN's revised access arrangement for 2016–21*, February 2016; Origin Energy, *Submission on the AER's preliminary decisions on the Victorian distribution network service providers for 2016–20*, 6 January 2016, p. 3; Origin Energy, *Submission on the Victorian networks' revised proposals (for 2016–21*), 4 February 2016; AGL, *Submission on the AER's draft decision on AGN's 2016–21 access arrangement*, 4 February 2016, p. 2; Victorian Government, S*ubmission on the Victorian electricity distribution network service providers' revised regulatory proposals for 2016–20*, 12 February 2016, p. 1–2; CCP (Mark Henley and Ruth Lavery), *Transmission for the generations: Response to proposal by AusNet Services transmission group pty ltd and AER issues paper for AusNet Services transmission revenue review 2017–22*, February 2016, p. 41; CCP (David Headberry, Bev Hughson and David Prins), *Submission to the Australian Energy Regulator (AER): An overview Response to AER Preliminary Decisions and revised proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, 25 February 2016, p. 30; EUCV*, A response to AusNet revenue reset proposal for the 2017–2022 period*, 9 February 2016, p. 40; CCP (David Prins and Robyn Robinson), *Advice to AER from Consumer Challenge Panel sub-panel 8 regarding the AER Draft Decision and Australian Gas Networks' (SA) revised access arrangement 2016–2021 proposal*, 32 March 2016, p. 2; Cotton Australia, *Re: Powerlink Electricity transmission revenue proposal 2017–2022 – Issues Paper*, 2 May 2016, pp. 1-2; Queensland Resources Council, *Submission on Powerlink's 2017-22 revenue proposal*, 29 April 2016, pp. 1-2; CCP (Hugh Grant and David Headberry), *Submission to the AER, Powerlink Queensland 2018–22 Revenue Proposal*, 20 June 2016, p. 4; Tasmanian Small Business Council, *Submission on TasNetworks' Electricity Distribution Regulatory Proposal, 1 July 2017 to 30 June 2019 and Tariff Structure Proposal*, 6 May 2016, p. 36; Tasmanian Council of Social Services, *Submission to the AER re TasNetworks' regulatory proposal 2017-19*, 28 April 2016, p. 2; CPP (David Headberry), *Submission to the AER, Response to the proposal from Tasmania's electricity distribution network service provider (TasNetworks - TND) for a revenue reset for the 2017–2019 regulatory period*, 4 May 2016, p. 44.

128 Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, paras 813, 993, 983; Australian Competition Tribunal, *Application by Jemena Gas Networks (NSW) Ltd [2016] ACompT 5*, 3 March 2016, paras 47, 49, 95.

- our approach to estimating the allowed return on debt using a simple average of the RBA and Bloomberg data series, rather than the RBA data series alone as preferred by some of the service providers.

We have maintained our approach to estimating these components of the allowed rate of return in this decision.

The Tribunal also recently reviewed our approach to applying a full transition from an on-the-day to a trailing average allowed return on debt for certain electricity distribution businesses operating in NSW and the ACT, and a gas distribution business in NSW. The Tribunal found error in our approach and remitted this matter back to us to make a decision on introducing the trailing average approach in accordance with several reasons outlined in its decision.[129] On 24 March 2016, we applied to the Federal Court for judicial review of this aspect of the Tribunal's decision. In particular, we have applied for review of the Tribunal's:

- finding that a benchmark efficient entity referred to in the NER 6.5.2(c) would be an unregulated entity[130]
- the Tribunal's rejection of a single benchmark efficient entity for those service providers
- approach to the interpretation of cl. 6.5.2(k)(4) of the NER.[131]

3.4 Reasons for draft decision

Our allowed rate of return is a weighted average of the return on equity and debt determined on a nominal vanilla basis (that is, a vanilla WACC). It has been estimated consistently with the estimation of the value of imputation credits.[132]

In deriving the WACC, and the estimated efficient debt and equity financing costs, we have applied the benchmark efficient entity gearing ratio of 0.6 (debt):0.4 (equity) that we proposed in the Guideline. We have no reason to depart from this gearing ratio.[133]

In making this decision we have considered issues that have been raised by TasNetworks as well as different service providers and stakeholders in our recently published regulatory determinations. While we have addressed matters specifically raised by TasNetworks and/or stakeholders in this decision process, much of our analysis and reasoning also addresses maters raised by service providers (and

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129 Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 1,227. The Tribunal's reasons are set out in paras 870 to 940. Also see Australian Competition Tribunal, *Application by Jemena Gas Networks (NSW) Ltd [2016] ACompT 5*, 3 March 2016, paras 80–83.

130 NGR, cl. 87(3); NER, cl. 6A.6.2(c) include similar provisions.

131 The transmission and gas rules mirror this provision in NER, cl. 6A.6.2(k)(4); NGR, cl. 87(11)(d).

132 NER, cl. 6.5.2(d); NER, cl. 6A.6.2(d); NGR, r. 87(4).

133 All the NSPs whose original and revised proposals we are currently assessing have proposed a gearing ratio consistent with the Guideline.

stakeholders) in their regulatory determination processes. All of this material informs our view on TasNetworks' proposal and also underpins our decision on the return on equity that contributes to the achievement of the ARORO. That is, a return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to TasNetworks in respect of the provision of standard control services.[134]

We discuss our reasons for the return on equity and return on debt under the separate subheadings, 3.4.1 and 3.4.2, respectively. Subsections 3.4.3 and 0 set out the gearing ratio and our expected inflation rate for the 2017–19 regulatory period.

3.4.1 Return on equity

Our return on equity estimate is 6.5 per cent. We consider that 6.5 per cent is the best estimate to combine with a return on debt estimate to form an overall allowed rate of return that achieves the ARORO. We also consider that 6.5 per cent is consistent with the prevailing conditions in the market for equity funds.

We hold these views because:

- We derive our estimate using the Sharpe–Lintner CAPM, which:
    - transparently presents the key risk and reward trade-off[135] that is at the heart of our task[136]
    - is widely and consistently used for estimating the expected return on equity by financial market practitioners, academics, and other regulators[137]
    - has well-accepted and unbiased methods for estimating its parameters, and these parameters can be estimated with tolerable accuracy, unlike the alternative models recently proposed by some service providers.
- We have regard to the prevailing market conditions for equity funds. We use the dividend growth model and conditioning variables to inform our estimate of the market risk premium. We use other relevant sources of information to cross-check the foundation model estimate. The triangulation of estimates from relevant market participants broadly supports our foundation model estimate of the return on equity. (see section A for more detail).
- Our estimate is supported by comparison to estimates from other approaches and other practitioners (the Wright specification of the CAPM, broker reports, valuation reports, and other regulators' decisions).
- The consistency over time of our Sharpe-Lintner CAPM estimation approach (reflective of a risk premium above a prevailing risk free rate) has been supportive

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134 NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR, r. 87(3).

135 That is, systematic risk priced via expected returns on equity.

136 As set out in NER cl.6; NER cl. 6A; NGR.

137 See AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 12–13.

of investment. While taking into account the downward trends in both our risk premium and the risk free rate,[138] service providers have continued to invest in their networks and propose to continue to grow their asset bases.[139]

- Our return on equity estimate is approximately 191 basis points above the prevailing yield-to-maturity on broad BBB-rated debt with a 10 year term-to-maturity. For a benchmark efficient entity with a similar degree of risk as TasNetworks, we would not expect the return on equity to be a long way above the prevailing return on debt.[140]
- We have come to this estimate following the application of our foundation model approach, which:
    - involves consideration of all relevant material submitted to us, and the role for each piece of material that would best achieve the ARORO; and
    - was developed through extensive consultation during our Guideline review process.

The Sharpe-Lintner CAPM provides that the return on equity can be calculated as the risk-free return plus a premium for risk. The risk premium is calculated as the product of the market risk premium and entity's[141] equity beta.[142] Our Sharpe-Lintner CAPM estimate[143] is based on:

- a placeholder risk free rate estimate of 1.95 per cent
- a market risk premium estimate of 6.5 per cent, and
- an equity beta estimate of 0.7.

Our derivation of these parameter estimates is outlined in the subsections below. We will update these estimates in our final decision based on prevailing market conditions.

Our decision is an acceptance of TasNetworks' proposal, which applied our Guideline approach, including the use of the Sharpe-Lintner CAPM as the foundation model, a market risk premium estimate of 6.5 per cent, and an equity beta estimate of 0.7. We also accept TasNetworks' proposal to estimate the risk free rate as the yield on

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138 Our regulatory determinations and rate of return guidelines since 2009 have set an equity risk premium ranging from 5.2 per cent to 4.55 per cent [AER, *Final Decision*, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters, 1 May 2009].

139 Between 2007–08 and 2013–14, the regulated transmission and distribution service providers across the national electricity market have invested in the order of more than $44 billion in capital expenditure. The annual capital expenditure has remained largely stable at around $6 billion per year.

140 Due to the regulatory regime and the businesses' monopoly positions shielding them from systematic risk; as well as the measured prevailing debt yields likely overstating the expected return on debt due to default risk. For more information, see section pages 96 to 99 of Attachment 3 to our preliminary decision for AusNet Services' 2016-20 distribution determination.

141 In this case, the benchmark efficient entity.

142 For more information on the Sharpe-Lintner CAPM, see section B.1 of Attachment 3 to our draft decision on AusNet Services' 2017-22 transmission determination.

143 Calculated as: 6.5% = 1.95% + 0.7 * 6.5%.

Australian Government securities with a ten-year term to maturity and calculated over a 20 business day averaging period.

The following aspects of our return on equity estimate have broad agreement from both service providers and consumer groups:

- The Sharpe-Lintner CAPM, at least in combination with other relevant material, is valuable for estimating return on equity
- The risk free rate should be estimated as the yield, averaged over a 20 business day averaging period,[144] on Australian government securities with a ten-year term-to-maturity.[145]
- Market risk premium estimates should be informed by historical stock returns and (to some extent) dividend growth model estimates.
- Equity beta estimates should be informed by regression estimates of the equity beta of relevant Australian and, to some extent, international energy network businesses.
- The Wright specification of the CAPM, and return on equity estimates from broker and valuation reports, are relevant material that can inform return on equity estimation.

There was also broad agreement from consumer groups on the application of our foundation model approach as set out in our Guideline. In applying our foundation model approach, some consumer groups supported our parameter estimates of 6.5 per cent for market risk premium and 0.7 for equity beta[146] while others submitted that these parameters should be lower.[147]

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144 And where this averaging period ends as close as practical to the start of the regulatory period.

145 Appendix K sets out the averaging period used in this decision.

146 Origin Energy, *Submission on ActewAGL's revised access arrangement for 2016–21*, 4 February 2016, p. 2; Origin Energy, *Submission on AGN's revised access arrangement for 2016–21*, February 2016; Victorian Government, *Submission on the Victorian electricity distribution network service providers' revised regulatory proposals for 2016–20*, 12 February 2016, p. 1–2; EUCV, *A response to AusNet revenue reset proposal for the 2017–2022 period*, 9 February 2016; AGL, *Submission on the AER's draft decision on AGN's 2016–21 access arrangement*, 4 February 2016, p. 2; Tasmanian Council of Social Service, *Submission to AER re TasNetworks' 2017-19 revenue proposal*, April 2016, p. 2.

147 ECCSA, *A response to the AER draft decision on AGN's AA2016 revenue reset,* February 2016, p. 32–37; VECUA, *Submission on the AER: AER preliminary 2016–20 revenue determinations for the Victorian DNSPs*, 6 January 2016, p. 2; CCP (Mark Henley and Ruth Lavery), *Transmission for the generations: Response to proposal by AusNet Services transmission group pty ltd and AER issues paper for AusNet Services transmission revenue review 2017–22*, February 2016, p. 41; CCP (David Headberry, Bev Hughson and David Prins), *Submission to the Australian Energy Regulator (AER): An overview Response to AER Preliminary Decisions and revised proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, 25 February 2016, pp. 10, 30–31, 33; *CCP (Hugh Grant and David Headberry), Submission to the AER, Powerlink Queensland 2018–22 revenue proposal*, 20 June 2016; CCP (David Headberry), *Response to the proposal from Tasmania's electricity distribution network service provider (TasNetworks - TND) for a revenue reset for the 2017–2019 regulatory period*, 4 May 2016, p. 44; Tasmanian Small Business Council, *TasNetworks' Electricity Distribution Regulatory Proposal, 1 July 2017 to 30 June 2019 and Tariff Structure Proposal*, May 2016, p. 35-36.

Origin Energy submitted that we have adopted a balanced and pragmatic approach that provides certain and predictable outcomes for investors and provides a balance between the views of consumer groups and the network businesses.[148] AGL submitted support for our Rate of Return Guideline as an equitable balance between the interests of the distribution networks and energy consumers.[149] The Energy Users Coalition of Victoria (EUCV) noted that consumers have accepted the guideline as being equitable and appropriate.[150] Several CCP members (David Headberry, Bev Hughson and David Prins) noted that the AER should continue to apply the return on equity methodology set out in the Guideline because the regulated businesses have not provided sufficient reasons to move away from it.[151]

While there was general support for our parameter estimates, consumer groups also submitted that these parameter estimates reflect a 'cumulative conservatism' that may result in over-estimating the return on equity. [152] However, in supporting our parameter estimates, consumer groups submitted that they valued the predictability and transparency resulting from the application of our Guideline and foundation model approach.[153]

Recently, some service providers disagreed with us on the relative merits of relevant material, as well as some of our methodological choices. These issues were discussed at length in attachment 3 to our final decision on AusNet Services 2016-20 distribution determination, and this analysis remains relevant.

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148 Origin Energy, *Submission on ActewAGL's revised access arrangement for 2016–21*, 4 February 2016, p. 3; Origin Energy, *Submission on AGN's revised access arrangement for 2016–21*, February 2016; Origin Energy, *Submission on the AER's preliminary decisions on the Victorian distribution network service providers for 2016–20*, 6 January 2016, p. 3; Origin Energy, *Submission on the Victorian networks' revised proposals (for 2016–21)*, 4 February 2016.

149 AGL, *Submission on the AER's draft decision on AGN's 2016–21 access arrangement*, 4 February 2016, p. 2.

150 EUCV, *A response to AusNet revenue reset proposal for the 2017–2022 period*, 9 February 2016.

151 CCP (David Headberry, Bev Hughson and David Prins), *Submission to the Australian Energy Regulator (AER): An overview Response to AER Preliminary Decisions and revised proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, February 2016, p. 33.

152 ECCSA, *A response to the AER draft decision on AGN's AA2016 revenue rese*t, February 2016, p. 36; CCP (David Headberry, Bev Hughson and David Prins), *Submission to the Australian Energy Regulator (AER): An overview Response to AER Preliminary Decisions and revised proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory perio*d, February 2016, pp. 10 & 29; CCP (David Headberry), *Response to the proposal from Tasmania's electricity distribution network service provider (TasNetworks - TND) for a revenue reset for the 2017–2019 regulatory period*, 4 May 2016, p. 44.

153 CCP (Mark Henley and Ruth Lavery), *Transmission for the generations: Response to proposal by AusNet Services transmission group pty ltd and AER issues paper for AusNet Services transmission revenue review 2017–22*, February 2016; Origin Energy, *Submission on ActewAGL's revised access arrangement for 2016–21*, 4 February 2016, p. 3; Origin Energy, *Submission on AGN's revised access arrangement for 2016–21*, February 2016; Origin Energy, *Submission on the AER's preliminary decisions on the Victorian distribution network service providers for 2016–20*, 6 January 2016, p. 3; Origin Energy, *Submission on the Victorian networks' revised proposals (for 2016–21*), 4 February 2016; VECUA*, Submission on the AER: AER preliminary 2016–20 revenue determinations for the Victorian DNSPs*, 6 January 2016, pp. 2, 11–12; CCP (David Headberry, Bev Hughson and David Prins), *Submission to the Australian Energy Regulator (AER): An overview Response to AER Preliminary Decisions and revised proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, 25 February 2016, pp. 30–31.

We are not satisfied that any information submitted to us indicates that a departure from the Guideline would contribute to the achievement of the ARORO. In addition to the reasons outlined in the subsections below, we consider the importance placed by all stakeholders on predictability and transparency is important to contribute to the achievement of the ARORO.[154]

The following sections provide further detail on our selection of equity pricing model, estimation of market risk premium and equity beta, and assessment of the overall return on equity.

Choice of equity pricing model

Our return on equity estimate of 6.5 per cent is derived from our application of the Sharpe-Lintner CAPM as our foundation model. We consider the Sharpe-Lintner CAPM is the best model for estimating the efficient costs of equity financing because it:

- transparently presents the key risk and reward trade-off[155] that is at the heart of our task[156]
- is widely and consistently used for estimating the expected return on equity by financial market practitioners, academics, and other regulators[157]
- has well-accepted and unbiased methods for estimating its parameters, and these parameters can be estimated with tolerable accuracy, unlike the alternative models proposed by some service providers.

Our consultants have also agreed with our use of the Sharpe-Lintner CAPM as the foundation model. Handley stated:[158]

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[154] We received many stakeholder submissions supporting our guideline approach including: Origin Energy, *Submission on ActewAGL's revised access arrangement for 2016–21*, 4 February 2016, p. 3; Origin Energy, *Submission on AGN's revised access arrangement for 2016–21*, February 2016; Origin Energy, *Submission on the AER's preliminary decisions on the Victorian distribution network service providers for 2016–20*, 6 January 2016, p. 3; Origin Energy, *Submission on the Victorian networks' revised proposals (for 2016–21*), 4 February 2016; AGL, *Submission on the AER's draft decision on AGN's 2016–21 access arrangement*, 4 February 2016, p. 2; Victorian Government, *Submission on the Victorian electricity distribution network service providers' revised regulatory proposals for 2016–20*, 12 February 2016, p. 1–2; EUCV, *A response to AusNet revenue reset proposal for the 2017–2022 period*, 9 February 2016; CCP (Mark Henley and Ruth Lavery), *Transmission for the generations: Response to proposal by AusNet Services transmission group pty ltd and AER issues paper for AusNet Services transmission revenue review 2017–22*, February 2016; CCP (David Headberry, Bev Hughson and David Prins), *Submission to the Australian Energy Regulator (AER): An overview Response to AER Preliminary Decisions and revised proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, 25 February 2016, p. 30; CCP (David Prins and Robyn Robinson), *Advice to AER from Consumer Challenger Panel sub-panel 8 regarding the AER Draft Decision and Australian Gas Networks' (SA) Revised Access Arrangement 2016–21 Proposal*, 31 March 2016, p. 2.

[155] That is, systematic risk priced via expected returns on equity.

[156] As set out in NER cl.6; NER cl. 6A; NGR r.87.

[157] See AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 12–13.

[158] Handley, *Advice on the return on equity*, 16 October 2014, p. 4.

> [t]he AER's choice of the Sharpe-CAPM as foundation model is entirely appropriate and reasonable for this purpose. The Sharpe-CAPM is the standard (equilibrium) asset pricing model. It has a long established and well understood theoretical foundation and is a transparent representation of one of the most fundamental paradigms of finance - the risk-return trade off.

McKenzie and Partington indicated with respect to the Sharpe–Lintner CAPM:[159]

> With regard to the CAPM, its efficacy comes from the test of time. This model has been around for in excess of half a century and has become the standard workhorse model of modern finance both in theory and practice. The CAPMs place as the foundation model is justifiable in terms of its simple theoretical underpinnings and relative ease of application. The competing alternatives, which build upon the CAPM, serve to add a level of complexity to the analysis.

Partington and Satchell noted that the 'SLCAPM remains the premier model used to estimate the cost of capital in practice, by both industry and regulators' and has wide agreement as 'a model of equilibrium expected returns'.[160]

Partington and Satchell also noted that the parsimony and observability of the Sharpe–Lintner CAPM 'reduces opportunities for cherry picking and also provides the opportunity for a relatively transparent implementation'.[161]

We also note that our consideration of the relative merits of the Sharpe-Lintner CAPM is supported by the widespread use of the Sharpe-Lintner CAPM over the other models by market participants including brokers, valuers, and other regulators.[162] Further, our application of the Sharpe-Lintner CAPM in our foundation model approach and our return on equity estimate are supported by a range of relevant material including market-based evidence (see the 'Assessing the overall return on equity

' section below).

Consumers and other stakeholders generally supported our use of the Sharp-Lintner CAPM and our foundation model approach.[163]

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[159] McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, p. 9. This position was also supported by Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 29; Partington and Satchell, *Report to the AER: Return of equity and comment on submissions in relation to JGN*, May 2015, p. 7; and Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 17, 21.

[160] Partington and Satchell, *Report to the AER: Cost of equity issues–2016 electricity and gas determinations*, April 2016, p. 47.

[161] Partington and Satchell, *Report to the AER: Cost of equity issues–2016 electricity and gas determinations*, April 2016, p. 9.

[162] See Brealey, Myers, Partington and Robinson, *Principles of corporate finance*, McGraw Hill Australia, 2007, p. 216; Stephan Schaeffler and Christoph Weber, 'The Cost of Equity of Network Operators – Empirical Evidence and Regulatory Practice', *Competition and Regulation in Network Industries*, 14(4), 2013, p. 386; McKenzie and Partington, *Report to the AER part A: Return on equity*, October 2014, pp. 9–10; AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 13–14.

[163] Origin Energy, *Submission on ActewAGL's revised access arrangement for 2016–21*, 4 February 2016, p. 2; Origin Energy, *Submission on AGN's revised access arrangement for 2016–21*, February 2016; Victorian Government,

Since publishing our Guideline some service providers have submitted that the use of additional models for estimating the return on equity, and various methods for combining the models, would result in an improved estimate. The additional models submitted by service providers are the Black CAPM, Fama-French model, the dividend growth model, and the historical and Wright specifications to the Sharpe-Lintner CAPM.[164]

We considered the relative merits of these models in detail in section B of attachment 3 to our draft decision on AusNet Services' 2017–22 transmission determination. We responded to specific issues raised about the use of equity models in table 3-4 of attachment 3 to our draft decision on AusNet Services' 2017–22 transmission determination. This reasoning remains relevant. In summary, we consider that the models other than the Sharpe-Lintner CAPM are too unreliable and at risk of potential bias to be relied upon. We are not satisfied that the service providers' proposed application of other equity models[165] will result in a return on equity that is commensurate with efficient financing costs (given the risk of TasNetworks' regulated services).[166]

Given the limitations of the other equity models proposed by the service providers, we consider that:

- These models should not form part of our foundation model approach, either as the sole model or as part of a multi-model approach.
- The Wright approach, the dividend growth model, and the theory underpinning the Black CAPM may provide some (albeit limited) insights. This material has been

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Submission on the Victorian electricity distribution network service providers' revised regulatory proposals for 2016–20, 12 February 2016, p. 1–2; EUCV, *A response to AusNet revenue reset proposal for the 2017–2022 period*, 9 February 2016; AGL, *Submission on the AER's draft decision on AGN's 2016–21 access arrangement*, 4 February 2016, p. 2; Queensland Resources Council, Submission on Powerlink regulatory proposal 2017–22, 29 April 2016; CCP (David Headberry), *Response to the proposal from Tasmania's electricity distribution network service provider (TasNetworks – TND) for a revenue reset for the 2017–2019 regulatory period*, 4 May 2016; TasCOSS, Submission to AER re TasNetworks revenue proposal 2017–19, 28 April 2016; Tasmanian Small Business Council, submission on TasNetworks' electricity distribution regulatory proposal 1 July 2017 to 30 June 2019 and tariff structure proposal, May 2016.

164 There are some variations between the service providers on weighting the estimates from the different models, but the general approach and rationale remain broadly consistent. Service providers provided new expert reports from Frontier and HoustonKemp to further support their views (see: Frontier Economics, The *required return on equity under a foundation model approach – Report prepared for Jemena Electricity Networks, ACTEWAGL Distribution, AusNet Services, Australian Gas Networks, CitiPower, Powercor and United Energy*, January 2016; HoustonKemp, *The Cost of Equity: Response to the AER's draft decisions for the Victorian Electricity Distributors, ActewAGL Distributors and Australian Gas Networks*, January 2016; Frontier Economics, *The relationship between government bond yields and the market risk premium*, January 2016).

165 For both the construction of individual models, and the quantitative and/or qualitative methods to give weight to the models.

166 For example, Partington noted that any return on equity estimate could be obtained from SFG's construction of the dividend growth model through judicious choice of input assumptions [Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 54].

used to inform our overall return on equity estimate (Wright) or the estimation of Sharpe-Lintner CAPM parameters (Black CAPM and dividend growth model).[167]

- The Fama-French model and historical specification of the Sharpe-Lintner CAPM should not be used to inform our return on equity estimate in any capacity.

Estimating the market risk premium

Our estimate of the prevailing market risk premium for this decision is 6.5 per cent. This is a forward-looking estimate of the risk premium—the return above the government bond rate—on the market portfolio required by investors with a ten-year investment horizon.

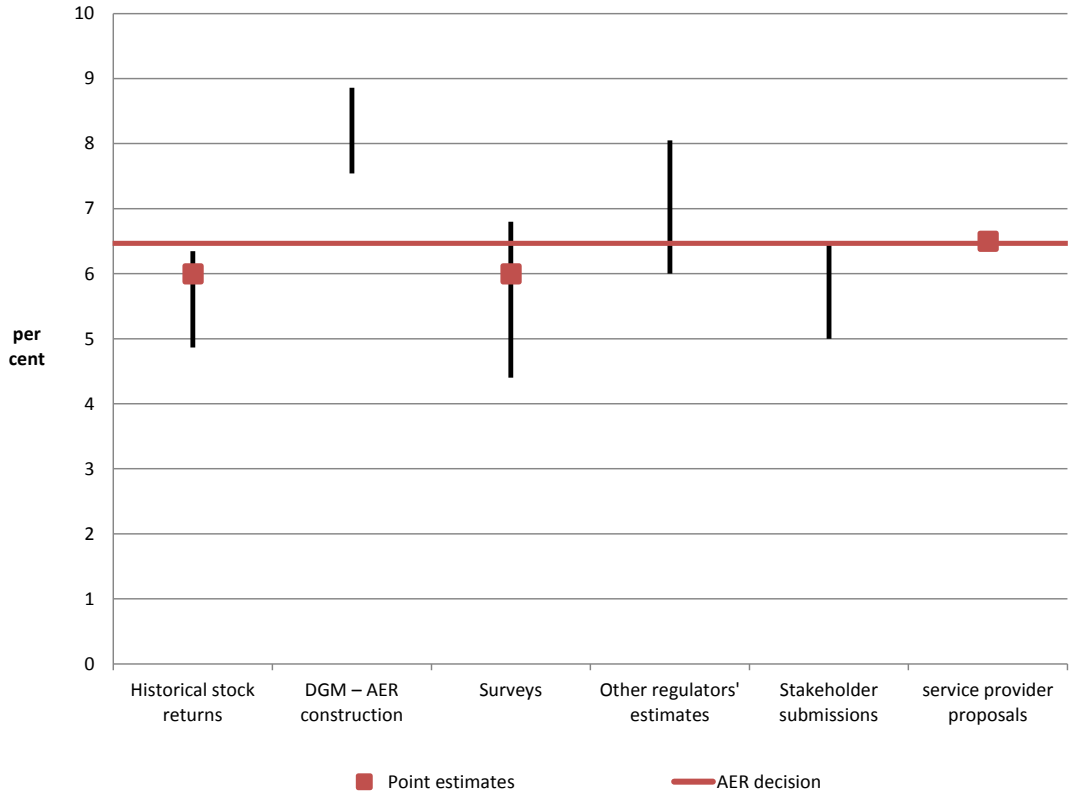
We consider 6.5 per cent to be the best estimate of the market risk premium to contribute to the achievement of the ARORO because:

- it is supported by our consideration of all relevant material submitted to us, following consideration of their relative merits (discussed below)
- it is corroborated by our cross-checks on the overall return on equity and equity risk premium. This further supports our estimate of the equity risk premium (of which the market risk premium is a component)
- it provides a balanced outcome between submissions by service providers and other stakeholders.

Figure 3-3 shows the market risk premium estimates from the relevant material that has informed our decision. These estimates range from 4.8 per cent to 8.86 per cent.

[167] We note that our specification of these models (particularly the dividend growth model) may differ from that proposed by the service providers.

Figure 3-3 Comparison of estimates of the market risk premium



Source: AER analysis

Note: We use the mid-point of other regulator's estimated market risk premium range.[168] The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network or pipeline, and as such it does not include submissions from services providers.[169]

We derive our point estimate from within this range by considering the relative merits of all of the relevant material. The application of our approach is set out as follows:

- Historical excess returns provide our baseline estimate and indicates a market risk premium of approximately 5.5 to 6.0 per cent from a range of 4.9 per cent to 6.0 per cent. See section A.1 for more detail on this material.
- Dividend growth model estimates indicate a market risk premium estimate above this baseline with a range of 7.54 to 8.86 per cent. We consider our dividend growth model is theoretically sound but that there are many limitations in practically

[168] The bottom of the range is from the ESCV and ESCOSA. The top of the range is from IPART. See section A.4.4 for a full reference list.

[169] The bottom of the range comes from CCP (Hugh Grant and David Headberry), *Submission to the AER Powerlink Queensland 2018-22 revenue proposal*, 20 June 2016, p. 4. The top of the range comes from Tasmanian Council of Social Services, *Submission to the AER re TasNetworks' regulatory proposal 2017-19*, 28 April 2016, p. 2; Queensland Resources Council, *Submission on Powerlink's 2017-22 revenue proposal*, 29 April 2016, pp. 1-2; and Energy Users' Coalition of Victoria, *A response to AusNet revenue reset proposal for the 2017-2022 period*, 9 February 2016, p. 40.

implementing dividend growth models, and they are likely to produce upward biased estimates in the current market.[170] We do not consider that the dividend growth model estimates are reliable on their own, but that they do provide some support for a point estimate above the range from historical returns. See section A.2 for more detail on this material.

- Survey evidence supports a market risk premium around 4.4 to 6.8 per cent. Other regulators' estimates are used as a cross check and indicate a market risk premium estimate of around 6.5 per cent is reasonable. Conditioning variables indicate that there has not been a material change in market conditions since our May 2016 decisions. See sections A.4.1, A.4.4, and A.3 for more detail on this material.

Stakeholder submissions have generally supported a market risk premium at or below the 6.5 per cent. For example:

- The Victorian Energy Consumer and User Alliance (VECUA) continued to recommend a market risk premium of 5.0 per cent, at the bottom of the range determined in the Guideline.[171] VECUA submitted that this appeared to be based on outcome-based considerations regarding the profitability and low risk of service providers and decisions made by other regulators, as well as a view that the AER should exercise its discretion in a more balanced manner.[172]
- The Energy Consumers Coalition of South Australia (ECCSA) commented that the market risk premium estimate in our October and November 2015 decisions, as it was set at the higher end of the credible range, added 'considerable conservatism' into the rate of return calculation.[173]
- Origin Energy continued to support our market risk premium estimate of 6.5 per cent as this better reflects the efficient financing costs of a business exposed to the level of risk that applies to an Australian regulated network business.[174]
- The Tasmanian Small Business Council continues to hold the view that a more appropriate market risk premium is 6.0 per cent.[175]
- In a separate regulatory process, several CCP members advised that we could still set a market risk premium of 6 per cent or below, commenting that a point estimate

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[170] McKenzie and Partington, *Report to the AER, Part A: Return on equity* October 2014, pp. 26–30; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 46–50, 59; Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, p. 43.

[171] VECUA, *Submission to the AER: AER preliminary 2016-20 revenue determinations for the Victorian DNSPs*, 6 January 2016, p. 17.

[172] VECUA, *Submission to the AER: AER preliminary 2016-20 revenue determinations for the Victorian DNSPs*, 6 January 2016.

[173] ECCSA, *A response to the Australian Energy Regulator draft decision on Australian Gas Networks AA2016 revenue reset*, February 2016, p. 36.

[174] Origin Energy, *Re: Submission to AER preliminary decision Victorian networks*, 6 January 2016, p. 3.

[175] Tasmanian Small Business Council , *Submission on TasNetworks' regulatory proposal* , May 2016, p. 36.

within our range but lower than those set by us to date would be 'more in the long term interests of consumers while still meeting investors' rights to an adequate return on capital invested'.[176]

Recently, some service providers argued that there is an inverse relationship between the risk free rate and market risk premium.[177] It is unclear why this risk premium would increase or decrease to entirely offset changes in the base risk free rate. We have not been provided with compelling evidence that the riskiness of TasNetworks relative to the risk free asset has increased as the risk free rate has decreased. Service providers have not sufficiently explained why, in the absence of an increase in the relative riskiness of TasNetworks, general risk aversion in equity investors would have risen as the risk free rate fell from November 2013, while over the same period it appeared to fall for debt investors. While required returns on equity are not directly observable, we have not been provided with compelling evidence for a clear inverse relationship between the long term forward looking risk free rate and the long term forward looking market risk premium.[178]

We note that some stakeholders also recently submitted that we place too much reliance on some material, that we did not have appropriate regard to information from other relevant sources, or that we made inappropriate methodological choices in our empirical analysis.[179] We set out stakeholder views on our use of relevant material and our responses in Table 3-5 in attachment 3 to our draft decision on AusNet Services 2017–22 transmission determination, and it remains relevant. Having considered the overall information and all material before us, at this time we are not satisfied that these submissions indicate a departure from the Guideline would contribute to the achievement of the ARORO and the National Electricity Objective.

Estimating equity beta

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176 CCP (Mark Henley and Ruth Lavery), *Transmission for the generations: Response to proposal by AusNet Services Transmission Group and AER issues paper*, February 2016, p. 6.

177 HoustonKemp, The cost of equity: Response to the AER's draft decisions for the Victorian electricity distributors, ActewAGL Distribution and Australian Gas Networks, January 2016, pp. 48.

178 For a discussion, see AER, *Explanatory statement to the rate of return guideline (appendices)*, 17 December 2013, pp. 25–26. Also see CEPA, *AER: Victorian gas networks market evidence paper*, February 2013; McKenzie and Partington, *Review of the AER's overall approach to the risk free rate and MRP*, February 2013; Lally, *Review of the AER's methodology*, March 2013. Further, we are not satisfied that there is evidence of a widespread 'flight to quality' among investors in prevailing market conditions that would impact the market risk premium. This can be seen in our consideration of conditioning variables, survey evidence, valuation reports, and broker reports. Further, Partington and the RBA noted that investors can engage in a 'search for yield' during periods of low interest rate, which can lead to a decrease in the market risk premium expected by investors (see: Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 72; RBA, *Statement of Monetary Policy*, February 2005, p. 24).

179 See, for example, SFG, *The required return on equity for regulated gas and electricity network businesses*, May 2014, pp. 8, 84. Service providers typically provided updated estimates based on this SFG approach and updated by Frontier Economics - see: Frontier Economics, *The required return on equity under a foundation model approach*, January 2016, p. 34.

Equity beta measures the sensitivity of an asset or business's returns to the movements in the overall market returns (systematic or market risk).[180]

We adopt an equity beta point estimate of 0.7 from a range of 0.4 to 0.7. Our equity beta estimate is required to be commensurate with a similar degree of risk as that which applies to TasNetworks' provision of regulated services.[181] We are satisfied that an equity beta of 0.7 reflects a similar degree of systematic risk as TasNetworks is exposed to in providing regulated services. We hold this view because:

- Our range and point estimate are based on direct measurements (that is, empirical estimates) of the equity beta that businesses with a similar degree of risk as TasNetworks have exhibited in the past (for more detail on this material see section A.5). We consider these are reliable indicators of the prevailing, forward-looking equity beta for an efficient business (or benchmark efficient entity) with a similar degree of risk as TasNetworks.
- Our range and point estimate are consistent with our conceptual analysis. This suggests the systematic risk of TasNetworks[182] would be less than the systematic risk of the market as a whole (that is, its equity beta would be less than 1.0). Our conceptual analysis is supported by McKenzie and Partington.[183]
- The theoretical principles underpinning the Black CAPM are reasonably consistent with an equity beta towards the upper end of our range. For firms with an equity beta below 1.0, the Black CAPM theory may support using a higher equity beta than those estimated from businesses with a similar degree of risk as TasNetworks when used within a Sharpe-Lintner CAPM. This is a result of the Black CAPM relaxing an assumption underlying the Sharpe-Lintner CAPM, which allows for unlimited borrowing and lending at the risk free rate.[184] However, we do not consider the theory underlying the Black CAPM warrants a specific uplift or adjustment to the equity beta point estimate.[185]
- We recognise the importance of providing stakeholders with transparency and predictability in our rate of return decisions, which we consider is consistent with

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[180] McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 21; Brealey, Myers, Partington, Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2000, p. 187.

[181] More precisely, standard control services, see: NER, cl. 6.5.2(c). For transmission network service providers the rules refer to prescribed transmission services, see NER, cl. 6A.6.2(c). For gas network service providers the rules refer to reference services, see NGR, r. 87(3).

[182] More precisely, an efficient business (or benchmark efficient entity) with a similar degree of risk as that which applies to TasNetworks in the provision of standard control services.

[183] See: McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 10–12; Partington, *Report to the AER: Return on equity (Updated)*, April 2015, p. 31; Partington and Satchell, *Report to the AER: Return on equity and comment on submissions in relation to JGN*, May 2015, p. 6; Partington & Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015.

[184] However, the Black CAPM replaces this with an assumption of unlimited ability to short sell stocks.

[185] The reasons for our use of the Black CAPM theory are set out in more detail in section B.2.3 of attachment 3 to our draft decision on AusNet Services 2017–22 transmission determination.

the achievement of the ARORO.[186] In this context, a point estimate of 0.7 is consistent with our Guideline (which was developed following extensive consultation) and is a modest step down from previous regulatory determinations.[187] It also recognises the uncertainty inherent in estimating unobservable parameters, such as the equity beta for a benchmark efficient entity.

Our direct measurements of the equity beta for businesses with a similar degree of risk as TasNetworks are primarily based on an expert report from Professor Olan Henry (Henry), which uses data for a set of Australian energy network businesses up to 28 June 2013.[188] We also consider a number of other empirical studies of the equity beta of Australian energy network businesses. These empirical studies show a consistent pattern of equity beta estimates that is robust to the use of different econometric methods and time periods. From 2002 to 2014, these empirical studies present equity beta estimates that converge on the range of 0.4 to 0.7. We also consider recent equity beta estimates for international energy businesses, which range from 0.3 to 1.0. However, the pattern of international estimates is not consistent and we consider international businesses are less likely than Australian businesses to have a similar degree of systematic risk as TasNetworks. More information on empirical estimates can be found in section A.5.

We consider the evidence in Henry's 2014 report suggests a best empirical estimate for the equity beta of approximately 0.5. However, we consider that the international estimates, in conjunction with considerations of the Black CAPM and investor certainty (as discussed above), support a higher estimate and an estimate at the upper end of our range.[189] Our equity beta point estimate also provides a balanced outcome given the submissions by stakeholders and services providers, as shown in figure 3-4.

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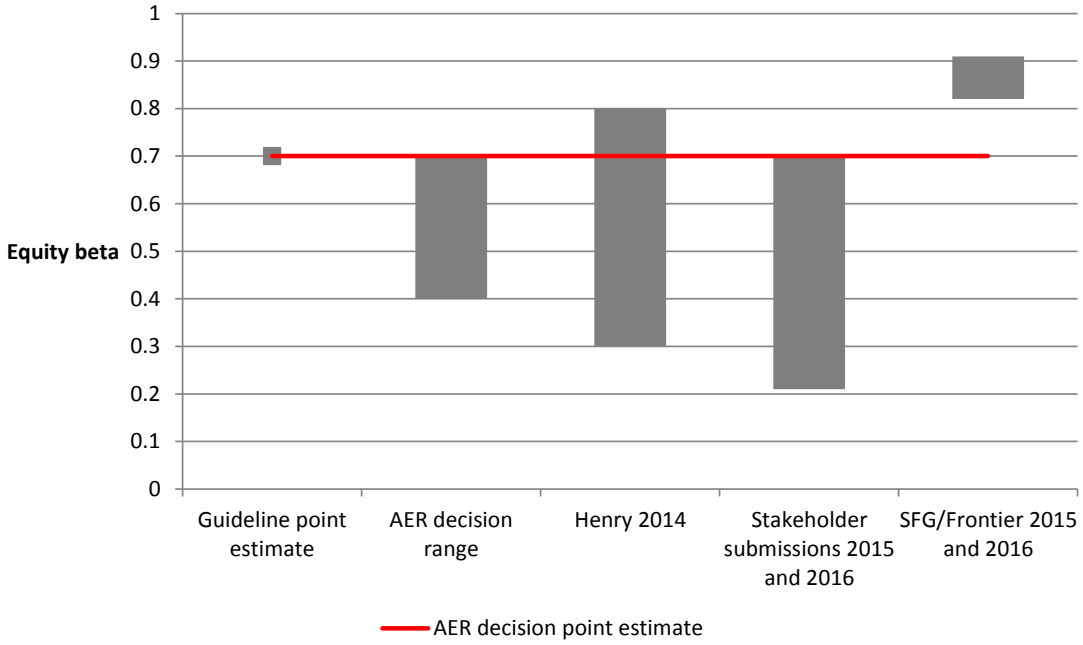
[186] Stakeholders, particularly service providers, sought greater certainty of process. See: AER, *Explanatory statement: Rate of return guideline*, December 2013, p. 51; AEMC, *Final rule determination*, November 2012, pp. 42–43, 45, 50; RARE Infrastructure Limited, *Submission to AER's rate of return guidelines consultation paper*, June 2013; The Financial Investor Group, *Response to the AER's rate of return guidelines consultation paper*, June 2013, p. 1; ENA, *Submission to AER's rate of return guidelines issues paper*, February 2013, p. 4; PIAC, *Submission to AER's rate of return guidelines issues paper*, February 2013, p. 17.

[187] That is, determinations prior to the 2012 Rule change. From 2010 to early 2014, all our regulatory determinations have applied an equity beta of 0.8. See: AER, *Review of the WACC parameters: final decision*, May 2009, p. v.

[188] Henry, *Estimating β: An update*, April 2014, p. 9.

[189] But does not support an estimate beyond our range. We hold this view based on:
(1) the outcome of our conceptual analysis that a business with a similar degree of risk as TasNetworks (in providing regulated services) is likely to have an equity beta less than one;
(2) our assessment of the relative merits of the material, and conclusion that greater weight should be placed on Australian empirical estimates than international estimates or the theory of the Black CAPM.

Figure 3-4 Submissions on the value of the equity beta



Source: AER analysis[190]

Note: Henry 2014 presents the range specified in Henry's 2014 report (0.3 to 0.8). The stakeholder submissions range is intended to reflect the views of consumer groups and those who use/engage with the energy network (or pipeline), and as such it does not include submissions from network (or pipeline) service providers. The lower bound of this range is based on the CCP's submission and the upper bound is based on Origin's submission. The SFG 2015 and 2016 range lower bound is based on SFG/Frontier's regression analysis of Australian and US firms (submitted under a multiple model approach for the return on equity) and the upper bound is based on SFG/Frontier's multiple model based equity beta estimates (under its alternative 'foundation model' approaches for the return on equity).

We note that some stakeholders submitted that we place too much reliance on some material, that we did not have appropriate regard to information from other relevant sources, or that we made inappropriate methodological choices in our empirical

[190] Based on our decision and the following reports: AER, *Rate of return guideline*, 17 December 2013, p. 15; Henry, *Estimating β: An update*, April 2014, p. 63; CCP (Bruce Mountain), *Submission on the AER's preliminary decisions for the Qld/SA distribution network service providers (2015-20), 29 July 2015, pp. 10-11*; Origin Energy, *Submission on the AER's preliminary decisions on the Victorian distribution network service providers for 2016–20*, 6 January 2016, p. 3. SFG/Frontier submitted 0.82 (under multiple model approach for return on equity) in SFG, *The required return on equity for the benchmark efficient entity*, 25 February 2015, p. 20; SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 4; and Frontier, *Estimating the equity beta for the benchmark efficient entity*, January 2016, p. 3. SFG/Frontier submitted 0.91 (under alternative 'foundation model' approaches for return on equity) in SFG, *Beta and the Black capital asset pricing model*, 13 February 2015, p. 35; Frontier, *The required return on equity under a foundation model approach*, January 2016, p. 11.

analysis.[191] For example, CCP members Hugh Grant and David Headberry submitted that our equity beta estimate should be 0.4 or below, noting that: [192]

> of the 19 calculations on which Professor Henry based his recommended range, most of the calculations were clustered at the lower end, with 14 calculations between 0.3 and 0.5.

Table 3-6 in attachment 3 to our draft decision on AusNet Services' 2017–22 transmission determination set out stakeholder views and our responses on the use of relevant material. We also note that Partington and Satchell, having reviewed the relevant submissions, continue to support our foundation model approach.[193]

Having considered all the information and material before us, at this time we are not satisfied that these submissions indicate a departure from the Guideline would contribute to the achievement of the ARORO. We are satisfied that an equity beta of 0.7 will contribute to the achievement of the ARORO and the NEO.[194]

Assessing the overall return on equity

To inform the reasonableness of the foundation model return on equity estimate, we estimate and evaluate values from other relevant sources of information.[195] In having regard to prevailing market conditions we have also examined recent movements in the relevant material.

Our task is to set the allowed rate of return to be commensurate with a similar degree of risk as that which applies to TasNetworks with respect to the provision of regulated services.[196] This requires us to consider the additional riskiness of TasNetworks[197] relative to the risk free asset, and the commensurate return that equity investors require to take on this additional risk.[198] Hence, the critical allowance is the allowed

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191 Most recently CCP (Hugh Grant and David Headberry*), Submission to the AER, Powerlink Queensland 2018–22 Revenue Proposal*, 20 June 2016; CCP (David Headberry), *Response to the proposal from Tasmania's electricity distribution network service provider (TasNetworks – TND) for a revenue reset for the 2017–2019 regulatory period*, 4 May 2016; Tasmanian Small Business Council, submission on TasNetworks' electricity distribution regulatory proposal 1 July 2017 to 30 June 2019 and tariff structure proposal, May 2016.

192 CCP (Hugh Grant and David Headberry), *Submission to the AER, Powerlink Queensland 2018–22 revenue proposal*, 20 June 2016, p. 46.

193 Partington and Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, p. 8.

194 NER, cl. 6.5.2(f); NER, cl. 6A.6.2(f); NGR, r. 87(6). NEL, s.16; NGL, s. 23.

195 Steps four and five of the foundation model approach. This includes broker reports, independent valuation reports, other regulators' decisions, the Wright approach and comparison between the return on equity and return on debt.

196 More specifically, standard control services. While there may be many various risks associated with providing regulated network or pipeline services, we consider that (consistent with modern portfolio theory) the rate of return will be commensurate with efficient financing costs if it reflects only non-diversifiable risks. Diversifiable risk can be addressed through other regulatory mechanisms, such as capex and opex allowances.

197 Or more precisely, a benchmark efficient entity with a similar degree of risk as TasNetworks in respect of the provision of standard control services.

198 In accordance with our task under the NER and NGR. While there may be many various risks associated with providing regulated services, we consider that (consistent with modern portfolio theory) the rate of return will be

equity risk premium over and above the estimated risk free rate at a given time. Figure 3-5 compares our foundation model equity risk premium to other relevant material[199] that can inform our estimate of return on equity and equity risk premium.

We consider that, on the whole, the other material[200] broadly supports our foundation model estimate of the return on equity. Overall, we find that this information does not indicate a material, sustained change in market conditions since our October and November 2015 and May 2016 decisions sufficient to cause us to move away from our foundation model estimate.

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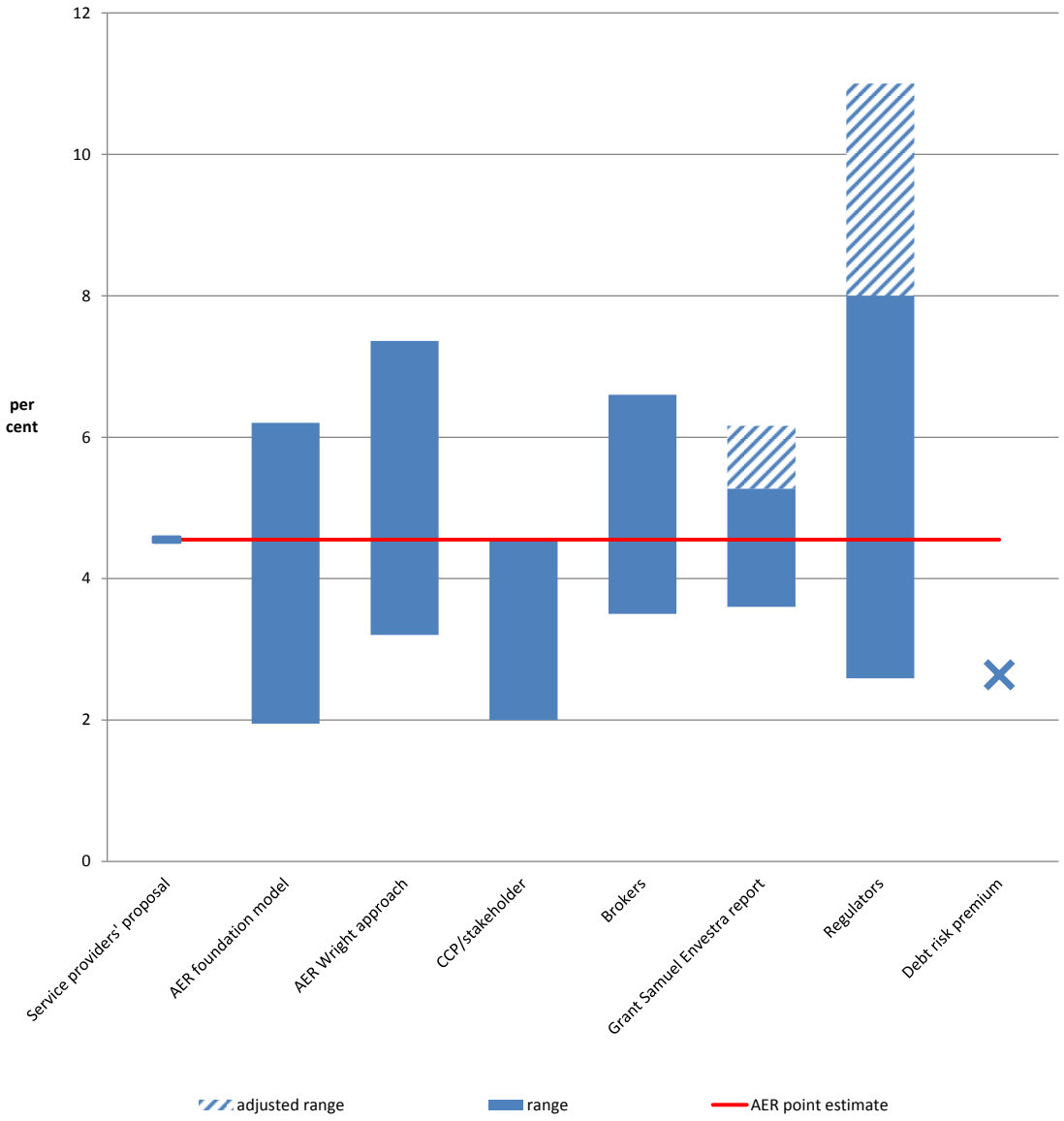
commensurate with efficient financing costs if it reflects only non-diversifiable risks. Diversifiable risk can be addressed through other regulatory mechanisms, such as capex and opex allowances.

199 The Rate of Return Guideline outlines the use of certain other material to inform our final estimate of the return on equity: the Wright approach, other regulators' estimates, broker returns, independent export reports and comparison with return on debt. See: AER, *Better Regulation: Explanatory Statement, Rate of Return Guideline*, December 2013, p. 61.

200 The other material include our construction of the Wright CAPM, other regulators' estimates, comparison with return on debt and relevant broker and independent expert reports.

Figure 3-5 Comparison of our foundation model equity risk premium



Source: AER analysis and various submissions and reports.

Notes: The AER foundation model equity risk premium range uses the range and point estimate for market risk premium and equity beta. The calculation of the Wright approach is set out in section A.1.2. The calculation of brokers and other regulators ranges is outlined in Appendix A.4.

Grant Samuel's final rate of return range included an uplift above an initial Sharpe-Lintner CAPM range. Grant Samuel made no explicit allowance for the impact of Australia's dividend imputation system. The upper bound of the range shown above includes the uplift and an adjustment for dividend imputation, while the lower bound does not. The upper shaded portion of the range includes the entirety of the uplift on return on equity and a full dividend imputation adjustment.[201]

[201] Grant Samuel, *Envestra: Financial services guide and independent expert's report*, March 2014, Appendix 3.

The shaded portion of the other regulators range represents the impact of rail, transport and energy retail decisions on the range. We consider these industries are unlikely to be comparable in risk to the benchmark efficient entity.

The service provider proposals range is based on the proposals from Powerlink and TasNetworks. The lower bound of the CCP/stakeholder range is based on CCP members' submission, [202] the upper bound is based on TasCOSS's submission.[203]

Our implementation of the foundation model approach results in a return on equity of 6.5 per cent and an equity risk premium of 4.55 per cent. This is consistent with equity risk premium ranges from broker reports, valuation reports, other regulators' decisions, and the Wright approach as shown in Figure 3-5.[204] The range of equity risk premium estimates from valuation reports and other regulators' decisions have not materially changed since our October and November 2015 decisions and May 2016 decisions. The estimated equity risk premium range from the Wright approach has increased since we made the October and November 2015 decisions as the risk free rate has fallen. We do not agree with the underlying premise of the Wright CAPM that there is a clear inverse relationship between movements in the risk free rate and market risk premium. Consequently we place limited reliance on the Wright approach.[205]

The return on debt material shown in Figure 3-5 does not support any change to our foundation model return on equity estimate. Our foundation model return on equity estimate is about 191 basis points[206] above the prevailing return on debt. The return on debt is a relative indicator and we expect that, most of the time,[207] investors' expected return on equity will exceed the expected return on debt. For our benchmark efficient entity with a similar degree of risk as TasNetworks, we would not expect the return on equity to be a large margin above the prevailing return on debt.

While the spread between equity and debt premiums has narrowed since the October and November 2015 decisions, it remains above the estimate at the publication of the Guideline in December 2013. Contrary to some service providers' assertions, we consider the current difference is not too low, given the low risk profile of a benchmark efficient entity with a similar degree of risk as TasNetworks in providing regulated

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202 CCP (Hugh Grant and David Headberry), *Submission to the AER, Powerlink Queensland 2018–22 revenue proposal*, 20 June 2016, p. 3.

203 TasCOSS, *submission to AER re TasNetworks revenue proposal 2017–19*, 28 April 2016, p. 2.

204 For more detail on our consideration of this material, see section A of this attachment.

205 See section B.5 of attachment 3 to our draft decision on AusNet Services' 2017–22 transmission determination for more detail on our approach.

206 Estimated as the difference between our estimate of the equity risk premium and the prevailing debt risk premium for 29 July 2016.

207 We consider that the expected return on debt is likely to exceed the expected return on equity during periods of financial distress because holders of debt are typically ranked ahead of equity holders in the event of bankruptcy. We also consider that equity and debt may face different types of risk. Inflation risk is one risk that is likely to affect debt more significantly than equity. Movements in the risk premia for these different types of risk may, theoretically, result in an expected return on debt that exceeds an expected return on equity.

services.[208] Further, measured debt yields likely understate the expected yield spread due to default risk, the use of broad BBB debt to proxy our benchmark rating of BBB+, and use of linear extrapolation of 7 year debt to 10 year debt.[209]

In addition to the equity risk premium ranges shown in Figure 3-5, we have analysed movements in various conditioning variables (yield spreads, dividend yields, and the volatility index for the ASX200).[210] These conditioning variables can provide information about prevailing market conditions and whether or not the market is in a period of heightened risk aversion. Overall, the conditioning variables appear fairly stable and close to their long term averages.

There was broad agreement from consumer groups on the application of our foundation model approach as set out in our Guideline.[211] We consider that this means applying the Guideline in its entirety including the overall approach, parameter estimation and use of other information[212] as relevant cross-checks.

We note some service providers submitted that we did not have appropriate regard to information from other relevant sources.[213] Some stakeholders submitted that we should also have regard to realised returns when considering our overall return on equity estimate.[214] Details of these submissions and our responses are provided in Table 3-7 in attachment 3 to our draft decision on AusNet Services 2017–22 transmission determination, and it remains relevant.

Recently, CCP members Hugh Grant and David Headberry submitted that we should have greater regard to information on realised returns based on service providers' actual financial performance.[215] In our previous determinations we noted that consideration of actual financial performance necessarily conflates to a consideration

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208 Due to the regulatory regime and the businesses' monopoly positions shielding them from systematic risk. For more information, see pages 96 to 99 of Attachment 3 to our preliminary decision for AusNet Services' 2016-20 distribution determination.

209 The debt risk premium above the yield on Australian Government securities is calculated as the extrapolated effective annual yield to maturity on BBB rated debt with 10 years to maturity less the effective annual yield to maturity on Australian Government securities with 10 years to maturity. BBB bond yields have been used instead of BBB+ because the RBA and Bloomberg quote BBB yields to maturity.

210 See section A for further discussion.

211 We received submissions from nine consumer groups that provided clear submissions on the approach for estimating the rate of return. No submission opposed the application of our Guideline for estimating the return on equity.

212 Broker reports, independent expert reports, other regulators' estimates, comparison with return on debt and our construction of the Wright CAPM.

213 Most recently: Cotton Australia, Re: Powerlink Electricity transmission revenue proposal 2017–2022 Issues paper, 2 May 2016; CCP (Hugh Grant and David Headberry), *Submission to the AER, Powerlink Queensland 2018–22 revenue proposal*, June 2016; CCP (David Headberry), *Response to the proposal from Tasmania's electricity distribution network service provider (TasNetworks – TND) for a revenue reset for the 2017–2019 regulatory period*, 4 May 2016.

214 Most recently: CCP (Hugh Grant and David Headberry), *Submission to the AER, Powerlink Queensland 2018–22 revenue proposal*, 20 June 2016.

215 CCP (Hugh Grant and David Headberry), *Submission to the AER, Powerlink Queensland 2018–22 revenue proposal*, 20 June 2016, pp. 38–41.

of RAB multiples—that is, a comparison of the market value of the asset base against the regulatory asset base value.[216] We note that, as a wholly government-owned business, there is no current market value of TasNetworks.[217] Further, a service provider's allowed rate of return may achieve the ARORO and at the same time the market value of its assets could exceed its RAB value for a number of reasons, including:

- the presence of cash flows from unregulated activities
- market expectations of real RAB growth in future regulatory periods
- market expectations of out-performance of regulatory forecasts and the operation of schemes to incentivise improved efficiency
- distortions in the market value, such as 'winners curse' or thin trading

We consider that these factors make it difficult for us at this time to make reliable inferences about our allowed rate of return based on RAB multiples.

Having considered all the information and material before us, at this time we are not satisfied that this information indicates a departure from the Guideline would contribute to the achievement of the ARORO.

3.4.2 Return on debt

The allowed return on debt provides a service provider with an allowance to cover its borrowing costs associated with funding investments in its network. Consistent with other components of the rate of return, we determine the allowed return by reference to a 'benchmark efficient entity' rather than the actual service provider.

Our draft decision is to adopt an indicative return on debt for the first regulatory year of 4.79 per cent. We have determined this rate using a methodology consistent with that proposed by TasNetworks.[218]

This draft decision sets out how we arrived at the rate for TasNetworks, and how we plan to update the return on debt in future regulatory years. That is, we set out:

- The return on debt approach. This sets out why we transition the entire return on debt from an on-the-day to a trailing average approach over 10 years (a full transition).
- Implementing the return on debt approach. This includes the benchmark term, benchmark credit rating, our choice and use of third party data series,

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[216] For example, see: AER, *Final Decision Ausgrid distribution determination 2015−16 to 2018−19 Attachment 3 – Rate of return*, April 2015, p. 99.

[217] See Attachment 2 to our draft decision on Powerlink's 2017-22 transmission determination.

[218] TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

extrapolation/interpolation issues, contingencies, averaging periods and the annual updating process.

Return on debt approach

Our draft decision is to transition the entire return on debt[219] from an on-the-day approach in the first regulatory year to a trailing average by updating 10 per cent of the debt portfolio over 10 years (a full transition). This is consistent with the Guideline and TasNetworks regulatory proposal.[220]

TasNetworks proposed that its allowed rate of return on debt be determined in accordance with the Guideline. However, TasNetworks also proposed that its allowed return on debt reflect any departures from the Guideline that we may undertake in any remittal decisions that may result from current Tribunal and Federal Court processes.[221] The final outcome of the Tribunal's decision on this matter has not yet been determined. The Tribunal remitted this matter back to us and the matter is currently under consideration. Aspects of the Tribunal's decision are also being considered by the Federal Court. Nevertheless, for completeness, we reproduce our analysis from recent decisions where we carefully considered a range of transitional options that other service providers had proposed. We concluded that of the options before us, only a full transition would contribute to the achievement of the ARORO.[222]

Moreover, we hold the view that, in the absence of a transition that substantially eliminates any change in the present value of a benchmark efficient entity as a result of the change in methodology, [223] the only other approach we consider will satisfy the ARORO is the continuation of the on-the-day methodology. The continuation of the on-the-day methodology sets an allowed return commensurate with efficient financing costs at the start of the regulatory period because it resets the allowed return to the current efficient market rates.

In this section, we:

- set out our overall return on debt approach (the transition to a trailing average).
- explain what approaches to estimating the return on debt can contribute to the ARORO and why (which includes our approach in this draft decision).
- explain why other forms of transition that service providers have recently proposed would not meet the requirements of the ARORO and NEO/NGO. This is for

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219 For clarity, that is 100% of the base rate and debt risk premium components of the allowed return on debt.

220 AER, *Better regulation—Rate of return guideline*, December 2013, chapters 3, 6 and appendix B. TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

221 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, pp. 114, 116.

222 See attachment 3 of our final decisions published in May 2016 for ActewAGL distribution (gas), AGN, APTNT, AusNet Services (distribution), CitiPower, Jemena Electricity Networks, Powercor, United Energy.

223 Such as our full transition.

completeness, in case TasNetworks considers these positons relevant in light of the recent Tribunal decisions.[224]

- set out general problems with using historical data to estimate the allowed return on debt.

Our approach to estimating the return on debt

Our draft decision is to start with an on-the-day approach for the first regulatory year and gradually transition into a trailing average approach over 10 years (a full transition).[225] Applied to TasNetworks, this means our return on debt approach is to:

- estimate the return on debt using an on-the-day approach (that is, based on prevailing interest rates near the commencement of the regulatory period) in the first regulatory year (2017–18) of the 2017–19 regulatory period, and
- gradually transition this approach into a trailing average (that is, a moving historical average) over 10 years by annually updating 10 per cent of the return on debt to reflect prevailing market conditions in that year.[226]

In practical terms, our return on debt approach means that an on-the-day approach around the start of the 2017–19 regulatory period is applied to:

- 100 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2017–18 regulatory year
- 90 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2018–19 regulatory year, with the remaining 10 per cent updated to reflect prevailing interest rates during TasNetworks' averaging period for 2018–19. Consistent with the rules requirements, this annual update (and all future annual updates) will be effected through the automatic application of the return on debt methodology we set out in this draft decision.[227]
- 80 per cent of the debt portfolio in the calculation of the allowed return on debt for the 2019–20 regulatory year, with 10 per cent based on prevailing interest rates during TasNetworks' averaging period for 2018–19, and 10 per cent updated to

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[224] Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 1,227. The Tribunal's reasons are set out in paras 870 to 940. Also see Australian Competition Tribunal, *Application by Jemena Gas Networks (NSW) Ltd [2016] ACompT 5*, 3 March 2016, paras 80–83.

[225] This approach is consistent with the approach we proposed in the Guideline, and have maintained in determination processes since the Guideline. In the Guideline, we based our transition on the approach recommended by the Queensland Treasury Corporation (QTC) (see QTC, *Moving average approach–Detailed design issues*, 8 June 2012). We refer to this as 'the QTC approach'.

[226] This decision determines the return on debt methodology for the 2017–19 regulatory period. This period covers the first two years of the 10 year transition period. This decision also sets out our intended return on debt methodology for the remaining eight years.

[227] NER cl. 6.5.2(l) and cl. 6A.6.2(l)and NGR, r.87(12). The return on debt methodology for the purposes of the annual update is set out in appendix A of this attachment 3.

reflect prevailing interest rates during TasNetworks' averaging period for 2019–20, and

- so on for the subsequent regulatory years.

After the 10 year transition period is complete, the return on debt is a simple average of prevailing interest rates during TasNetworks' averaging periods over the previous 10 years (a trailing average).

Approaches that contribute to the achievement of the ARORO

We consider the ARORO requires that the allowed rate of return appropriately compensates investors for capital investments (in an ex-ante sense) and aims to minimise the long run cost of capital (all else being equal).[228] We consider ex-ante efficient compensation should result in the ex-ante allowed return on capital cash flows having a present value equal to the present value of the ex-ante efficient cost of capital cash flows required to finance the RAB. This means the allowed return on and of capital cash flows should have a present value equal to the statutory value of the RAB. This is a zero NPV investment condition, as discussed in section 3.3.3.[229]

A rate of return that achieves the ARORO should also be consistent with the RPPs in the NEL/NGL, which indicate a service provider should be provided with a reasonable opportunity to recover at least efficient costs. These also require that we should provide regulated firms with effective incentives to promote economic efficiency and have regard to the economic costs and risk of the potential for service providers to under- or over-invest.[230]

We have formed our view that our decision to estimate the allowed return on debt by starting with an on-the-day approach for the first regulatory year and gradually transitioning into a trailing average approach over 10 years will result in an allowed return on debt that contributes to the achievement of the ARORO. The other option that we consider would achieve the ARORO is maintaining the on-the-day approach. Related to this, all else being equal, a trailing average (with transition) and on-the-day approach provide equivalent ex-ante compensation over the term of the RAB (see Appendix A for a detailed discussion). We consider this position is consistent with the AEMC's observations about SFG's view:[231]

> SFG highlighted that for a given definition of the return on debt for an efficient benchmark service provider (in particular, the assumed credit rating and term to maturity) the average cost of debt will be the same over the long run. This is

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[228] By appropriate compensation we mean that the ex-ante return should be commensurate with the expected return in the capital market for an investment with a similar degree of risk as that of a benchmark efficient entity in the position of the service provider supplying regulated services.

[229] See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

[230] For the RPPs see NEL, s. 7A; NGL, s. 24.

[231] AEMC, *Final Rule Determination: Economic regulation of network service providers, and price and revenue regulation of gas services*, 29 November 2012, pp. 74–75.

regardless of whether the return on debt estimate is based on the prevailing debt cost spot rate or an average of that spot rate. Changing to an averaging approach will not, in itself, systematically reduce or increase the allowed return on debt in the long run.

Trailing average (with full transition) meets the ARORO

With a full transition, a trailing average approach would provide a benchmark efficient entity with a reasonable opportunity to recover at least efficient costs over the term of the RAB. It could therefore result in an allowed return on debt (and overall rate of return) that can be consistent with the rules and NEL/NGL. Appendix Bprovides detailed reasons, including a mathematic description, for why this holds. Further, regarding adopting a trailing average approach more broadly:

- Compared to an on-the-day approach, a trailing average approach will lead to less volatile cash flows.[232]
- Some stakeholders submitted that a trailing average would reduce some of the risks faced by service providers, which would eventually flow to lower betas than what we have historically seen.[233] Frontier also advised that a trailing average approach would result in a smooth profile for the allowed return on debt.[234]
- A trailing average approach received broad stakeholder support.[235]

We consider the on-the-day approach could contribute to the achievement of the ARORO and is therefore open to us (see the following section). On this basis, the present value of a benchmark efficient entity's allowed revenues under the on-the-day approach would have been sufficient to compensate it for its efficient financing costs. That is, a benchmark efficient entity would not have been under- or over-valued when we calculated its debt allowance under the on-the-day approach, and continuing this approach will continue to provide correct compensation commensurate with efficient financing costs.

If this holds, then changing the present value of a benchmark efficient entity would result in over-compensation (if we increase its value) or under-compensation (if we decrease its value). This would not meet the ARORO or be consistent with achieving the NEO/NGO. As such, changing debt estimation methodologies must be revenue-neutral (in a present value sense) to avoid incorrectly compensating a benchmark efficient entity relative to its efficient financing costs.

Switching immediately from an on-the-day approach to a trailing average approach could only be revenue-neutral by chance. Specifically, this could occur if the average cost of debt over the last nine years equalled the current cost of debt in the market.

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[232] AER, *Explanatory statement to the rate of return guideline (Appendices)*, December 2013, p. 38.

[233] MEU, *Submission to beta issues paper*, October 2013, p. 5; PIAC, *Submission to beta issues paper*, October 2013, pp. 6–7, 9–10.

[234] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 74.

[235] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 108–111.

However, if the nine year average was higher (lower) than the current cost of debt, then changing approaches would increase (decrease) the present value of the benchmark efficient entity. This arises because the allowed return on debt is estimated using prevailing market data under the on-the-day approach and historical market data under the trailing average approach. As such, by construction, these two approaches will typically produce different estimates at given points in time.

For this reason, we have used our transition approach because it is approximately revenue neutral (in a present value sense).[236] That is, it aims to assist us in switching between methodologies to estimating the return on debt without changing the present value of a benchmark efficient entity's allowed revenues purely due to this switch. HoustonKemp provided support for a transition to avoid such changes to the present value of a benchmark efficient entity's allowed revenues and to limit 'regulatory risk' in its advice to ESCOSA.[237] We also note that SFG advised the AEMC that the type of transition mechanism we apply in this draft decision would be effective:[238]

> The type of "rolling in" arrangement [transition] that has been proposed by QTC [the full transition we adopted] would be an effective means of transitioning from the current Rules to the use of an historical average cost of debt approach

For completeness, changing approaches once from an on-the-day to a trailing average approach will only require one revenue neutral transition. If there was good reason to later readopt an on-the-day approach (or adopt an alternative approach that could also contribute to meeting the ARORO), this would require another once-off revenue-neutral transition. We consider this is consistent with the rules requirement to have regard to any impacts on a benchmark efficient entity referred to in the ARORO that could arise from a change of methodology.[239] The AEMC explained that the purpose of this aspect of the rules was:[240]

> for the regulator to have regard to impacts of changes in the methodology for estimating the return on debt from one regulatory control period to another. Consideration should be given to the potential for consumers and service providers to face a significant and unexpected change in costs or prices that may have negative effects on confidence in the predictability of the regulatory arrangements.

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[236] Only a full transition is revenue neutral of the different transition paths before us. However, there are other possible revenue paths that are revenue neutral (in a present value sense) from the change in methodology. For example, this could include a lump sum transfer (see Appendix A).

[237] HoustonKemp, *Appropriate objective to guide the setting the cost of debt allowance*, March 2015, p. 5.

[238] SFG, Rule change proposals relating to the debt component of the regulatory rate of return, August 2012, p. 46.

[239] NER, cl. 6.5.3(k)(4), states '(k) In estimating the return on debt under paragraph (h), regard must be had to the following factors… (4) any impacts (including in relation to the costs of servicing debt across regulatory control periods) on a benchmark efficient entity referred to in the allowed rate of return objective that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory control period to the next'. Also see NER, cl. 6A.6.2 (k) (4); NGR, cl. 87(12) (d).

[240] AEMC, *Final Rule Determination: Economic regulation of network service providers, and price and revenue regulation of gas services*, 29 Nov ember 2012, p. 85.

Continuing the on-the-day approach meets the ARORO

An on-the-day approach provides service providers with a reasonable opportunity to recover at least efficient costs over the term of the RAB and over each regulatory period. Appendix Bprovides detailed reasons, including a mathematic description, for why this holds. On this basis, we consider continuing the on-the-day approach for estimating the allowed return on debt will achieve the ARORO and the NEO.[241] Further, as table 3-4 shows, we consider that neither an on-the-day nor trailing average approach would be clearly superior to the other. Rather, each of these approaches has its own benefits and limitations

Given this, while we adopt a trailing average for this determination, we do not consider this change in methodology would be justified in the absence of a transition. Without a transition, the change to the trailing average would not be revenue neutral, but would rather increase the present value of a benchmark efficient entity's allowed revenues purely due to changing the debt estimation methodology (see the subsequent section). Consequently, in the absence of a transition, we would not consider a trailing approach will achieve the ARORO and we would instead maintain the on-the-day approach to estimating the return on debt.

Table 3-4: Benefits of different debt approaches

Benefits of a trailing average approach	Benefits of an on-the-day approach
A trailing average approach provides service providers with a regulatory benchmark that they can more readily match each regulatory period.[242] As such, this provides a benchmark efficient entity with an enhanced opportunity to minimise any mismatch between actual costs and regulated revenues.[243] Nevertheless, it is important to note that this mismatch risk would not result in a benchmark efficient entity being ex-ante over- or under-compensated for its efficient debt financing costs for a regulatory period or over the life of its assets. All else being equal, this reduced risk and the reduced need to enter hedging arrangements might lower the efficient cost of financing for a benchmark efficient entity and increase productive efficiency. A trailing average is likely to provide for a smoother price path than the on-the-day approach. Regulatory revenues adjust gradually to movements in interest rates. By contrast, the on-the-day approach can lead to large shifts in revenue at each reset if underlying interest rates have	An on-the-day approach better reflects the prevailing cost of debt in the capital market near the commencement of the regulatory period. Due to this, it: • Better reflects investors' opportunity cost of debt and expectations of future returns near the commencement of the regulatory period.[244] It therefore provides a better signal for efficient investment decisions that increase dynamic efficiency. This is consistent with the AEMC's view that the return on debt framework should minimise the risk of creating distortions in service providers' investment decisions:[245] • Is more internally consistent with how we estimate other components of the allowed rate of return and the building block model more generally. • Leads to an estimate that is commensurate with efficient financing costs and competitive market outcomes near the commencement of the regulatory

241 As required under NER, cl. 5.5.2(h); NER, cl. 6A.6.2(h); NGR, cl. 87(8).

242 See AER, *Final decision: TransGrid transmission determination, Attachment 3*, April 2015, p. 150.

243 HoustonKemp, *Memo: Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 4.

244 Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill, Ed. 10, 2009, pp. 427, 434.

245 AEMC, *Final Rule Determination: Economic regulation of network service providers, and price and revenue regulation of gas services*, 29 November 2012, p. 73.

moved since the last reset.	period. We expect prevailing market rates for capital finance to be competitive.[246] Moreover, a return on debt that reflects the current market rate more closely imitates the outcomes of a competitive market by representing the costs that other service providers will face to enter the market.[247]

Source: AER analysis.

Other proposed transition paths will not contribute to the achievement of the ARORO

Where service providers have proposed departing from the Guideline in how they transition to a trailing average approach, we have characterised this as effectively proposing two separate things:

- to move to a trailing average methodology; and
- to increase the net present value of their assets (and associated revenues) by proposing to move a trailing average methodology in a manner that is not revenue neutral.

We have seen these as separate issues. We have also observed that, as long as a revenue-neutral transition is applied, the first issue is not in contention. This has warranted predominately responding to the second issue—the form of transition. As such, we have carefully considered several proposed transition paths, including:

- No transition (or an immediate move) to a trailing average—Adopt a backwards looking trailing average approach (no transition on either the base rate or debt risk premium components of the return on debt).[248]
- Hybrid transition—Start with an on-the-day approach for the base rate component and gradually transition into a trailing average approach over 10 years. This would be combined with a backwards looking trailing average debt risk premium (that is, a base rate transition only).[249]
- Hybrid transition under partial hedging—Assume a benchmark efficient entity hedged only one third of the base rate under the on-the-day regime on the basis that this would have been ex-post optimal.[250] Gradually transition this portion of the

[246] Kahn, A.E., 'The economics of regulation: Principles and institutions', The MIT Press, Massachusetts, 1988, p. 45.

[247] In a competitive market, prices are theoretically constrained by entry or the threat of entry. See HoustonKemp, *Memo: Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 1. This is also implied in Chairmont, *Cost of debt comparative analysis*, November 2013, p. 4.

[248] Proposed as a first preference in revised proposals from ActewAGL, AGN, APTNT, AusNet Services, CitiPower, JEN, Powercor, and United Energy.

[249] Proposed in initial proposals from ActewAGL, AGN, AusNet Services, CitiPower, JEN, Powercor and United Energy. AGN also proposed this as a third preference in its revised proposal.

[250] Proposed as a second preference in revised proposals from ActewAGL, AGN, AusNet Services distribution, CitiPower, JEN, Powercor and United Energy. APTNT proposed this in its initial proposal.

base rate and apply an immediate trailing average to the other two thirds of the base rate and the entire debt risk premium component.

For the reasons discussed below, we do not consider any of these transition paths would contribute to the achievement of the ARORO.

Immediate transition will not contribute to the achievement of the ARORO

For the reasons discussed above under, 'trailing average (with full transition) meets the ARORO', immediately moving to a trailing average by immediately adopting a historical cost of debt is likely to change the present value of a benchmark efficient entity's allowed revenues relative to a continuation of the on-the-day approach.

The current market cost of debt is considerably below the average market cost of debt over the past nine years. As such, in current circumstances, an immediate transition would lead to an excess positive return relative to the efficient return in the market. All else being equal, this will result in a material increase in the present value of a benchmark efficient entity's allowed revenues relative to its expected efficient costs to a value well above its RAB, thereby overcompensating it. No service provider has submitted material that satisfies us that materially increasing the present value of their allowed revenues from the change in methodology would contribute to the achievement of the ARORO or be consistent with the NEL/NGL.

It is worth noting that equally, the trend in interest rates could have been reversed (that is, if we had moved from a low to high interest rate environment). If this occurred, an immediate transition would have led to a material decrease in the present value of a benchmark efficient entity's allowed revenues relative to its expected efficient costs, thereby undercompensating it. That is, the allowed return would have been below the efficient financing costs of a benchmark efficient entity. Neither outcome would achieve the ARORO and would not lead to efficient investment and use of infrastructure, in the long term interest of consumers. We explain this and show this mathematically in detail in Appendix B.

Further, we consider that failing to implement a revenue neutral transition would undermine the ARORO and the NEL/NGL for the following reasons:

- The future return on debt allowance would have a different present value if we switched methodologies to estimating the allowed return on debt without a transition. In Appendix B, we establish that continuing the on-the-day approach would satisfy the ARORO. Given this, changing approaches must be revenue neutral or it would either over- or under-compensate a benchmark efficient entity for its efficient debt financing costs. We do not consider this outcome contributes to the achievement of the ARORO, NEO/NGO or RPPs.
- If switching to a trailing average approach is not revenue neutral, this would change the present value of a benchmark efficient entity's expected regulated cash flows compared to the value of the expected cash flows that would be consistent with the investor expectations when they invested (under the on-the-day approach). This may increase expected regulatory uncertainty. This may undermine confidence in the predictability of the regulatory arrangements and lead to an inefficient increase

in financing costs (all else being equal).[251] This is consistent with SFG's advice to the AEMC that:[252]

> The lack of any transition arrangements in a setting whether the rule change exposes regulated businesses to risks that they did not previously face is likely to be viewed by the market for funds as a signal that a higher degree of regulatory risk should be priced into their provision of funds. Such an outcome is unlikely to be consistent with the NEO and RPP.

- Incentives on service providers to adopt efficient financing practices (and thereby minimise their long run cost of capital all else being equal) under the regulatory regime may be undermined.[253] For instance, by allowing service providers to bear the consequences (or reap the benefits) of their actions from prior regulatory periods, this incentivises them to efficiently manage financial risk.

Hybrid transitions will not contribute to the achievement of the ARORO

As table 3-5 highlights, both hybrid transitions are effectively different combinations of a 'full transition' and 'no transition'. On the basis that a full transition contributes to the achievement of the ARORO and no transition fails to achieve this, then both hybrid transitions would fail to achieve the ARORO. For this reason, our analysis above on why immediately moving to a trailing average approach will not contribute to the achievement of the ARORO also applies to the hybrid transitions that service providers have proposed.

Table 3-5 Different transitions to a trailing average

Form of transition	Revenue-neutral transition by updating 10% per year over 10 years	Immediately move to a trailing average approach
Full transition	100% of base rate + debt risk premium	-
Hybrid transition	100% of base rate	Debt risk premium
Hybrid transition under partial hedging	1/3 of base rate	2/3 of base rate + debt risk premium
No transition	-	100% of base rate + debt risk premium

Source: AER analysis.

For clarity, we also emphasise why the logic underpinning the use of a hybrid transition is problematic. By basing service providers' debt allowance on a 10 year historical debt risk premium, a hybrid transition effectively removes realised losses or gains from

[251] See HoustonKemp, *Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 5; Expert Panel on Energy Access Pricing, *Report to the Ministerial Council on Energy*, April 2006, p. 59.

[252] SFG, *Rule change proposals relating to the debt component of the regulatory rate of* return, August 2012, p. 46.

[253] The RPPs require we have regard to this effect on incentives. See NEL, s. 7A(3)(b); NGL, s. 24(3)(b).

interest rate risk that they had previously borne. This reasoning also applies to an immediate transition.

As the services providers operate under an ex-ante regulatory regime, we consider the ARORO requires us to provide ex-ante efficient compensation. This does not entail compensating for historically incurred costs. That would be cost of service regulation, not incentive regulation. Investors have invested accepting the interest rate risk from the on-the-day approach, and we have already appropriately compensated service providers for bearing this risk. For both reasons, removing the outcomes of this risk ex-post would not contribute to the achievement of the ARORO.[254]

Further, we consider that we have appropriately compensated investors for the risks they faced when we set the allowed return on debt using the on-the-day approach. This is because:

- We have set the allowed return on debt using the on-the-day approach for many years.[255] As such, when we applied the on-the-day approach, investors in a benchmark efficient entity would have expected us to reset the return on debt at the start of each regulatory period and accepted any risks associated with this approach. When we proposed moving to a trailing average in the Guideline, this proposal was contingent on applying a transition so that the value of the firm aligned with previous investor expectations under the on-the-day regime.
- We benchmark the allowed rate of return (which requires consistently benchmarking the return on debt, return on equity and gearing) on observed data from service providers comparable to a benchmark efficient entity operating under an on-the-day approach. Therefore, the allowed rate of return should be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as a regulated service provider operating under this approach.[256]

Further, we consider a full transition necessary to satisfy the ARORO and NEO/NGO even if firms partially hedged. It is also worth noting that service providers proposing this transition did not appear to hold the view that hedging one third of the base rate was optimal ex-ante because they appeared to have hedged nearly their entire base rate in practice.[257]

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254 Lally, *Review of submissions on the cost of debt*, 21 April 2015, p. 25.

255 We have used the on-the-day approach to estimate the return on debt since 1998 where we interpreted our task as requiring us to derive a rate of return that was as up to date as possible at the time the access arrangement came into effect. See ACCC, *Victorian Gas Transmission Access Arrangements Final Decision*, 6 October 1998, p. 49.

256 In particular, to the extent that the financial risks (including interest rate risk) arising from the on-the-day approach are systematic, they would be priced into investors' required return on equity. This would be compensated for in our equity beta estimate, which is calculated based on historical returns.

257 APA Group, *Annual report 2015*, p. 14; DUET Group, *Financial report for year ended 30 June 2015* , p. 61; Envestra Ltd, *Directors' and financial report*, 30 June 2014, p. 27; Spark Infrastructure, *Annual report 2012*, p. 16; SP AusNet, *Business review 2014: SP AusNet Distribution financial report*, Note 19, p. 11. Spark Infrastructure cancelled its interest rate swaps in 2013. See Spark Infrastructure, *Annual Report 2013*, p. 16.

General problems with using approaches based on historical data

Both the immediate and hybrid forms of transition to the trailing average rely on using historical data to estimate the allowed return on debt. We consider this has the following problems:

- All of these transition paths would produce a return on debt allowance that effectively removes interest rate risk (to at least some extent) incurred in prior regulatory periods. A benchmark efficient entity was required to bear and manage this risk under the on-the-day approach. As such, these transition paths alter the service providers' historic risk profiles after they have made decisions on how to manage their financial risk.
- Choosing an approach that uses historical data after parties already know the results of that historical data has the potential to bias regulatory decisions. In previous decisions, we have explained that when parties (whether they be service providers, the Tribunal, or ourselves) choose historical averaging periods, the knowledge of the return on debt at any past point may influence the choice.[258] For example, if a service provider could select an averaging period by looking at historical yields, it could introduce an upward bias.[259] This is one of the reasons why, when recommending a gradual transition into the trailing average approach, QTC stated:

  > The transitional rule ensures that the NSP is not able to receive a higher initial rate simply by electing to use the moving average approach. It also avoids the need to reach agreement on the return on debt calculation for each of the preceding nine years.[260]

- In previous decisions, we have observed there are practical problems with using historical data dating back nine years.[261] In particular, high quality and readily available historical data is unavailable for the debt risk premium component of the return on debt.[262] There is also no consensus among service providers on how to estimate the historical debt risk premium. Moreover, the results of the different data series vary considerably with Lally observing:[263]

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258 For example, see AER, *Preliminary decision—CitiPower determination, Attachment 3: Rate of return*, October 2015, pp. 190–2. Also see AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 166.

259 Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

260 QTC, *Moving average approach–Detailed design issues*, 8 June 2012.

261 For example, see AER, *Preliminary decision—AusNet Services determination, Attachment 3: Rate of return*, October 2015, pp. 196–9; AER, *final decision-AusNet Services distribution determination 2016 to 2020, Attachment 3: Rate of return*, May 2016, p. 106 . Also see AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 166–167.

262 No third party data series is available for the full 10 year historical period, meaning a mixture of data series for different time periods would be required. The RBA and Bloomberg (BVAL) data series commenced in January 2005 and April 2010 respectively. The Commonwealth Bank of Australia Spectrum and Bloomberg fair value curve data series ceased publication in August 2010 and May 2014 respectively.

263 Lally, M, *Transitional arrangements for the cost of debt*, November 2014, p. 15.

there has been considerable variation in the results from four such indexes since early 2007, most particularly in early 2009 when the estimates of the RBA, CBA Spectrum, and BFV indexes were 9.5%, 5.0% and 3.5% respectively (CEG, 2014, Figure 1); this variation complicates the process of choosing estimates for that historical period.

Implementing the return on debt approach

In the previous section, we set out our approach to estimating the allowed return on debt. This approach involves estimating the allowed return on debt using the on-the-day approach gradually transitioning into a trailing average approach over 10 years. This gradual transition will occur through updating 10 per cent of the allowed return on debt each year to reflect prevailing market conditions during TasNetworks' averaging period for that year.

In this section, we set out our considerations on the implementation of the allowed return on debt approach. These considerations are:

- the term of debt issued by a benchmark efficient entity
- the credit rating of a benchmark efficient entity
- whether to use an independent third party data series or to construct our own data series (for example, based on an index of actual industry borrowing costs)
- the choice of third party data series (or combination of data series) to estimate the efficient debt financing costs of a benchmark efficient entity, based on the benchmark debt term and benchmark credit rating
- the formula used to calculate the trailing average return on debt
- extrapolation and interpolation issues with adjusting our choice of data series
- the averaging period used to estimate the return on debt for each regulatory year
- a step-by-step guide to calculating the return on debt
- the timing of the annual process to update the return on debt
- contingencies associated with implementing our choice of data series, if the data series we have chosen to estimate the return on debt are unavailable or change in future regulatory years during the regulatory period.

These matters are discussed in turn below.

Consistent with the Guideline, we are satisfied that a return on debt estimated based on a 10 year benchmark debt term, BBB+ benchmark credit rating, and using an independent third party data series is commensurate with the efficient financing costs of a benchmark efficient entity.

In choosing that third party series (or combination of series), we are satisfied that adopting a simple average of the broad BBB rated RBA and Bloomberg Valuation Service (BVAL) curves, with the RBA data series extrapolated to a 10 year term, is commensurate with the efficient financing costs of a benchmark efficient entity.

Our return on debt approach involves annual updates to the return on debt.[264] The NER require that the change to TasNetworks' annual building block revenue requirement resulting from updating the return on debt is to be effected through a formula specified in the revenue determination.[265] For the purposes of clause 6.5.2(L), our draft decision is that the resulting change to TasNetworks' annual building block revenue requirement is to be effected through:

- the automatic application of the return on debt methodology specified in this section
- using the return on debt averaging periods specified in confidential appendix D, and
- implemented using TasNetworks' final determination post-tax revenue model (PTRM) in accordance with section 3 of the AER's PTRM handbook for distribution network service providers.[266]

Term

Our draft decision is to adopt a ten year term for the return on debt. This is consistent with the Guideline and with TasNetworks' regulatory proposal.[267]

We are satisfied that measuring the allowed return on debt by reference to a 10 year benchmark term is commensurate with the efficient financing costs of a benchmark efficient entity. Our reasons for adopting a 10 year benchmark debt term are:

- A long debt tenor is consistent with the long lived assets of a benchmark efficient entity and reduces refinancing risk.
- A 10 year term is similar to (though somewhat longer than) the industry average term at issuance of a sample of firms that are comparable to the benchmark efficient entity.

Regulated network assets are long lived, and have asset lives that are longer than the terms commonly available for debt. Refinancing risk is the risk that a firm would not be able to refinance its debt at a given point in time due to this mismatch in terms. While conceptually we agree that businesses will seek to issue longer term debt to lower their refinancing risk, generally the cost of long term debt is higher than shorter term debt. This is because debt holders require compensation for the risks associated with holding debt over a longer time period. We consider a benchmark efficient entity would have regard to the trade-off between the higher cost of long term debt and the risk associated with refinancing and structure their debt holdings accordingly. Overall, these considerations suggest the average debt term of a benchmark efficient entity would be long term, but they do not provide clear guidance on what exactly that term should be.

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[264] NER, cl. 6A.6.2(i).

[265] NER, cl. 6A.6.2(l).

[266] AER, *Final decision—Amendment—Electricity DNSPs PTRM handbook*, 29 January 2015.

[267] AER, *Better regulation—Rate of return guideline*, December 2013, p. 21; TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117..

For that reason, in our Guideline, we requested information from a range of privately owned service providers on the amount, type, term and credit rating of their debt issuances.[268] These service providers are comparable to our definition of the benchmark efficient entity which is a 'pure play' regulated energy network business operating within Australia. Based on observed practice, the weighted average term at issuance of the debt portfolio of these service providers was 8.7 years at the time of the Guideline. We observed that service providers are securing bank debt with an average term at issuance of 4.3 years, issuing Australian bonds with an average term at issuance of 9.6 years, and issuing offshore bonds with an average term of 9.7 years.[269]

Credit rating

Our draft decision is to adopt a BBB+ benchmark credit rating to estimate the return on debt. This benchmark credit rating is the same rating we proposed in the Guideline and applied in our most recent decisions.[270] We also applied this credit rating to decisions that were upheld before the Tribunal.[271]

In recent regulatory processes, different service providers, consultants and other stakeholders have proposed different credit ratings for the benchmark efficient entity. In particular:

- AusNet Services proposed a credit rating of BBB.[272]
- Powerlink and TasNetworks accepted the approach in the Guideline, which has a BBB+ credit rating.[273]

These service providers did not submit any consultant reports on the benchmark credit rating. However, the consultant reports we received previously were mixed. For instance:

- NERA and Houston Kemp (commissioned by TransGrid in a recent regulatory process) recommended a BBB+ credit rating.[274]

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[268] Information was received from APA Group, AusNet Services, CitiPower, Dampier to Bunbury Pipeline, ElectraNet, Envestra, Jemena, Multinet, Powercor, SA Power Networks and United Energy.

[269] AER, *Better regulation—Explanatory statement to the rate of return guideline*, December 2013, p. 136.

[270] AER, *Better regulation—Rate of return guideline*, December 2013, p. 21; AER, *Better regulation—Explanatory statement to the rate of return guideline*, December 2013, pp. 152–157. See attachment 3 of our final decisions published in May 2016 for ActewAGL distribution (gas), AGN, APTNT, AusNet Services (distribution), CitiPower, Jemena Electricity Networks, Powercor, United Energy.

[271] Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 993.

[272] AusNet Transmission Group Pty Ltd, Transmission Revenue Review 2017–2022 regulatory proposal, 30 October 2015, p. 191.

[273] Powerlink, Queensland revenue proposal, January 2016; TasNetworks, Tasmanian distribution regulatory proposal: Regulatory control period 1 July 2017 to 30 June 2019, 29 January 2016. For our Guideline approach

[274] Houston Kemp, *Response to the draft decision on the return on debt allowance*, January 2015, p. 4; NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 10.

- Several service providers and CEG (commissioned by several service providers) recommended a BBB credit rating.[275]
- Lally (commissioned by us) and the South Australian Centre for Economic Studies (SACES) recommended a credit rating for energy networks of BBB to BBB+.[276]

In contrast, consumer groups generally submitted the benchmark credit rating of BBB+ was too low. For instance:

- The Chamber of Commerce and Industry Queensland (CCIQ) and Energy Consumers Coalition of South Australia (ECCSA) submitted that credit ratings of BBB and BBB+ are too low.[277] ECCSA specifically noted this was the case given benchmark firms' gearing levels.[278]
- The Victorian Energy Consumer and User Alliance (VECUA) referred to an analysis by the Energy Users Rule Change Committee (EURCC) in 2011 to support their view that we should recognise or have regard to service providers' actual credit ratings.[279] VECUA submitted that we provide higher debt allowances than appropriate by basing these on credit ratings that are lower than service providers' actual credit ratings.[280] Further, VECUA also submitted that by using debt in a broad BBB band to estimate the allowed return on debt, the debt allowance we provide is predominantly based on more expensive debt ratings.[281] We note that several service providers disagreed with this submission.[282]

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[275] ActewAGL, *Revised regulatory proposal*, January 2015, pp. 431–432; Ausgrid, *Revised regulatory proposal and preliminary submission,* January 2015, pp. 70–71; AusNet Services, *Draft decisions NSW/ACT electricity distribution determination 2015–19*, February 2015, pp. 11–16; CitiPower/Powercor, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015;Endeavour Energy, *Revised regulatory proposal*, January 2015, pp. 104–105, Ergon Energy, *Appendix C: Rate of return, Regulatory proposal*, October 2014, p. 123;Essential Energy, *Revised regulatory proposal*, January 2015, p. 230; JGN, *Access arrangement: Response to the AER's draft decision and revised proposal, Appendix 7.10 — Return on debt response*, February 2015, pp. 6–10; SAPN, *Regulatory proposal 2015–20*, October 2014, p. 305; United Energy, *Submission in relation to the first round of regulatory determinations under the new rules*, February 2015. CEG, *WACC estimates*, May 2014, p. 64; CEG, *Memorandum: Factors relevant to estimating a trailing average cost of debt*, 24 May 2014, pp. 12–15.

[276] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 28–3; SACES, *Independent estimates of the WACC for SAPN: Report commissioned by the SACOSS*, January 2015, pp. 13–14.

[277] CCIQ, *Submission to the Australian Energy Regulator on Energex's regulatory proposal for the 2015-20 revenue determination*, January 2015; ECCSA, *AER review of SAPN application 2014: ECCSA response to AER's preliminary decision*, June 2015.

[278] ECCSA, A response to the AER draft decision on AGN's AA2016 revenue reset, February 2016, p. 34.

[279] ECCSA, *AER review of SAPN application 2014: ECCSA response to AER's preliminary decision*, June 2015.

[280] VECUA, *Submission to the AER: Victorian Distribution Networks' 2016-20 revenue proposals*, January 2016.

[281] Victorian Energy Consumer and User Alliance (VECUA), *Submission to the AER - AER Preliminary 2016-20 Revenue Determinations for the Victorian DNSPs*, January 2016, p. 18.

[282] ActewAGL, AusNet Services and United Energy disagreed that our use of a broad BBB curve to estimate the return on debt was conservative in their favour. See ActewAGL Distribution, *Attachment 3: Response to submission made to the AER by the VECUA dated 6 January 2016*, p. 4; AusNet Services, *Response to submissions on the Victorian EDPR preliminary decision (2016–20)*, 4 February 2016, pp. 22–7; United Energy, *Submission to the AER's preliminary determination for United Energy (for 2016–20)*, 4 February 2016, pp. 4–9.

- A CCP member submitted that we should account for the difference between service providers actual cost of debt and the BBB benchmark so the allowance better reflects service providers' actual debt costs.[283]

We are satisfied that a benchmark efficient entity would have a BBB+ credit rating. We formed this view, as well as our view on the benchmark term of issuance, from considering a set of firms that we consider com parable to a benchmark efficient entity.[284] Our analysis is detailed in the subsections below. We consider this is more consistent with incentive regulation than basing our allowance for individual service providers on their actual credit ratings or actual historical costs of debt.

Comparator set

We draw our comparator set for estimating the benchmark credit rating from Standard and Poor's industry report cards, with the exclusion of the Queensland state government-owned Ergon Energy Corp Ltd. This is made up of the following businesses:

- APT Pipelines Ltd
- ATCO Gas Australian LP
- DBNGP Trust
- DUET Group
- ElectraNet Pty Ltd
- Energy Partnership (Gas) Pty Ltd
- Australian Gas Networks Ltd— previously Envestra Ltd
- ETSA Utilities
- Powercor Australia LLC
- AusNet Services — previously SP AusNet Group
- SGSP — previously SPI (Australia) Assets Pty Ltd
- The CitiPower Trust
- United Energy Distribution Pty Ltd
- Victoria Power Networks Pty Ltd[285]

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[283] CCP (Bruce Mountain), *Comments on the AER's Preliminary Decision on the Weighted Average Cost of Capital (WACC) for Energex, Ergon and SA Power Networks,* July 2015, p. 8.

[284] See, for example, AER, *Explanatory statement: Rate of return guideline*, December 2013, pp. 152–157; AER, *Explanatory statement: Rate of return guideline (appendixes)*, December 2013, pp. 126–130.

[285] Powercor Australia LLC and the CitiPower Trust now raise debt under a common funding vehicle, Victoria Power Networks (Finance) Pty Ltd. As such, from 2015, the CitiPower Trust and Powercor Australia LLC fall out of our sample and Victorian Power Networks Pty Ltd is added. See Spark Infrastructure, *Victoria Power Networks announces new joint funding vehicle for CitiPower and Powercor*, 2 November 2015, see http://www.asx.com.au/asxpdf/20151102/pdf/432p758z1zn56z.pdf.

Accordingly, our preferred approach is to include the full sample of privately owned (that is, non-Australian government owned) energy network service providers, while recognising the strengths and limitations of this approach. However, whether applying all or none of the potential exclusion criteria, we would likely maintain a BBB+ benchmark credit rating.

Current industry mean

Consistent with the Guideline explanatory statement, we have had regard to empirical evidence in applying a benchmark credit rating of BBB+.[286] We also have regard to variability in the median credit rating throughout time. This recognises that while shorter term data is more likely to reflect current expectations, longer term data may reduce the influence on the median from firm specific or idiosyncratic factors.

Table 3-6sets out the median credit rating over historical periods of progressively longer length. While Table 3-6 shows some support for a credit rating of BBB, we consider it shows stronger support for a credit rating of BBB+.

We also note that this estimate entails taking the median from the yearly medians. We could also take the median of all credit rating observations over these time periods. This gives BBB+ for the five most recent periods, BBB/BBB+ for the period 2010–2015 and BBB for the longer averaging periods (2006–2015 to 2009–15). Both median of yearly medians and median of all observations show stronger support for a BBB+ benchmark credit rating. Similarly, having considered our presentation of this data in recent determinations, the Tribunal observed that the more recent years firmly point towards a BBB+ credit rating for the benchmark efficient entity.[287]

Table 3-6 Median credit rating—Comparator set of firms

Time period	Median credit rating	Time period	Median credit rating
2015	BBB+	2010–2015	BBB/BBB+
2014–2015	BBB+	2009–2015	BBB
2013–2015	BBB+	2008–2015	BBB/BBB+
2012–2015	BBB/BBB+	2007–2015	BBB/BBB+
2011–2015	BBB/BBB+	2006–2015	BBB/BBB+

Source: Bloomberg (S&P), AER analysis.

For further detail, Table 3-7 sets out the median credit ratings across our comparator set since the 2006 calendar year end.

[286] AER, *Better regulation—Explanatory statement to the rate of return guideline*, December 2013, p. 156.

[287] Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 993.

Table 3-7 Credit ratings of network service providers over time

Issuer	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
APT Pipelines Ltd	NR	NR	NR	BBB	BBB	BBB	BBB	BBB	BBB	BBB
ATCO Gas Australian LP	NR	NR	NR	NR	NR	BBB	BBB	A-	A-	A-
DBNGP Trust	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
DUET Group	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	NR	NR	NR
ElectraNet Pty Ltd	BBB+	BBB+	BBB+	BBB	BBB	BBB	BBB	BBB	BBB+	BBB+
Energy Partnership (Gas) Pty Ltd	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
Australian Gas Networks Ltd	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB	BBB+	BBB+
ETSA Utilities	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
Powercor Australia LLC	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	NR
AusNet Services	A	A	A-	A-	A-	A-	A-	A-	A-	A-
SGSP Australia Assets Pty Ltd	NR	NR	A-	A-	A-	A-	A-	BBB+	BBB+	BBB+
The CitiPower Trust	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	NR
United Energy Distribution Pty Ltd	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB
Victoria Power Networks Pty Ltd	NR	NR	NR	NR	NR	NR	NR	NR	NR	BBB+
Median (year)	BBB/ BBB+	BBB/ BBB+	BBB+	BBB	BBB	BBB	BBB	BBB/ BBB+	BBB+	BBB+

Source: Bloomberg, Standard and Poor's, AER analysis.

Use of independent third party data series

Our decision is to estimate the return on debt by reference to independent third party data series. Using third party data series is the same approach we proposed in the Guideline.[288] It is also consistent with TasNetworks' regulatory proposal.[289]

[288] AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 126–130.

[289] TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

The CCP and several other consumer groups have raised our use of third party data service providers as an issue in several recent regulatory processes. For instance, the CCP recommended using service providers' actual borrowing costs as a reasonableness check and/or using an industry index based on actual borrowing costs.[290]

We are satisfied that using a third party data series (or multiple series), appropriately chosen, is commensurate with the efficient debt financing costs of a benchmark efficient entity. It is also consistent with the rule requirement that the change in revenue (resulting from the annual debt update) is effected through the automatic application of a formula that is specified in the revenue determination.[291] This is because:

- A third party data series can be practically applied in the annual debt update process—We discuss this point further below.
- A third party data series is independent information developed by finance experts with access to financial datasets—These experts develop this independently from the regulatory process and for the use of market practitioners.
- Using a third party data series also reduces the scope for debate on debt instrument selection and curve fitting—For instance, independent data service providers have already exercised their judgement on bond selection, curve fitting and adjusting yields. However, we still must exercise our regulatory judgement to assess which third party data series (or combination of series) is better suited for contributing to the achievement of the ARORO.
- There is no consensus among Australian regulators on the best method to estimate the return on debt—Some regulators use independent third party data series while others use their own data series (with or without it being cross checked against a third party data series).[292] The Tribunal has found both approaches reasonable.[293]

We explain our first reason listed above in more detail here. The rules require that if we apply annual updating (or any other approach that could result in a different return on debt each year), then the change in revenue must be effected through the automatic

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290 CCP, *Smelling the roses and escaping the rabbit holes: the value of looking at actual outcomes in deciding WACC*, July 2014, pp. 4, 12.

291 NER, cl. 6A.6.2(l).

292 IPART has switched from having its own approach to using an independent data service provider (the RBA). The ERA has developed its own bond yield approach and the QCA engaged PwC to develop its own econometrically derived approach (and combines this with using a third party data series as a cross check). The ESCV and ESCOSA have been using an independent data service provider (Bloomberg). See IPART, *New approach to estimating the costs of debt: use of the RBA's corporate credit spreads*, February 2014; QCA, *Final decision: Cost of debt estimation methodology*, August 2014, p. ii; ESC, *Price review 2013: Greater metropolitan water businesses - Final decision*, June 2013, p. 108; ESCOSA, *SA Water's water and sewerage revenues 2013/14-2015/16: Final determination statement of* reasons, May 2013, p. 140.

293 The Tribunal largely upheld the ERA's own bond-yield approach. See Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, Para 620. Similarly, the Tribunal has endorsed proposals to rely on an independent data service provider alone. See Australian Competition Tribunal, *Application by United Energy Distribution Pty Limited [2012] ACompT 1*, 6 January 2012, para 462.

application of a formula that is specified in the revenue determination.[294] Even if this were not a rule requirement, we consider using a third party data series is likely to be the only practical option to update the return on debt annually. This position is supported by NERA (commissioned by TransGrid in a recent decision process), who advised that:

> …a third party data service provider is essential to allow the return on debt to be updated automatically'.[295]

Alternatives, such as calculating and implementing our own data series, would likely require us to apply a greater element of judgement and involve far greater complexity of calculations. For example, we may need to exercise judgement over whether we should exclude certain bonds as outliers. Consultation on these matters, particularly given the complexity of calculations, would be impractical to achieve during the annual debt update process. The annual debt update we propose is set out below after the section on the averaging period. This process needs to occur relatively quickly and without consultation. Using a third party data series enables this. This is because we can consult on the choice of the data series and any implementation issues (for example, weighting of data series, extrapolation, or interpolation issues) when making the revenue determination. We can then add a formula to the determination and apply it mechanistically during the annual debt update process.

Choice of third party data series (including adjustments)

In the previous section, we explained our draft decision is to use third party published data series to estimate the allowed return on debt, rather than deriving our own data series. In this section, we explain our choice of third party data series, including adjustments we have decided to make to those data series.

Our draft decision is to adopt a simple average of the debt data series published by the RBA and Bloomberg that match, as close as available, our benchmarks of a BBB+ credit rating and a 10 year debt term. Specifically, in estimating the prevailing return on debt in each year (specified as $_{a}R_{a+10}$ in the next section below) we adopt a simple average of:

- the 10 year estimate from the non-financial corporate BBB rated data series published by the RBA (the RBA curve),[296] and
- the 10 year yield estimate from the Australian corporate BBB rated Bloomberg Valuation Service (BVAL) data series published by Bloomberg (the BVAL curve).[297]

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294 NER, cl. 6A.6.2(l).

295 NERA, *Return on capital of a regulated electricity network: A report for Ashurst*, May 2014, p. 10.

296 The RBA data series is available on the RBA's website in Statistical Table F3: http://www.rba.gov.au/statistics/tables/index.html#interest-rates

297 The BVAL data series is available through a licence service from Bloomberg under the code 'BVCSAB10 index'. As of 14 April 2015, Bloomberg had revised its methodology for the BVAL curve and had recommenced publishing a 10 year yield estimate.

The RBA and BVAL curves are both 'broad BBB' rated data series in that they reflect bond pricing generally across the BBB+, BBB and BBB- rated spectrum of bonds. CCP members Hugh Grant and David Headberry submitted that this use of broad BBB rated data ' is providing significantly higher return on debt allowances than appropriate'.[298] However, the CCP members' did not set out how it determined the counterfactual appropriate return on debt, or an alternative data series that would be more appropriate. We acknowledge that the available data series does not precisely match our benchmark credit rating, but consider that the use of broad BBB rated data remains appropriate for practical purposes and that the resulting return on debt estimates are likely to achieve the ARORO.

Our draft decision is also to make certain adjustments to the RBA and BVAL curves so these rates are consistent with our 10 year benchmark debt term and also so they can be applied across the dates of TasNetworks' averaging periods. Those adjustments are:

- For the RBA curve, to extrapolate the data series from a 'target' 10 year term to an 'effective' 10 year term using the method recommended by Dr Lally (the Lally method),[299] to interpolate the monthly data points to produce daily estimates, and to convert the estimates from a semi-annual to an effective annual rate.
- For the BVAL curve, to convert the estimates from a semi-annual to an effective annual rate[300] and, depending on the maximum term published at the time:
    - where it is available, use the 10 year estimate[301] without further adjustment
    - where the 7 year estimate is available and the 10 year estimate is not available, extrapolate the 7 year estimate to a 10 year term using the 7–10 year margin from the RBA curve

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298 CCP (Hugh Grant and David Headberry), S*ubmission to the AER, Powerlink Queensland 2018-22 revenue proposal*, 20 June 2016, p. 46.

299 While the RBA publishes an estimate for a 10 year 'target' term, the 'effective' term of the RBA's estimate is commonly less than 10 years, and so requires extrapolation to produce a 10 year term. This is because the RBA's method involves weighting bonds with less weight placed on bonds the further the term to maturity of the bond is from the 10 year target term. There are commonly more bonds with terms to maturity of less than 10 years than there are bonds with terms to maturity greater of than 10 years. As a result, the RBA's methodology places greater weight on the collective pool of bonds with terms of less than 10 years, which results in the 'effective' (or average) term being less than the 10 year 'target' term of the RBA curve: see ACCC Regulatory Economic Unit, *Return on debt estimation: A review of the alternative third party data series*, August 2014, pages 34–40. The Lally method of extrapolation is set out in Lally, *Implementation issues for the cost of debt*, 20 November 2014, pp. 38–44.

300 As of 14 April 2015, Bloomberg revised its methodology for the BVAL curve and has recommenced publishing a 10 year yield estimate. In the current round of decisions, only Energex and Ergon Energy have averaging periods which commenced before 14 April 2015. Before 14 April 2015, the longest tenor estimate published by Bloomberg was either 5 or 7 years, depending on the dates, and therefore required extrapolation to produce a 10 year estimate. Accordingly, for Energex and Ergon Energy we have also applied an extrapolation adjustment to the Bloomberg data before 14 April 2015.

301 As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate.

- where the 5 year estimate is available and neither the 10 year nor the 7 year estimates are available, extrapolate the 5 year estimate to a 10 year term using the 5–10 year margin from the RBA curve.

For both the RBA and BVAL estimates, we then calculate a simple average of the daily estimates over the averaging periods determined in the 'averaging periods' section below.

We do not estimate the allowed return on debt in this draft decision by reference to the 10 year yield curve published by Thomson Reuters (the Reuters curve). While TasNetworks has not proposed we adopt the Thomson Reuters curve, other service providers have recently proposed this as a source of data for estimating the allowed return on debt. Nonetheless, we do not rule out including the Reuters curve in future determinations following a proper period of consultation. We discuss the Reuters curve in section I.1 of attachment 3 to our draft decision on AusNet Services' 2017–22 transmission determination, and this analysis remains relevant. [302]

The above positions are consistent with the approach we adopted in the first round of decisions since the publication of the Guideline, the most recent being our decisions released in May 2016.[303]

We are satisfied that a simple average of the two curves will result in a return on debt that contributes to the achievement of the ARORO. This is because:

- Based on analysis of the bond selection criteria (including the approach for identifying outliers), we consider that both approaches employed by the RBA and Bloomberg have their unique differences, but we are not satisfied that either is clearly superior.
- Based on analysis of the curve fitting (or averaging) methodologies, we consider that both approaches have their unique differences, but we are not satisfied that either is clearly superior.
- Both curves require adjustments from their published form to make them fit-for-purpose, and we are not satisfied that either can be more simply or reliably adjusted to estimate the annual return on debt.[304]
- A simple average is consistent with expert advice from Dr Lally that we adopt a simple average of the BVAL curve and the RBA curve, subject to the necessary

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[302] We did not reach a definitive view on whether use of the Thomson Reuters curve would contribute to an estimate that achieves the ARORO. However, we considered the impact of including or excluding the Thomson Reuters curve appeared to be of limited materiality except over a historical period of two months.

[303] See for example, AER, *Final decision: CitiPower distribution determination 2016 to 2020, Attachment 3—Rate of return*, May 2016, p. 353.

[304] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate. Therefore, in applying this curve it only requires an adjustment to convert it into an effective annual rate, as set out in the formula for automatic application. However, the RBA curve requires several adjustments from its published form.

adjustments to each curve. [305] In particular, Lally concluded that based on analysis of the curves, it was reasonably likely that a simple average of the two curves would produce an estimator with a lower mean squared error (MSE) than using either curve in isolation. Lally also advised:

> …on the question of which index better reflects the cost of debt for the efficient benchmark entity, there is no clear winner.[306]

- The two curves have regularly produced materially different results at particular points in time. Both curves have their strengths and shortcomings, but it is not clear to us that one approach is clearly superior. Consequently, when the curves depart, we consider it is not easily discernible which curve produces estimates that better reflect the efficient financing costs of a benchmark efficient entity. We also note that the BVAL curve has produced estimates both higher than, lower than, and similar to, the RBA curve, depending on the particular point in time. So there is no clear indication that one curve produces systematically higher or lower estimates than the other.
- A simple average of two curves, in these circumstances, is consistent with the Tribunal's decision in the ActewAGL matter where the Tribunal concluded that:

> …if the AER cannot find a basis upon which to distinguish between the published curves, it is appropriate to average the yields provided by each curve, so long as the published curves are widely used and market respected.[307]

- A simple average of the two curves will reduce the likely price shock if either curve becomes unavailable or produces erroneous estimates during the period.

In our previous decisions, we have explained each of these reasons in more detail.[308] This analysis included the following evidence.

Dr Lally used the report of the Regulatory Economic Unit[309] to identify 11 points of distinction between the RBA and BVAL curves. Lally analysed each of those differences and concluded: [310]

> In summary, eleven points of distinction have been identified between the BVAL and RBA indexes. Point (11) is irrelevant in view of the AER not requiring

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305 Lally, *Implementation issues for the cost of debt*, 20 November 2014, p. 3; Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, 5.

306 Lally, *Implementation issues for the cost of debt*, 20 November 2014, p. 5.

307 In this decision, the issue before the Tribunal was the choice between the Bloomberg fair value curve (BFVC) and the CBASpectrum curve, neither of which are currently published. See: *Application by ActewAGL Distribution [2010] ACompT4*, 17 September 2010, paragraph 78.

308 For example, see AER, *Draft decision—JGN access arrangement 2015-20—Attachment 3—Rate of return*, November 2014, pp. 3-134 to 3-158, 3-301 to 3-308.

309 Regulatory Economic Unit, *Return on Debt Estimation: A Review of the Alternative Third Party Data Series*, report prepared for the AER (www.aer.gov.au).

310 Lally, *Implementation issues for the cost of debt*, 20 November 2014, p. 19.

> historical data. In respect of points (3), (4), (6), (7) and (8), it is not possible to express a preference for one of the two indexes. The BVAL is favoured in respect of points (1) and (9), but the advantage in respect of point (9) is small. The RBA is favoured in respect of points (2), (5) and (10), but the advantage in respect of point (5) is small. The most that can be said here is that neither index is clearly superior to the other.

Based on this analysis, Lally recommended using a simple average of the two curves. Lally advised: [311]

> Firstly, on the question of which independent third-party data service provider should be used to estimate the cost of debt … I … recommend that a combined estimator be used. Since the standard deviations of these estimators are similar and it is not possible to quantify any biases in these two indexes, I recommend that the two indexes be equally weighted. This will lower the Mean Squared Error (MSE) of the estimator relative to using only one of the indexes, and significantly so if the correlation between the indexes is low.

Those 11 points of distinction, and Lally's assessment of those differences between the RBA and BVAL curves, are summarised in the following table.

Table 3-8 Dr Lally's advice of the differences between the RBA and BVAL curves

No.	Points of distinction identified by REU[312]	Advice from Dr Lally[313]
1	The BVAL is available daily whilst the RBA is only available monthly.	BVAL favoured.
2	The BVAL is only available for terms up to seven years, and therefore would have to be extrapolated out to the desired ten years, whilst the RBA is at least notionally available for the desired ten year term.	RBA favoured. *Note: From April 2015, this point would have changed to "BVAL favoured" as Bloomberg commenced publication of a 10 year BVAL curve, which no longer requires any extrapolation adjustment.*
3	The BVAL sample of bonds is limited to those with a minimum pricing quality (liquidity measure), at least two months to maturity, and above retail size ($10m: see REU, 2014, page 20), whilst the RBA sample is limited to bond issues of at least $100mAUD and at least one year to maturity.	Not possible to express preference for one over the other.
4	The BVAL sample does not exclude financial corporations whilst the RBA's does.	Not possible to express preference for one over the other.

311 Lally, *Implementation issues for the cost of debt*, 20 November 2014, p. 3.

312 Identified by REU, *Return on debt estimation: A review of the alternative third party data series: Report for the AER*, August 2014; and summarised by Lally, *Implementation issues with the cost of debt*, November 2014, pp. 7–8.

313 Set out by Lally, *Implementation issues with the cost of debt*, November 2014, pp. 8 to 19, and summarised on p. 19.

No.	Points of distinction identified by REU[312]	Advice from Dr Lally[313]
5	The BVAL sample is limited to unsecured bonds whilst the RBA's sample includes both secured and unsecured bonds.	RBA favoured, but advantage is small.
6	The BVAL sample is limited to bonds rated by either S&P or Moody's, whilst the RBA sample is limited to bonds rated by S&P or issued by a firm with an S&P rating.	Not possible to express preference for one over the other.
7	The BVAL sample is limited to AUD denominated bonds whilst the RBA sample also includes USD and Euro denominated bonds.	Not possible to express preference for one over the other.
8	The BVAL sample excludes bonds with call, put and conversion options, whilst the RBA sample does not exclude them.	Not possible to express preference for one over the other.
9	The BVAL methodology involves a par yield curve whilst the RBA's does not.	BVAL favoured, but advantage is small.
10	The BVAL methodology for curve fitting is (in large part) not disclosed whilst the RBA's methodology is disclosed.	RBA favoured.
11	The BVAL is only available back to February 2011 (continuously) whilst the RBA is available back to January 2005, and therefore there will be more problems obtaining a ten-year trailing average when using the BVAL.	Not relevant, as AER does not require historical data.

Source: Advice from Dr Lally.[314]

In our previous decisions, we explained each of these reasons in more detail.[315]

Recently, the Tribunal also upheld this approach, in relation to the NSW/ACT electricity distribution determinations and JGN gas access arrangement.

The Tribunal was satisfied that our approach of adopting a simple average of the information from both the RBA and Bloomberg data services in those reviews was appropriate, stating:[316]

> The AER had a choice to make as to what data services, or combination of data services, it should use. Its reasons for selecting the combination of data services are cogent, and reasonable. It is not shown to have misunderstood or overlooked material information. Although there are facts underlying the choice of the AER, the Tribunal is not persuaded of any particular material factual finding which is different from those made by the AER.

Similarly, in relation to the choice of a BBB+ credit rating, the Tribunal noted:[317]

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[314] Lally, *Implementation issues for the cost of debt*, 20 November 2014.

[315] For example, see AER, *Draft decision—JGN access arrangement 2015-20—Attachment 3—Rate of return*, November 2014, pp. 3-134 to 3-158, 3-301 to 3-308.

[316] [2016] ACompT 1, para 983.

[317] [2016] ACompT 1, para 993.

> The Tribunal is not satisfied that the AER's relevant Final Decisions on this topic disclose a ground of review. In the Final Decisions … is a table analysing the median credit ratings over time. The table itself is not apparently inaccurate. The more recent years point firmly towards a BBB+ credit rating for the BEE. The Tribunal does not consider that it was either factually wrong, or a wrong exercise of the discretion, to have regard to that material for the purpose of identifying the characteristics of the BEE.

Indeed, the Tribunal went further, noting that even if it was wrong in these findings, it would not be persuaded that it was materially preferable and in the long term interests of consumers to adopt a different approach to that adopted by the AER, noting:[318]

> In any event, the Tribunal would not take the step of being satisfied, in either respect, that to vary or set aside the relevant Final Decision would, or would be likely to, result in a materially preferable NEO decision under s 71P(2a)(c).While some aspects of the Tribunal's decision have been challenged in the Full Federal Court, this aspect of the Tribunal's decision has not been challenged by any party.

We have assessed new information recently received in regulatory proposals from service providers who recommend that we depart from our previous position of adopting a simple average of the RBA and BVAL curves. We consider that this new information does not persuade us to depart from our position or reasons from recent decisions. We explain our reasoning in sections I.1, I.2, and I.3 of attachment 3 to our draft decision on AusNet Services 2017–22 transmission determination, and they remain relevant.

We also requested Dr Lally review the recommendations from his previous report in light of the material submitted by service providers with current proposals. As part of that analysis, we requested Dr Lally review both our approach and the various approaches proposed by service providers proposals at that time against a set of criteria drawn from the requirements of the law and the rules, including the ARORO. After reviewing that material, Dr Lally concluded:

> …the AER's proposed approach satisfies the criteria and these criteria are not satisfied by any other proposed approach.
>
> Finally, I have previously provided advice on these implementation issues to the AER and nothing in these submissions warrants any change in that advice.[319]

In its regulatory proposal, TasNetworks' return on debt estimate is based on a simple average of the estimates from Bloomberg's BVAL and the RBA's series. We accept this approach and note that it is consistent with our recent determinations.[320]

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[318] [2016] ACompT 1, para 985.

[319] Lally, *Review of submissions on implementation issues for the cost of debt*, 18 October 2015, p. 5.

In a concurrent regulatory determination process, Powerlink requested Queensland Treasury Corporation's (QTC's) advice on how to estimate the 10-year benchmark debt yield to be used in its regulatory proposal.[321] QTC's advice recommended:[322]

- The RBA's non-financial yields are appropriate for the purposes of estimating the benchmark debt yield to determine Powerlink's allowed return on debt.
- If the BVAL margin is maintained to a level that is consistent with QTC's credit margin survey data and our past extrapolations, it would be appropriate to give equal weight to the RBA and Bloomberg estimates. Otherwise, sole reliance should be placed on the RBA estimates. QTC advice does not discuss the probability of the maintenance of the BVAL margin.

QTC's advice was based on the following observations:[323]

- The AER previously used a 'paired bond' method (to extrapolate the 7-year BVAL margin to swap to a 10-year tenor). This method typically resulted in a margin of about 0.3 per cent being added to the 7-year BVAL margin, which is consistent with the results from QTC's credit margin survey.
- Compared to QTC's SRP survey data, the difference between the 7-year and 10-year BVAL margins to swap up to November 2015 is too small.
- From November 2015 the BVAL BBB swap spread has widened significantly and it is more in line with survey data.
- Based on current observations it is appropriate to consider giving equal weight to the RBA and Bloomberg estimates. QTC will continue to monitor the BVAL performance going forward.

We are not satisfied that analysis of comparative movements of yield estimates can robustly demonstrate that either curve clearly better reflects the costs faced by a benchmark efficient entity. More generally, we are not persuaded that time-series or cross-sectional comparisons between curve outputs are reliable or consistent ways to determine which curve produces a result that is most consistent with benchmark efficient costs.

Different market experts may come to different views about the best approaches to estimating yield curves. For example, Bloomberg, the RBA and Thompson Reuters appear all to adopt distinct bond selection criteria and distinct curve fitting methodologies. We have assessed the RBA and BVAL curves through a detailed

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320 For example: AusNet Services, *Transmission Revenue Review 2017–2022 regulatory proposal*, 30 October 2015; AusNet Services, *Revised regulatory proposal*, 6 January 2016; United Energy, *United Energy's revised regulatory proposal—nominated debt averaging periods (Confidential)*, 6 January 2016; United Energy, *Revised regulatory proposal*, 6 January 2016; JEN, *Revised regulatory proposal—Attachment 6-1: Rate of return, gamma, forecast inflation, and debt and equity raising costs*, January 2016.

321 Powerlink, *2018-22 Powerlink Queensland Revenue Proposal - Appendix 9.02*, January 2016 p. 163 -164.

322 Powerlink, *2018-22 Powerlink Queensland Revenue Proposal - Appendix 9.02*, January 2016 p. 164.

323 Powerlink, *2018-22 Powerlink Queensland Revenue Proposal - Appendix 9.02*, January 2016 p. 163.

analysis of their underlying technical characteristics, including analysis from expert consultants.[324] Our analysis and expert advice supported a conclusion that both curves had strengths and weaknesses, but that neither was clearly superior. Therefore, we do not agree that it is robust or informative to compare the outputs of the two curves against each other.

Nonetheless, to the extent that these comparisons are informative, we are not persuaded that a comparison of the Bloomberg and RBA curves suggest anomalous performance of either curve. While the curves produce materially different results at specific points in time, they appear to have consistently reflected the same underlying debt market movements.

Further, the approach we adopt must produce annual estimates each year over the five year period that will achieve the allowed rate of return objective, while being effected through a formula specified up front in our regulatory determination.[325] We have therefore adopted an approach that we are currently satisfied will contribute to estimates that will, across the regulatory period, achieve the allowed rate of return objective.

Formula for calculating the trailing average return on debt

Below we specify the allowed return on debt formulae for each year of the 10 year transition path. In each formula:

- ${}_{a}R_{a+10}$ corresponds to the estimated return on debt that was entered into in year a and matures in year a+10, which is to be calculated using the return on debt implementation methodology outlined in the remainder this section and using TasNetworks' return on debt averaging periods specified in confidential appendix D.
- ${}_{b}kd_{b+1}$ refers to the allowed return on debt for regulatory year b+1.

In the first regulatory year of transitioning to the trailing average approach (2017), the allowed rate of return on debt will be based on the estimated prevailing rate of return on debt for that year (similar to the 'on the day' approach):

$${}_{0}kd_{1} = {}_{0}R_{10}$$

In the second regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first and second regulatory years of the transitional period:

$${}_{1}kd_{2} = 0.9 \cdot {}_{0}R_{10} + 0.1 \cdot {}_{1}R_{11}$$

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[324] See for example: AER, *Ausgrid distribution determination: Draft Decision—Attachment 3: Rate of return*, pp. 135–150; Lally, *Implementation issues for the cost of debt*, November 2014; ACCC Regulatory Economics Unit, *Return on debt estimation: A review of the alternative third party data series*, August 2014; Lally, *Review of submissions on implementation issues for cost of deb*t, October 2015.

[325] NER, cl. 6A.6.2(l).

In the third regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first, second, and third regulatory years of the transitional period:

$$_2kd_3 = 0.8 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12}$$

In the fourth regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first, second, third and fourth regulatory years of the transitional period:

$$_3kd_4 = 0.7 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13}$$

In the fifth regulatory year, the allowed rate of return on debt will be the weighted average of the prevailing rates in the first, second, third, fourth and fifth regulatory years of the transitional period:

$$_4kd_5 = 0.6 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13} + 0.1 \cdot {}_4R_{14}$$

The calculation for all subsequent regulatory years until the transitional period is completed is set out below:

$$_5kd_6 = 0.5 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13} + 0.1 \cdot {}_4R_{14} + 0.1 \cdot {}_5R_{15}$$

$$_6kd_7 = 0.4 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13} + 0.1 \cdot {}_4R_{14} + 0.1 \cdot {}_5R_{15} + 0.1 \cdot {}_6R_{16}$$

$$_7kd_8 = 0.3 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13} + 0.1 \cdot {}_4R_{14} + 0.1 \cdot {}_5R_{15} + 0.1 \cdot {}_6R_{16} + 0.1 \cdot {}_7R_{17}$$

$$_8kd_9 = 0.2 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13} + 0.1 \cdot {}_4R_{14} + 0.1 \cdot {}_5R_{15} + 0.1 \cdot {}_6R_{16} + 0.1 \cdot {}_7R_{17} + 0.1 \cdot {}_8R_{18}$$

$$_9kd_{10} = 0.1 \cdot {}_0R_{10} + 0.1 \cdot {}_1R_{11} + 0.1 \cdot {}_2R_{12} + 0.1 \cdot {}_3R_{13} + 0.1 \cdot {}_4R_{14} + 0.1 \cdot {}_5R_{15} + 0.1 \cdot {}_6R_{16} + 0.1 \cdot {}_7R_{17} + 0.1 \cdot {}_8R_{18} + 0.1 \cdot {}_9R_{19}$$

Extrapolation and interpolation

We will likely need to make the following adjustments to data from third party data series:

- Extrapolation—where we need to extend a curve beyond the observed or published range. For example, before April 2015, Bloomberg publishes its BVAL curve to a maximum term of 7 years, whereas we require an estimate for a 10 year term.
- Interpolation—where we need a value for which there is no published estimate but it lies between two published estimates. For example, the RBA only publishes its curve estimates for one day each month, but we require estimates for each business day.

We maintain our same approach in regards to extrapolation and interpolation issues as set out in our recent decisions.[326] Specifically, we will make the following adjustments as set out in Table 3-9 and Table 3-10.

Table 3-9 Adjustments to the RBA curve

Adjustment type	Amendment made?	Comments
Interpolation to construct daily estimates	Yes	The RBA curve only provides an estimate for one business day at the end of each month. In our experience, averaging periods commonly start and/or end on dates during the month. We will address this issue by linearly interpolating between month end values where possible. While we are satisfied that interpolation over business days is also reasonable, we will interpolate over all days because: • this is consistent with our widely accepted approach to interpolate estimates of the risk free rate using Australian government securities • interpolating over all days is simpler to implement • it is impractical to interpolate over business days for estimating the risk free rate, as this would require calculations relative to specific trading days 10 years in advance • the difference to the estimates between interpolating over business days or interpolating over all days is immaterial.[327] Where this is not practical due to timing, we will hold the last available RBA monthly estimate constant until the end of the averaging period. It would not be practical to linearly interpolate between two RBA monthly estimates where the allowed return on debt must be estimated and incorporated into the annual debt update process before the publication of the next RBA monthly estimate after the end of the averaging period. Our draft decision on the annual debt update process is set out in this appendix.
Extrapolation to target term	Yes	The 'effective term' of the RBA bond sample is commonly less than 10 years. For this reason, Lally recommended that the spread component of the yield should be extrapolated from its effective term at publication to the benchmark term (10 years).[328] We agree with Lally's recommendation to extrapolate the spread component of the RBA's published yield in order to match it with the benchmark term of debt. However, we do not agree it is necessary to extrapolate the base component. As identified by the RBA and Lally,[329] the base component of the published 10 year yield already matches the benchmark term of debt. Therefore, extrapolating this component would result be erroneous and lead to overcompensation in most circumstances, where the yield curve is upward sloping.
Conversion to	Yes	The RBA's published methodology does not explicitly specify whether the

[326] For example, see AER, *Final decision: Citipower distribution determination 2016 to 2020, Attachment 3 – Rate of return*, May 2016, pp. 354–6.

[327] For example, the difference between approaches between 2 June 2014 to 30-June 2014 was 22 basis points, which means it would have changed the return on debt by 0.0022 per cent.

[328] Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

[329] See the 'notes' tab in RBA, *Aggregate measures of Australia corporate bond spreads and yields*, available at: http://www.rba.gov.au/statistics/tables/xls/f03hist.xls; Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

Adjustment type	Amendment made?	Comments
effective annual rate		published yields should be interpreted as effective annual rates. Effective annual rates are a consistent basis on which to compare bond rates and imply that the coupon payments compound during the year. We therefore consulted the RBA, who informed us that 'the spreads and yields in F3 can be best thought of as annual rates with semi-annual compounding'.[330] Therefore, this would require conversion into an effective annual rate, using the same approach as is applied to the BVAL yield estimate.

Source: AER analysis.

Table 3-10 Adjustments to the BVAL curve

Adjustment type	Amendment made?	Comments
Interpolation to construct daily estimates	No	Bloomberg publishes daily estimates.
Extrapolation to target term	Depends on maximum term published by Bloomberg	For most of the time that the BVAL curve has been published, it has had a maximum term of 7 years. However, between September 2014 and November 2014, it was published to a maximum 5 year term.[331] In April 2015, Bloomberg revised its methodology for the BVAL curve (BVCSAB10) and it now publishes a 10 year estimate.[332] For the periods where 7 years is the maximum term, we extrapolate the spread component of the 7 year yield estimate to the 10 year target term. We have done so using the margin between the spread components of the extrapolated RBA 7 and 10 year yield estimates, converted to effective annual rates. We add to this extrapolation the difference between the base Australian Government security estimates from 7 to 10 years. That is: BVAL yield 10 years = BVAL yield 7 years + difference in AGS from 7 to 10 years + difference in RBA extrapolated spread to AGS from 7 to 10 years As recommended by Lally,[333] we are satisfied this approach is comparably reliable to the more complex approaches submitted by other stakeholders,[334] but is simpler to implement and based on publicly available data. For the period where 5 years is the maximum term, we extrapolate the spread component of the 5 year yield estimate to the 10 year target term using an analogous methodology to that used to extrapolate from 7 to 10 years. For the period where 10 years is the maximum term, we

330 RBA, *Email in response to: AER follow up question on the basis of YTM quotations in RBA statistical table F3*, 16 October 2014.

331 Specifically, from 15 September 2014 to 3 November 2014.

332 Specifically, 14 April 2015.

333 Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

334 Incenta, *Methodology for extrapolating the debt risk premium*, June 2014, pp. 2–3.

Adjustment type	Amendment made?	Comments
		do not extrapolate the estimate.
Conversion to effective annual rate	Yes	Bloomberg publishes its yield as annual rates with semi-annual compounding. This needs to be converted into an effective annual rate.

Averaging periods

TasNetworks did not propose a placeholder averaging period for the purposes of this draft decision. Accordingly, we have nominated a placeholder return on debt averaging period.[335] We will update this averaging period for the final decision in accordance with the final averaging periods in confidential appendix D.

For use in our final decision, we accept TasNetworks' proposed debt averaging periods for 2017 to 2019.[336] We specify these averaging periods for the 2017 to 2019 regulatory years in confidential Appendix D. This is because our practice is to keep the dates of averaging periods confidential until they have expired.

In the Guideline,[337] we proposed that service providers could nominate averaging periods that satisfy certain conditions, which are set out in Table 3-11. We developed these conditions so that the application of the averaging period contributes to the achievement of the ARORO.[338] We consider that TasNetworks' proposed averaging periods satisfy these conditions.

In general, when assessing service providers' proposed averaging periods, we applied the conditions we proposed in the Guideline, except for one condition that we do not consider is necessary to achieve the ARORO. This condition was that averaging periods should be as close as practical to the commencement of each regulatory year. We remain of the view that the remaining Guideline conditions are important and necessary to promote the ARORO. Those conditions include that at the time the period is nominated all dates in the averaging period must take place in the future, and that all averaging periods should be specified prior to the commencement of the regulatory control or access arrangement period. These conditions, respectively, help to ensure that the return on debt resulting from the averaging period is unbiased and the annual debt update can be practically and automatically applied (as required by the rules).

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335 Being 40 business days ending 29 July 2016.

336 TasNetworks, *Letter from John Sayers Program Leader Revenue Resets TasNetworks to Chris Pattas General Manager AER - Averaging periods to estimate the allowed return on debt,* 23 December 2015.

337 AER, *Rate of return guideline*, December 2013, p. 21.

338 NER, cll. 6.5.2(c) and 6A.6.2(c); NGR, r. 87(3).

Table 3-11 Assessment of proposed averaging periods against our conditions

Condition	Reasons for condition	Condition met?
Observed over a period of 10 or more consecutive business days up to a maximum of 12 months	Averaging daily estimates over a number of days smooths out short term volatility in the annually updated return on debt allowance.	Yes
It should be specified prior to the commencement of the regulatory period.	This allows us to substantively assess the service provider's proposal. This avoids the practical difficulties with either (1) creating a new process for approving averaging period proposals or (2) assessing averaging period proposals during the annual pricing process, which is meant to be a compliance check that takes place over a short time frame.	Yes
At the time it is nominated, all dates in the averaging period must take place in the future.	If a regulated service provider can select an averaging period by looking at historical yields, it may introduce an upward bias.[339]	Yes
An averaging period needs to be specified for each regulatory year within a regulatory period.	This allows for the annual debt update. The annual debt update reduces the potential for a mismatch between the allowed and actual return on debt for the benchmark efficient entity.	Yes
The proposed averaging periods for different regulatory years are not required to be identical but should not overlap.	This avoids double counting averaging periods. This would detract from our specification of the trailing average, which weights periods equally. Not requiring periods to be identical helps preserve confidentiality and provide service providers with a degree of flexibility.	Yes
The nominal return on debt is to be updated annually using the agreed averaging period for the relevant regulatory year.	This prevents a service provider from introducing bias by only updating annually using the agreed averaging period when it is advantageous for it to do so.	Yes
The averaging period should fall within a window of: (a) 25 business days prior to when TasNetworks submits its pricing proposal to us; and (b) 12 months prior to (a)	The timing of submitting a pricing proposal affects how late an averaging period can end and still be implemented in practice. This provides sufficient time for us to calculate (and provide quality assurance checks on) the updated return on debt, revenue and X factor; and for TasNetworks to factor the updated information into its pricing proposal.	Yes
Each agreed averaging period is to be confidential.	This facilitates service providers organising their financing arrangements without market participants being aware of the averaging periods. Accordingly, in practice we keep averaging periods confidential until they expire.	Yes

Source: AER, *Rate of return guideline*, December 2013, pp. 21-22; TasNetworks, *Letter from John Sayers Program Leader Revenue Resets TasNetworks to Chris Pattas General Manager AER - Averaging periods to estimate the allowed return on debt,* 23 December 2015; AER analysis.

In recent regulatory processes, some service providers proposed more complicated approaches to nominating debt averaging periods. Jemena and ActewAGL proposed

[339] Lally, *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

nominating averaging periods each year, rather than nominating periods up front for all years of the regulatory period.[340] Jemena and ActewAGL also proposed a lag of one year in the annual debt update process.[341] Australian Gas Networks proposed separate averaging periods for the base rate and debt risk premium components of the return on debt.[342]

We did not accept these proposals. We were not satisfied that there are benefits from these proposals that outweigh the additional complexity and increased risk of introducing bias. We also considered a sufficiently simple, mechanistic process is required to meet the rules requirement for automatic updating. Our reasons for our decision are in section I.5 of attachment 3 to our draft decision for AusNet Services' 2017–22 transmission determination, and they remain relevant.

We also received submissions from other stakeholders. For example, the CCP members do not support the service providers' proposals to nominate an averaging period for each regulatory year just prior to that regulatory year, rather than at the start of the whole regulatory period. It considers that this increases the complexity and opportunities for regulatory gaming.[343]

Some service providers also proposed departing from the Guideline in relation to nominating averaging periods that are as close as practical to the commencement of each regulatory year in a regulatory period.[344] We consider that relaxing this Guideline condition gives service providers more flexibility in nominating averaging periods without adding significant complexity.

The Guideline approach to estimating the return on debt is significantly different to the previous approach under the old rules. Under the old rules (on-the-day approach), the return on debt was estimated once for the entire regulatory period. Therefore, the return on debt of a service provider was estimated as the prevailing return on debt as close as possible to the start of the regulatory period.[345] The same averaging periods was also used for both return on equity and return on debt. Under this approach, the averaging period should to be as close as practically possible to the commencement of the regulatory period. We continue to hold this position for the return on equity averaging period. However, under the new rules we have proposed and adopted a

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340 JEN, *Revised regulatory proposal—Attachment 6-1: Rate of return, gamma, forecast inflation, and debt and equity raising costs*, January 2016, pp. 36–37; ActewAGL, *Revised access arrangement proposal: Appendix 5.01—Detailed response to rate of return, gamma and inflation*, January 2016, pp. 46–47.

341 JEN, *Revised regulatory proposal—Attachment 6-1: Rate of return, gamma, forecast inflation, and debt and equity raising costs*, January 2016, pp. 36–37; ActewAGL, *Revised access arrangement proposal: Appendix 5.01—Detailed response to rate of return, gamma and inflation*, January 2016, pp. 46–47.

342 AGN, *Revised access arrangement proposal—Attachment 10.2A Response to draft decision: Averaging periods (Confidential)*, 6 January 2016.

343 CCP (David Headberry, Bev Hughson and David Prins), *Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period: Attachment 1*, August 2015, p. 86.

344 AusNet Services, *Transmission Revenue Review 2017–2022 regulatory proposal*, 30 October 2015, p. 275.

345 AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 104.

trailing average approach with annual updates.[346] This estimates the return on debt as a weighted average of the total return on debt over a period (10 years) spanning up to the start of the regulatory period (or regulatory year).[347] Under this approach, we consider it is less important for the debt averaging periods to be as close as practically possible to the commencement of each regulatory year in the regulatory period. This is because the return on debt is updated each year, and because a different (or potentially different) averaging period is now used for the return on equity and return on debt.

Step-by-step guide to calculations

Below we describe the step-by-step processes of calculating:

- the adjusted RBA estimate
- the adjusted BVAL estimate
- the final estimate—where we combine our implementations of the RBA estimate and the BVAL estimate.

These formula steps relate to the approach specified in this decision, and the averaging periods determined in confidential appendix D. In the event that data availability changes during the regulatory period, the formulas below will change to reflect the contingencies set out in the 'Contingencies' section below.

For the purposes of calculating the return on debt, a 'business day' is a day that is not a Saturday or Sunday and not a national or New South Wales public holiday. This is because the independent data service providers (RBA and Bloomberg) do not publish data on national or New South Wales public holidays.

Calculation of the adjusted RBA estimate

1. Download RBA table F3—'Aggregate measures of Australian corporate bond yields' from the RBA website.
2. From this file, download the 7 and 10 year 'Non-financial corporate BBB-rated bonds—Yield' entries for dates:
    a. from the most recent published RBA date prior to the commencement of the relevant averaging period for debt
    b. to the first published RBA date following the conclusion of the relevant averaging period for debt
    c. all published dates between a. and b.

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[346] We have also proposed and adopted a full transition into the trailing average approach. This starts with an on-the-day rate for the first regulatory year and gradually transitions into a trailing average approach over 10 years.

[347] AER, *Explanatory statement to the rate of return guideline*, December 2013, p. 108.

3. Download, from RBA table F16—'Indicative Mid Rates of Australian Government Securities - 2013 to Current', daily yields on Australian Government securities for dates within the relevant averaging period.

4. Linearly interpolate between the two nearest bonds straddling 7 years remaining term to maturity,[348] and the two nearest Australian Government securities (bonds) straddling 10 years remaining term to maturity. This should be done using the following formula:[349]

   yield interpolated = yield lower straddle bond + (yield upper straddle bond - yield lower straddle bond) * (date 10 years from interpolation date - maturity date lower straddle bond) / (maturity date upper straddle bond - maturity date lower straddle bond).

5. Linearly extrapolate the published RBA 10 year yield (from step 2) from its published effective term to an effective term of 10 years using the formula below:[350]

   $yield_{10} = yield_{10\ year\ published} + [(spread\ to\ swap_{10\ year\ published} - spread\ to\ swap_{7\ year\ published})/(effective\ term_{10\ year\ published} - effective\ term_{7\ year\ published})] * (10 - effective\ term_{10\ year\ published})$.

6. Linearly extrapolate the published RBA 7 year yield (from step 2) from its published effective term to an effective term of 7 years using the formula below:[351]

   $yield_{7}$ = $yield_{7}$ year published + [(spread to $swap_{10}$ year published - spread to $swap_{7}$ year published)/(effective $term_{10}$ year published - effective $term_{7}$ year published)] * (7 - effective $term_{7}$ year published).

7. Subtract from the extrapolated 10 year RBA yield on each publication date the interpolated Australian Government security yield on that date. For the 10 year term, use the RBA series as adjusted in step 5. These are the adjusted RBA 10 year spreads.[352]

8. Obtain daily RBA spread estimates by linear interpolation of the adjusted RBA spreads (from steps 5 and 6) for both 7 and 10 year terms between the published dates identified in step 2. Use the adjusted RBA spread estimates as calculated in step 6. This should be done using the following formula:

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[348] That is, the bond with the nearest maturity date that is earlier than 10 years from the interpolation date, and the bond with the nearest maturity date than is later than 10 years from the interpolation date.

[349] This formula relies on the operation in Microsoft Excel. Dates can be subtracted from one another to work out the number of days in between two dates.

[350] As per Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

[351] As per Lally, *Implementation issues for the cost of debt*, November 2014, pp. 38–44.

[352] We have re-calculated the published 'spread to CGS' by subtracting our estimate of the interpolated Australian Government security yield, as calculated in step 4, from the RBA's published yield to maturity. This allows us to combine daily data from Australian Government securities with an estimate of the spread calculated correctly with reference to both the RBA's yield estimate and our estimates from Australian Government securities.

$$spread_{interpolated} = spread_{first\ straddling\ publication\ date} + (date_{interpolation} - date_{first\ straddling\ publication\ date}) * (spread_{second\ straddling\ publication\ date} - spread_{first\ straddling\ publication\ date}) / (date_{second\ straddling\ publication\ date} - date_{first\ straddling\ publication\ date})$$

Note: If the annual return on debt estimate must be finalised before a final published RBA month-end estimate is available, hold the last observed RBA spread constant to the end of the averaging period.

9. Add to these daily spreads (from step 8), daily interpolated estimates of the Australian Government securities (from step 4) for all business days in the relevant averaging period. Specifically:

   a. add the 7 year interpolated Australian Government securities estimates to the 7 year interpolated RBA spreads. These are the interpolated RBA daily 7-year yield estimates.

   b. add the 10 year interpolated Australian Government securities estimate to the 10 year interpolated RBA spread. These are the interpolated RBA daily 10-year yield estimates.

10. Convert the interpolated daily yield estimates (from step 9) to effective annual rates, using the formula:[353]

$$effective\ annual\ rate = ((1 + yield / 200)^2 - 1)*100$$

11. Average the yield estimate for the 10 year RBA yield estimate over all business days in the relevant averaging period. This is our adjusted RBA estimate.

Calculation of the adjusted BVAL estimate

1. For dates after 14 April 2015, download the 10 year Corporate BBB rated Australian BVAL curve (BVCSAB10).[354]

2. Convert the 10 year yields into effective annual rates, using the formula:

$$effective\ annual\ rate = ((1 + yield / 200)^2 - 1)*100$$

3. Average the extrapolated daily estimates of the BVAL 10 year yield over all business days in the relevant averaging period. This is our adjusted BVAL estimate.

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[353] In this formula, the term 'published yield / 200' is based on the yield being published as a number (e.g. 2.0) rather than a percentage (e.g. 2 %, or 0.02). The RBA yield data is published in this form at the time of this decision. For example, where the yield is published as '2.0', this is equivalent to 2 per cent or 0.02. However, it is necessary to convert from the published yield to either alternative to calculate the effective annual rate. If the spread was published as 2 per cent, this term would be 'published spread/2'.

[354] In previous decisions, we have stated that for dates before 14 April 2015, calculating the adjusted BVAL estimate would require downloading the 7 year Corporate BBB rated Australian BVAL curve (BVCSAB07 index) and adding the difference between the 7 and 10 year daily RBA adjusted yields (as calculated in step 8 of the RBA process) to this yield. However, under the approach in this draft decision, all averaging period dates should be after 14 April 2015.

Final estimate

Take the simple average of the adjusted RBA estimate (from step 11 in the RBA data section) and the adjusted BVAL estimate (from step 4 in the BVAL data section). This is the annual estimate of the return on debt.

Timing of annual debt updates

Our draft decision is to complete our annual update debt process by 25 business days before TasNetworks submits its pricing proposal to us. This will allow TasNetworks to finalise its pricing proposal. Additionally, we consider this is consistent with the period for notifying other service providers of their updated return on debt allowance prior to the start of the regulatory year.

The general process we propose to adopt for the annual debt update for TasNetworks is set out in Table 3-12.

Table 3-12 Annual distribution debt update process

Step	Timing	Description of step	Reasons for timing
1	25 business days before pricing proposal is submitted to us.	Averaging period ends on or before this date	We determine the maximum practical end date of the averaging period from the timing of steps 2 and 3.
2	10 business days before pricing proposal is submitted to us.	So TasNetworks can factor this its pricing proposal, we inform it of updates on the return on debt, annual building block revenue requirement and X factor that incorporates the updated return on debt	15 business days between steps 1 and 2 provides sufficient time for us to calculate (and provide quality assurance checks on) the updated return on debt, revenue and X factor.
3	Pricing proposal is submitted	TasNetworks submits its pricing proposal for the relevant year.	10 business days between steps 2 and 3 is based on service providers' advice regarding the minimum period it would require to factor the updated information into its prices.

Source: AER analysis.

We are open to service providers requesting a different notification date than that outlined in step 2 of Table 3-12 if it better accommodates their internal processes. We note that a longer (or shorter) time period would move back (or forward) the timeframe in which an averaging period should fall (see Table 3-11).

The process outlined in Table 3-12 does not apply to the first year of the regulatory period. This is because in our determination, X factors will already incorporate the return on debt for the first year.

Contingencies

We have set out a series of contingencies in Table 3-13 below that forms part of our draft decision. This is important because the availability of third party data can change and we have determined to annually update the trailing average portfolio return on debt. Under the rules, the change in revenue resulting from the annual update must occur by automatic application of a formula that is specified in the revenue determination.[355] This means that our decision on how to apply these third party data sources must be fully specified upfront in the determination, and must be capable of application over the regulatory period without the use of subsequent judgement or discretion.

Table 3-13 Contingency approaches to choice of data series

Event	Changes to approach
Either the RBA or Bloomberg ceases publication of Australian yield curves that reflect a broad BBB rating.	We will estimate the annual return on debt using the remaining curve.
A different third party commences publication of a 10 year yield estimate (or we are made aware of a different third party publishing a 10 year yield estimate).[356]	We will not apply estimates from a third party data provider that we have not evaluated and included in our final decision approach. We will consider any new data sources in future determinations.
Either Bloomberg or RBA substitutes its current methodology for a revised or updated methodology.	We will adopt the revised or updated methodology. Then, at the next regulatory determination, we will review this updated methodology. As noted above, we would also review any new data sources. However, if Bloomberg or the RBA backcasts or replaces data using a revised or updated methodology we will not use the backcasted data to re-estimate our estimates of the prevailing return on debt for previous years. This would be impractical and would create regulatory uncertainty over whether the allowed return on debt would at some point in the future be re-opened. Instead, we will continue to use the Bloomberg or RBA data that we downloaded at the time of estimating the prevailing return on debt for that point in time.
Bloomberg reduces the maximum published BVAL term from 10 years.	If Bloomberg still publishes the BVAL curve to 5 or more years, we will extrapolate the BVAL curve from the longest published term to 10 years using the corresponding yield margin from the RBA curve. [357] If Bloomberg no longer publishes the BVAL curve to 5 years, we will rely entirely on

[355] NER cl. 6A.6.2(l).

[356] Or we determine it is open to us to use the Reuters curve, following a proper assessment and period of consultation on this information.

[357] For example, where Bloomberg only publishes a 6 year curve, we will extrapolate it to 10 years using the 6 to 10 year yield margin from the RBA curve. Or, where Bloomberg only publishes a 7 year estimate, we will extrapolate it to 10 years using the 7 to 10 year yield margin from the RBA curve.

Event	Changes to approach
	the RBA curve.
The RBA ceases publication of a 10 year yield estimate.	If the RBA ceases publication of a 10 year yield estimate, we will extrapolate the RBA estimate to 10 years using: • if available, the margin between spreads in the Bloomberg curve,[358] from the RBA's longest published target term to 10 years • otherwise, the actual Australian Government securities margin from the RBA's longest published estimate to 10 years, plus the average debt risk premium spread for the same term margin over the last month prior to the end of its publication.
The RBA commences publication of daily estimates.	We will cease interpolating the RBA monthly yields. Instead, we will estimate both the RBA yield and the RBA year extrapolation margin (used with the BVAL curve) using these daily estimates.
Either Bloomberg or the RBA publishes a BBB+ or utilities specific yield curve.	We will adopt the BBB+ or utilities curve in place of the provider's existing curve, on the basis that it is a closer fit to our benchmark efficient entity.

Source: AER analysis

Our draft decision largely maintains the set of contingencies set out in our recent decisions.

For this draft decision, we have re-worded the contingency for the scenario where Bloomberg reduces its longest published term to between 5 and 10 years. This does not change the meaning of the required change in response to this event, and remains consistent with the approach we adopted in decisions prior to Bloomberg publishing a 10 year BVAL estimate. However, we consider this explanation of the 'changes to approach' is clearer.

We have made our decision based on the information and third party data that is currently available, subject to consultation and review.[359] For clarity, we do not estimate the allowed return on debt with reference to the Reuters data series, on which we have had limited opportunity to consult or review.[360]

In general, we have decided on these contingencies based on a series of guiding principles. These are that the contingency must:

[358] Specifically, the spread to Australian Government securities.

[359] As of 14 April 2015, Bloomberg has revised its methodology for the BVAL curve (BVCSAB10). It has correspondingly recommenced publishing a 10 year yield estimate.

[360] Thompson Reuters publishes a BBB par yield curve to 10 years from 25 May 2015 (BBBAUDBMK Par Yield). However, we have had limited opportunity to review and consult on f this information as this was first put before us with the revised regulatory proposals in January 2016. Nevertheless, we have performed a preliminary assessment of this information (see appendix A). This indicates that the Reuters curve would produce comparable estimates to the existing combination. We do not rule out including the Reuters curve in future determinations following a proper period of consultation.

- Be practically implementable—the NER require the automatic application of a formula to update the trailing average portfolio return on debt. As a result, we will be unable to analyse changes to the approaches or new approaches during the regulatory period. Therefore, it is important that any contingency be practical and easily implementable.
- Use the curve in a form as close as possible to its published form—for example, in April 2015 Bloomberg commenced publication of a 10 year BVAL curve. Accordingly, for averaging periods where the 10 year estimate is available, we will adopt this estimate rather than the 7 year BVAL curve extrapolated with RBA data.
- Where necessary, rely on the independent expert judgement of the RBA and Bloomberg. In particular, where the RBA or Bloomberg makes changes to its methodology, we would prefer to evaluate these changes before concluding we are satisfied the curve still meets the criteria set out in the Guideline.[361] However, this is not possible during the regulatory period. In these circumstances, we have two alternatives of ceasing to rely on the updated curve, or temporarily relying on the updated curve on the basis that we have assessed the data provider as credible. As we are satisfied that both the RBA and Bloomberg are credible and independent, but not that either curve is clearly superior, we consider it is preferable that we adopt the updated curve to limit stakeholders' exposure to the distinct characteristics of a single curve. This is consistent with our position of placing weight on both curves to minimise the mean squared error.

3.4.3 Gearing ratio

Our decision is to adopt a 60 per cent gearing ratio. This is consistent with the Guideline and TasNetworks' regulatory proposal.[362]

Overall, we are satisfied that a 60 per cent gearing ratio is commensurate with the efficient financing costs of a benchmark efficient entity. This is because a 60 per cent gearing ratio is supported by the industry average of a sample of firms that are comparable to the benchmark efficient entity.

Gearing is defined as the ratio of the value of debt to total capital (that is, debt and equity). There are benefits in using debt to fund investment. Debt is usually cheaper than equity and the use of debt also has tax advantages because borrowing costs are tax deductible. However, increased use of debt also increases the possibility that a business will experience financial distress, and in the worst case, bankruptcy. In theory, the optimal debt to equity ratio is the point at which business value is maximised, where the marginal benefits just offset the marginal cost of debt. While an optimal capital structure theoretically exists, the actual optimal value of debt and equity for any given business is dynamic and dependent on a number of business specific

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[361] AER, *Explanatory statement–Rate of return guideline*, December 2013, pp. 23–24.

[362] AER, *Rate of return guideline*, December 2013, p. 9; TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

factors. Because of this uncertainty around the theoretically optimal gearing ratio, we primary rely on the average of a sample of firms that are comparable to the benchmark efficient entity. In other words, we assume that the industry is, on average, efficient and therefore use the industry average to guide our regulatory benchmark.

We consider that the empirical evidence supports a gearing of 60 per cent. Average gearing levels considered in our Guideline are presented in the following table. We observe that the average level of gearing across the four different approaches has a range of 59 to 66 per cent. Accordingly, we propose to maintain the currently adopted benchmark efficient level of gearing of 60 per cent.

Table 3-14 Averaging gearing ratio—Comparator set of firms

Year	2009 AER review 2002–2007[a]	Bloomberg (market value) 2002–2012 (full sample)[b]	Bloomberg (market value) 2002–2012 (refined sample)[c]	Standard and Poor's (book value) 2008–2012[d]
2002	65.1	54.5	65.8	N/A
2003	64.8	51.8	60.5	N/A
2004	61.7	51.2	55.1	N/A
2005	64.6	51.2	62.6	N/A
2006	63.0	56.6	61.9	N/A
2007	60.5	57.6	57.6	N/A
2008	N/A	68.3	68.3	70
2009	N/A	68.8	68.8	69
2010	N/A	65.5	65.5	66
2011	N/A	63.2	63.2	62
2012	N/A	60.6	60.6	65
Average	63.3	59.0	63.1	66

Source: AER analysis.

Notes: (a) AER, *Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, 1 May 2009, p. 124.
(b) Analysis including full sample of businesses.
(c) AGL, Alinta and GasNet excluded from the analysis.
(d) ERA, *Explanatory statement for the draft rate of return guidelines*, 6 August 2013, p. 49.

The benchmark gearing ratio is used:

- to weight the expected required return on debt and equity to derive an overall rate of return
- to re-lever the asset betas for the purposes of comparing the levels of systematic risk across businesses, and

- as a factor in estimating the benchmark credit rating.[363]

CCP members Hugh Grant and David Headberry submitted that we should adopt a lower gearing ratio based for Powerlink based on its actual financing arrangements.[364] We note that the CCP members' submission relies on a method for valuing Powerlink's asset base that we consider is inconsistent with the NER (see attachment 2 to our Powerlink draft decision for more detail). In any case, we consider that using a benchmark gearing ratio will contribute to the achievement of the ARORO given uncertainty around the theoretically optimal gearing ratio.[365]

3.4.4 Expected inflation rate

Our estimate of expected inflation for this draft decision is set out in table 3-15. We base our approach on an average of the RBA's short term inflation forecasts and the mid-point of the RBA's inflation targeting band. TasNetworks also proposed to use this method to estimate expected inflation.[366]

Table 3-15 is based on the RBA's August 2016 Statement of Monetary Policy. We will update our estimated expected inflation rate for the RBA's most recent inflation forecasts available as close as practical to the publication of our final decision.

Table 3-15 AER estimate of expected inflation (per cent)

Expected inflation	2017–18	2018–19	2019–20 to 2026–27	Geometric average
TasNetworks proposal (indicative)	2.50	2.50	2.50	2.50
AER draft decision	2.00 [a]	2.50 [b]	2.50	2.45

Source: TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117; RBA, *Statement on Monetary Policy*, August 2016, p. 67.

(a) In August 2016, the RBA published a range of 1.5–2.5 per cent for its June 2018 Consumer Price Index (CPI) inflation forecast. We select the mid-point from this range.

(b) The August 2016 statement of monetary policy did not have a CPI inflation forecast for the year ending June 2019. However, we expect this forecast to be included in the RBA's February 2017 statement of monetary policy, which we will take into account in our final decision.

[363] That is, if a service provider had a gearing ratio that was significantly different to the benchmark gearing ratio, then we would consider any implications of this for including that service provider within the sample used to estimate the industry median credit rating.

[364] CCP (Hugh Grant and David Headberry), *Submission to the AER, Powerlink Queensland 2018–22 revenue proposal*, 20 June 2016, p. 47.

[365] Noting that TasNetworks' actual financing arrangements may not reflect those of a benchmark efficient entity.

[366] TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 117.

This method is consistent with what we have previously adopted and applied since 2008, as well as our recent decisions (the current method).[367] We consider the current method to be a reasonable estimation method for the following reasons:

- RBA research indicates that its one year inflation forecasts have substantial explanatory power.[368]
- To the extent that the historical success of RBA monetary policy informs market consensus inflation expectations, the mid-point of the RBA's inflation targeting band would reflect longer term inflation expectations. We note that since inflation rate targeting in 1993, the average annualised inflation rate has been approximately 2.6 per cent, which is close to the 2.5 per cent midpoint of the target band.
- Evidence indicates that the RBA's control of official interest rates and commentary has an impact on outturn inflation and inflation expectations.[369]
- This method is simple, transparent, easily replicated and unlikely to be subject to estimation error.

Although TasNetworks proposed this method, a number of other service providers recently proposed estimating expected inflation by using the 'breakeven approach'.[370] The breakeven approach entails estimating the inflation rate in which an investor would be indifferent between investing in nominal bonds and indexed bonds. This inflation rate is implied from nominal and indexed bond yields of the same maturity.

Our draft decision is to apply our current method rather than to use the breakeven approach. We consider there are clear limitations to using breakeven approaches that result in biased estimates of expected inflation unless particular adjustments are made to these estimates. We outlined these potential adjustments in Table 3-25 in Attachment 3 to our final decision on AusNet Services 2016–20 distribution determination.

So far, no stakeholder has put any material before us to discuss the limitations of the breakeven approach or how to adjust for them. Without consensus on the appropriate methods for addressing these limitations, the breakeven approach may increase

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[367] See attachment 3 of our final decisions published in May 2016 for ActewAGL distribution (gas), AGN, APTNT, AusNet Services (distribution), CitiPower, Jemena Electricity Networks, Powercor and United Energy.

[368] Further, RBA forecasts have been marginally more accurate than private sector forecasts. Tullip, P., Wallace, S., 'Estimates of uncertainty around the RBA's forecasts', *RBA Research Discussion Paper – November 2012*, RDP2012–07, p. 30.

[369] AER, *Final decision: SP AusNet transmission determination 2008–9 to 2013–14*, January 2008, pp. 103–4; RBA, *Letter to ACCC*, 9 August 2007, p. 3; Australian Treasury, *The Treasury bond yield as a proxy for the CAPM risk-free rate, Letter to ACCC*, 7 August 2007, p. 5.

[370] See for example: AusNet Services, *RINs schedule 1 – 4.2.b – Forecast inflation estimate*, October 2015; United Energy, *Response to AER Preliminary Determination Re: Rate of return and gamma*, 6 January 2016, p. 100; CEG, *Measuring expected inflation for the PTRM*, June 2015, p. 10; CEG, *Measuring risk free rates and expected inflation: A report for United Energy*, April 2015; CitiPower, CitiPower revised regulatory proposal 2016-2020, January 2016, p. 378.

uncertainty and the potential for bias as a result of regulatory gaming, relative to our current approach based on RBA forecasts.

Further, market imperfections can undermine the ability of breakeven approaches to estimate the market's inflation expectations. Despite having improved since 2007,[371] we consider that the size and liquidity of the market for indexed Australian government bonds is still limited and may cause biases in breakeven inflation estimates.[372]

Given the information currently before us, and considering the limited amount of consultation we have been able to undertake on a parameter that should apply to all service providers, we are not satisfied that changing our approach would improve our estimates of expected inflation.

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[371] In 2007, the AER switched from using the breakeven approach to using its current approach, following submissions from service providers and information from the RBA and Australian Treasury that the market for indexed Australian government bonds may be too illiquid to produce reliable forecasts. See: AER, *Final decision: SP AusNet transmission determination 2008–9 to 2013–14*, January 2008, pp. 103–4; RBA, *Letter to ACCC*, 9 August 2007, p. 3; Australian Treasury, *The Treasury bond yield as a proxy for the CAPM risk-free rate, Letter to ACCC*, 7 August 2007, p. 5.

[372] Devlin, W., Patwardha, D., 'Measuring market inflation expectation', *Economic Roundup*, No. 2, 2012, p. 7.

A Return on equity implementation

Section 3.4.1 sets out our reasons for our return on equity estimate. This section provides more detail on the information that we have had regard to in estimating return on equity. Further detail on how the application of our return on equity estimation approach and the information we consider can be found in our Rate of Return Guideline and in our previous determinations.[373]

A.1 Historical stock returns

This section examines realised returns to Australian listed equity (stocks) as a proxy for the historical return on the portfolio of all equity in the market. We examine total returns and excess returns. Excess returns are the realised returns[374] that stocks have earned in excess of the returns on government bonds with a ten-year term-to-maturity.

Our dataset and methodology is based on Brailsford, Handley, and Maheswaran (Brailsford et al).[375] A detailed discussion on data and methodology can be found in Brailsford et al, our Guideline, and attachment 3 to our preliminary decision for AusNet Services' 2016-20 distribution determination.

A.1.1 Prevailing estimates: excess returns

Table 3-16 sets out our estimates of historical excess returns, measured using both arithmetic and geometric averages, and estimated over different sample periods up until the 2015 calendar year end.[376] Arithmetic average measures range between 5.6 and 6.3 per cent and geometric average measures range between 3.9 and 4.9 per cent.

Table 3-16 Historical excess returns (per cent)

Sampling period	Arithmetic average	Geometric average
1883–2015	6.2	4.9
1937–2015	5.9	4.0

[373] For example see: AER, *Final decision: AusNet Services determination 2015 -16 to 2019–20, Attachment 3—Rate of return*, May 2016.

[374] The Sharpe-Lintner CAPM is an equilibrium pricing model and hence the market risk premium parameter of the model should reflect the premium that investors require in a market in equilibrium. In this section, we examine returns that have been realised in practice, over periods in which the market may not have been in equilibrium. This data is used for practical reasons - the ex-ante required equilibrium return of investors is not observable. We consider that realised returns remain a reliable indicator of investor expectations in market equilibrium.

[375] Brailsford, Handley, Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 76–77, 85–86.

[376] We have traditionally taken historical excess returns as a calendar year-end estimate. For consistency, and given these change slowly throughout time, we maintain this convention.

1958–2015	6.3	4.0
1980–2015	6.2	3.9
1988–2015	5.6	4.0

Source: Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012, p. 6. AER update for 2012–2015 market data.

Notes: Based on a theta of 0.6.

A.1.2 Prevailing estimates: total returns

Table 3-17 sets out our estimates of historical returns on the market portfolio. The nominal return ranges from 9.9 to 12.5. We use a range because the estimated return on the market will vary depending on the time period used.[377]

Table 3-17 Historical returns on the market portfolio (per cent)

Sampling period	Market return (real)	Market return (nominal)
1883–2015	8.6	11.3
1937–2015	7.3	9.9
1958–2015	8.8	11.5
1980–2015	9.7	12.5
1988–2015	9.0	11.7

Source: Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012, p. 6. AER update for 2012–2015 market data.

Notes Historical market returns are estimated using arithmetic averages, assuming a theta value of 0.6, and assuming an inflation rate of 2.5 per cent. Nominal figures calculated by the AER using the Fisher equation: $1+i=(1+r)\times(1+\pi)$ where r denotes the real return, i denotes the nominal return and π denotes the inflation rate.

We estimate a return on equity under the Wright CAPM[378] by combining the historical nominal market return with our prevailing risk free rate estimate and equity beta estimates.[379] As shown in Table 3-18, our estimated range for equity beta and market return results in Wright CAPM return on equity estimates ranging from 5.1 to 9.3.

Table 3-18 Wright CAPM return on equity (per cent)

AER equity beta estimate	Wright CAPM return on equity based on 9.9 market return	Wright CAPM return on equity based on 12.5 market return

377 AER, *Explanatory statement: Rate of return guideline (appendices)*, December 2013, pp. 26–27.

378 See section B.5 of Attachment 3 to our final decision on AusNet Services 2016-20 distribution determination for details on the Wright CAPM.

379 Our estimated range for equity beta is 0.4 to 0.7. For more detail, see section 3.4.1.

AER equity beta estimate	Wright CAPM return on equity based on 9.9 market return	Wright CAPM return on equity based on 12.5 market return
0.4	5.15	6.15
0.7	7.55	9.31

Source: AER analysis.

Notes: Based on a placeholder risk free rate estimate of 1.95 per cent.

A.2 AER's dividend growth model

Dividend growth models use forecast dividends of businesses to derive the return on equity by assuming that the present value of these dividends is equal to the business' market value of equity.[380]

A.2.1 Prevailing estimates

Results in Table 3-19 show that, for the two month period up to end–July 2016, the dividend growth models produce a range of market risk premium estimates between 7.54 to 8.86 per cent.

Table 3-19 Market risk premium estimates under dividend growth models (per cent)

Growth rate	Two stage model	Three stage model
3.8	7.54	7.82
4.6	8.32	8.46
5.1	8.79	8.86

Source: Bloomberg, AER analysis.

Notes: Growth rate is nominal, for more detail on derivation of these long term dividend growth rate estimates see section B.2.1 of Attachment 3 to our preliminary decision for AusNet Services' 2016-20 distribution determination. Market risk premium estimates are based on an assumed theta of 0.6, and a 2 month average (Jun-Jul 2016) of analysts' dividend forecasts.

A.2.2 Sensitivity analysis

We consider that market risk premium estimates from dividend growth models are sensitive to input assumptions such as the:

- Long term dividend growth rate.

[380] For clarity, we use the term 'return on equity' in regards to market value. This is consistent with the rest of our decision, and the use of terminology in the rules. In its report on the dividend growth model, SFG uses 'return on equity' in regards to book value and uses the term, 'cost of equity' with regards to market value.

- Period estimates are averaged over.
- Use of analyst forecasts, which are likely to be biased.

Table 3-20 shows how sensitive our dividend growth models are to these factors.

Table 3-20 Sensitivities in the dividend growth model (per cent)

Sensitivity	Description	Two stage model	Three stage model
Baseline	4.6% long-term growth rate 2 month average to end July 2016 unadjusted analysts' forecasts	8.32	8.46
Baseline with different long-term growth rates	5.1% long-term growth rate	8.79	8.86
	3.78% long-term growth rate	7.54	7.82
Baseline with different averaging periods	6 months to end July 2016	8.18	8.35
	12 months to end July 2016	8.32	8.45
Baseline with adjusted analyst forecasts	Analysts' forecast + 10%	8.91	9.06
	Analysts' forecast - 10%	7.73	7.86
Combined - low	3.78% growth, 6 month averaging and analysts' forecasts - 10%.	6.80	7.09
Combined - high	5.1% growth, 12 month averaging and analysts' forecasts + 10%	9.43	9.48

Source: Bloomberg, AER analysis.

Notes: All market risk premium estimates are based on an assumed theta of 0.6.

A.2.3 Preferred construction of the model

Our preferred construction of the dividend growth model is consistent with that set out in our rate of return guideline.[381] The following equation depicts this dividend growth, which we apply to estimate *k*, the expected return on equity for the market portfolio:

$$P_c = \frac{m \times E(D_c)}{(1+k)^{m/2}} + \sum_{t=1}^{N} \frac{E(D_t)}{(1+k)^{m+t-0.5}} + \frac{\frac{E(D_N)(1+g)}{k-g}}{(1+k)^{m+N-0.5}}$$

Where: Pc is the current price of equity, for which we use the S&P/ASX 200 index as the proxy

[381] See: AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, pp. 114–125 for more information on our preferred DGM construction. Note that since publishing our Guideline we have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

E(Dc) is expected dividends per share for the current financial year[382]

E(Dt) is expected dividends per share for the financial year t years after the current financial year

m is the fraction of the current financial year remaining, expressed as a decimal point

N is the time period after which dividend growth reverts to its long-term rate (for the two stage model, N = 2, for the three stage model N = 9)

g is the expected long term growth rate in nominal dividends per share. For this parameter, we use a range of 4.0 to 5.1 per cent, with a point estimate of 4.6 per cent.

We adopt two versions of a simple standard dividend growth model:

- A two stage model, which assumes that dividends grow at the long term growth rate following the dividend forecast period.
- A three stage model, which assumes that dividend growth transitions linearly over eight years from the short term growth rate implied in the dividend forecast period to the long term growth rate.

Our dividend growth models also display the following characteristics:

- They use daily data of analysts' consensus dividend forecasts for the ASX 200 index from the Bloomberg Professional Services (Bloomberg). Analysts' dividend forecasts are for the current and following two financial years. We take monthly averages of the daily data.
- They use market prices for the ASX 200[383].
- They estimate a long term growth rate in dividends per share. We determine this by adjusting the long term growth rate in real gross domestic product (GDP) for the net creation of shares and expected inflation.[384]

We consider our preferred construction of the dividend growth model to be reasonable. We developed our preferred construction of the model in close consultation with stakeholders when developing our rate of return guideline.[385] We have analysed a variety of submissions on our construction of the model,[386] which have not persuaded us to depart.[387] Further, experts have critically reviewed[388] our construction of the dividend growth model and we consider that—overall—their advice suggests our

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382 We sourced dividend forecasts from Bloomberg. We have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

383 Rather than target prices.

384 Assumed to be 2.5 per cent, which is the mid-point of the RBA's target inflation band.

385 For example, see AER, *Explanatory statement to the draft rate of return guideline*, August 2013, pp. 219–225; AER, *Consultation paper: Rate of return guidelines*, May 2013, pp. 101–102.

386 Specifically, see SFG, *Dividend discount model estimates of the cost of equity*, 19 June 2013; SFG, *Reconciliation of dividend discount model estimate with those compiled by the AER*, 10 October 2013; SFG, *Alternative versions of the dividend discount model and the implied cost of equity*, 15 May 2014; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, 13 February 2015.

387 Note that since publishing our Guideline we have been informed by Bloomberg that its convention for reporting dividend forecasts on an index is to use calendar year forecasts as the relevant financial year forecasts.

388 McKenzie and Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December 2013; Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013.

model construction is reasonable.[389] We also have sound reasons for adopting the technical specifications of our preferred construction of the model. A detailed discussion of the reasons for our preferred construction of the dividend growth model can be found in Appendix B to Attachment 3 of our preliminary decision on AusNet Services' 2016-20 distribution determination.

A.3 Conditioning variables

Conditioning variables are market data that can be used to inform (or 'condition') an initial estimate. We do not consider conditioning variables provide reliable estimates on their own.[390] However, this information is relevant and may be useful for indicating changes in prevailing market conditions. We note that conditioning variables should be considered symmetrically through time to avoid bias.

In our rate of return guideline we stated that we would consider three types of conditioning variables to inform our estimate of the market risk premium: dividend yields, yield spreads and implied volatility. In the guideline we also stated that we would use yield spreads to inform our overall return on equity estimate.

For the reasons set out below, we consider that, overall, the conditioning variables appear to have experienced moderate short term movement. Consideration of the implied volatility approach, dividend yields and corporate bond spreads show slight decreases.[391] The state government bond spreads and the comparison between equity and debt premiums provide no clear indication that there have been any changes to conditioning variables.[392]

Moreover, it appears that conditioning variables are currently close to their long term averages. This is particularly apparent when compared with the sharp increases in these variables seen between 2008–13, which were likely associated with the height of the Global Financial Crisis and European debt crisis. We consider that there is currently little evidence of a sustained trend away from long term averages. Taken together, we see no significant trend to support any further changes to our approach.

It is important to note that we are estimating a 10-year forward-looking market risk premium with regard to prevailing conditions in the market for equity funds. In this context, prevailing conditions can be considered ‘prevailing expectations’ over the relevant forward looking timeframe, which is 10 years. Therefore, we consider short term fluctuations in conditioning variables should be treated with caution.

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389 For example, McKenzie and Partington found our 'implementation of a two stage model is a reasonable, transparent and easily reproducible' and recommended consider a transition to long term growth (which we subsequently adopted). See McKenzie and Partington, *The DGM*, December 2013, p. 24.

390 See: AER, Explanatory statement—Rate of return guideline, December 2013, pp. 94 and 97.

391 See, Figure 3-6: Implied volatility (VIX) over time; Figure 3-7: Dividends yields; Figure 3-8 Australian bond spreads over government yields.

392 See, Figure 3-9: State government bond spreads over government yields; Figure 3-10: Comparison of equity and debt premiums.

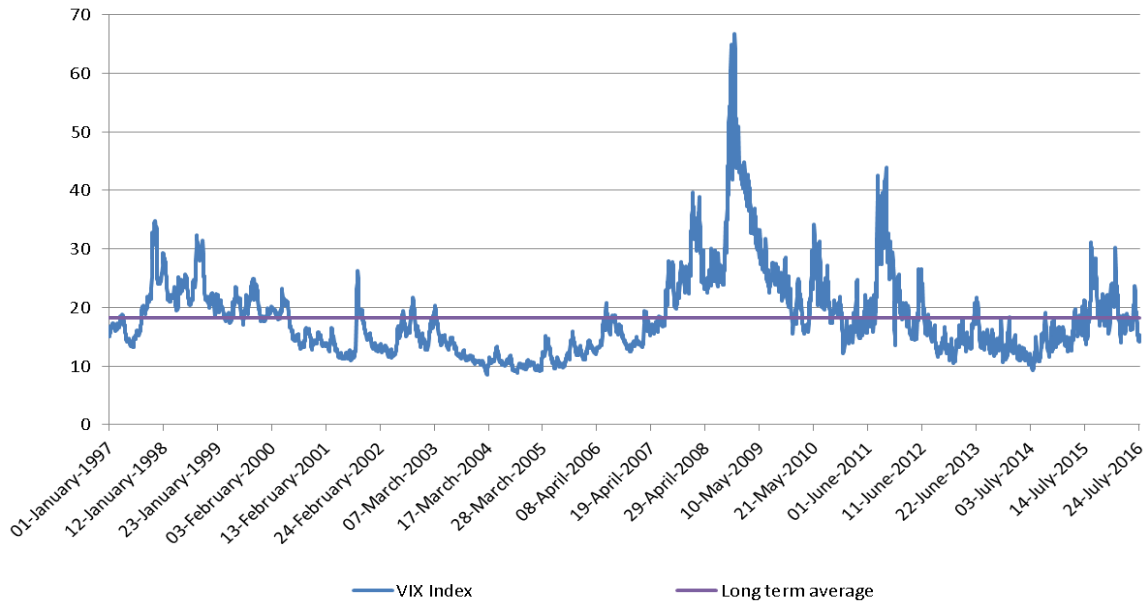
A.3.1 Implied volatility

The implied volatility approach assumes that the market risk premium is the price of risk multiplied by the volume of risk (volatility).[393] Figure 3-6 Implied volatility (VIX) over time shows volume of risk in the market portfolio estimated using the implied volatility index.

Implied volatility was high during the global financial crisis and the height of the European debt crisis. However, recent implied volatility levels have generally been below or close to the long run average of 18.2 per cent (measured from the start of the data series in 1997).

Figure 3-6 Implied volatility (VIX) over time shows the value of this measure of implied volatility relative to its long run average level since the start of the data series in 1997 to 29 July 2016. On 29 July 2016, the ASX200 implied volatility index was 14.2 per cent. Using the same averaging period as the risk free rate, the volatility index was 16.2 per cent.[394] Over the year ending 29 July 2016, the volatility index was 19.6 per cent. Overall, we consider that Figure 3-6 Implied volatility (VIX) over time shows implied volatility is close to its long run average.

Figure 3-6 Implied volatility (VIX) over time



Source: ASX200 VIX volatility index sourced from Bloomberg via code AS51VIX from 2/1/2008 and code CITJAVIX prior to 2/1/2008.

[393] This was based on Merton, R.C., 'On Estimating the Expected Return on the Market: An Exploratory Investigation', *Journal of Financial Economics*, 1980, Vol. 8, pp. 323–361.

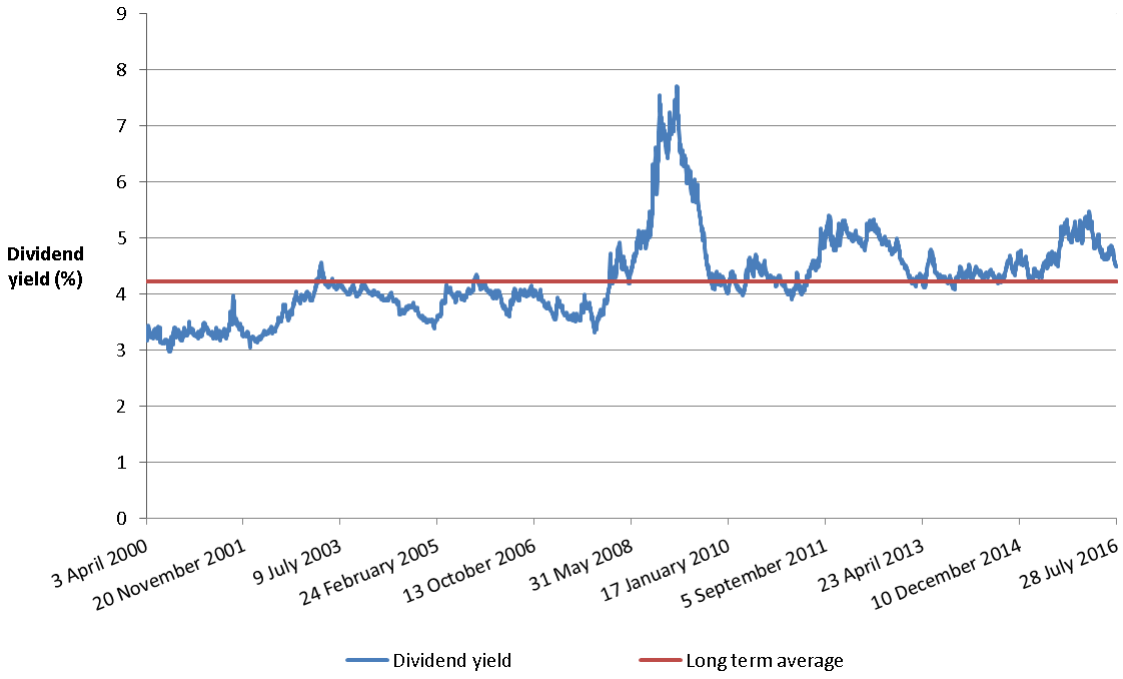
[394] This averaging period is 20 business days ending 29 July 2016.

A.3.2 Dividend yields

We use dividend yields as a directional indicator of the market risk premium.[395] We consider this information by comparing current dividend yields with the average dividend yield through time.[396] Figure 3-7 Dividend yields shows dividend yields against their historical average up to 29 July 2016.

Figure 3-7 Dividend yields shows dividend yields are higher than their long term average. However, prior to this increase, dividend yields were close to their long term average and have been relatively steady over the last two years (approximately). Recently, dividend yields appear to be falling, particularly in July 2016, moving closer to their long term average.

Figure 3-7 Dividend yields



Source: Bloomberg AS51 Index, AER analysis.

A.3.3 Yield spreads

Yield spreads are the difference between the yields on different assets, typically debt instruments. We examine two categories of yield spreads:

- Credit spreads, used to inform our market risk premium estimate.

[395] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 94.

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

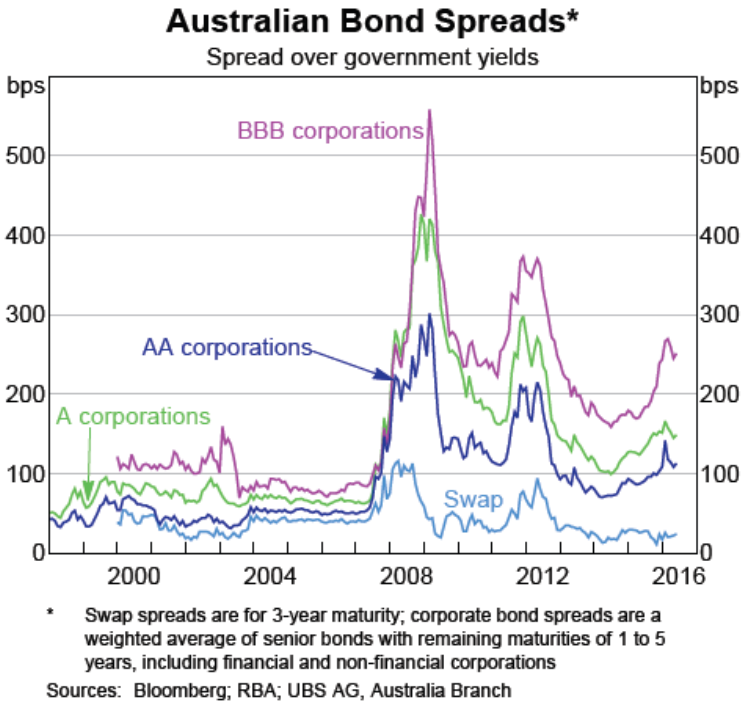
- The spread between our equity risk premium and debt risk premium, used to inform our overall return on equity estimate.

Credit spreads are the spreads between the risk free rate (the yield on Australian government securities) and the return on debt for different debt instruments. We use credit spreads as a directional indicator of the market risk premium.[397] We consider this information can be used to indicate changes in market conditions. That is, to indicate whether spreads are widening, stabilising or narrowing.

Figure 3-8 shows credit spreads for A-rated, AA-rated, and BBB-rated corporate debt instruments over yields on Australian government securities. These credit spreads were showing a clear downward trend from approximately 2012 before widening slightly in recent times.

Most credit spreads are also above their pre-2007 levels, while the swap rate spread is at or below its pre-2007 levels. In essence, lower quality debt is further from pre-2007 levels than higher quality debt. However, the credit spreads are all substantially lower than they were between 2008 and 2013.

Figure 3-8 Australian bond spreads over government yields



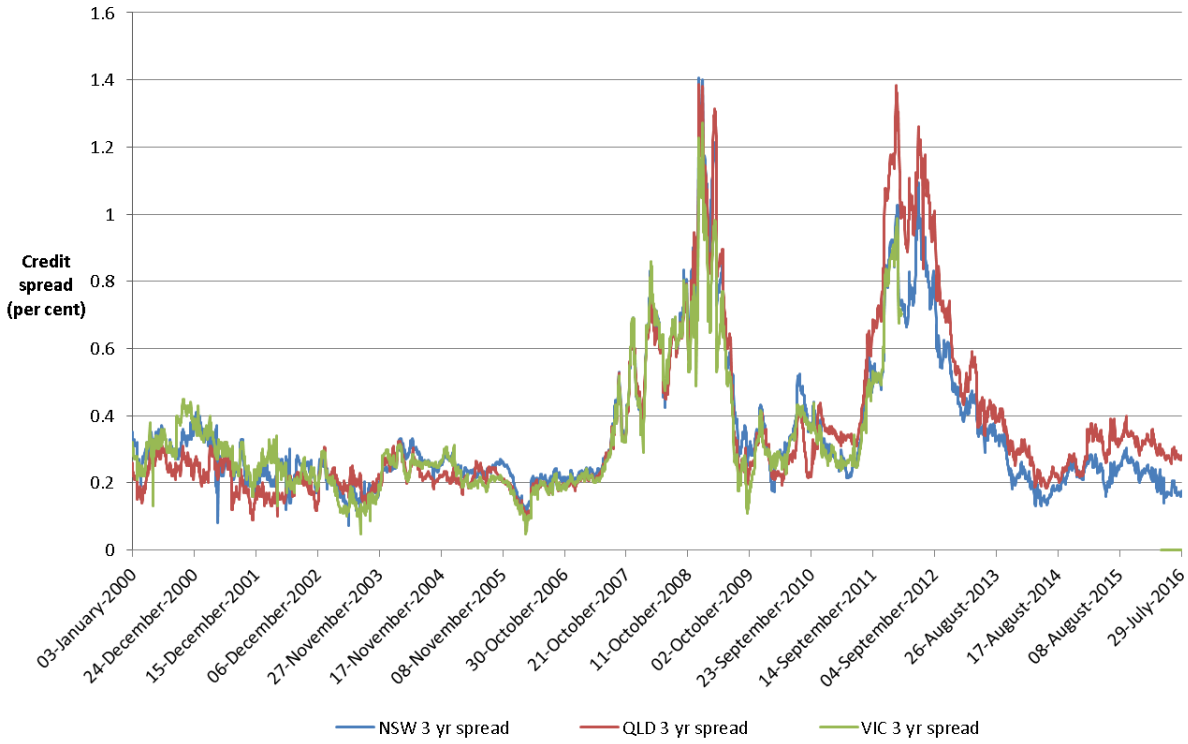
Source: RBA, Chart Pack, August 2016.

Note: Swap spreads are for a 3 year maturity. Corporate bonds are a weighted average of senior bonds with remaining maturities of 1 to 5 years and include financial and non-financial corporations.

[397] AER, *Explanatory statement rate of return guideline (appendices)*, 17 December 2013, p. 96.

Figure 3-9 shows the spread between state government debt and Australian government debt up to 29 July 2016.[398] Figure 3-9 shows that credit spreads were falling since late 2012, and are now around their pre-2007 levels with no discernible trend.

Figure 3-9 State government bond spreads over government yields



Source: AER analysis, RBA F.2 interest rate statistics.

On the comparison between the return on equity and return on debt, we consider that prevailing debt market conditions provide support for the view that our estimated return on equity is not below efficient financing costs.[399]

The current debt market is indicating a premium over the risk free rate of about 2.64 per cent.[400] This compares to our foundation model equity premium over the risk free rate of 4.55 per cent (given a market risk premium of 6.5 per cent and a beta of 0.7). Figure 3-10 shows the current and historical debt risk premium and our foundation model equity risk premium.

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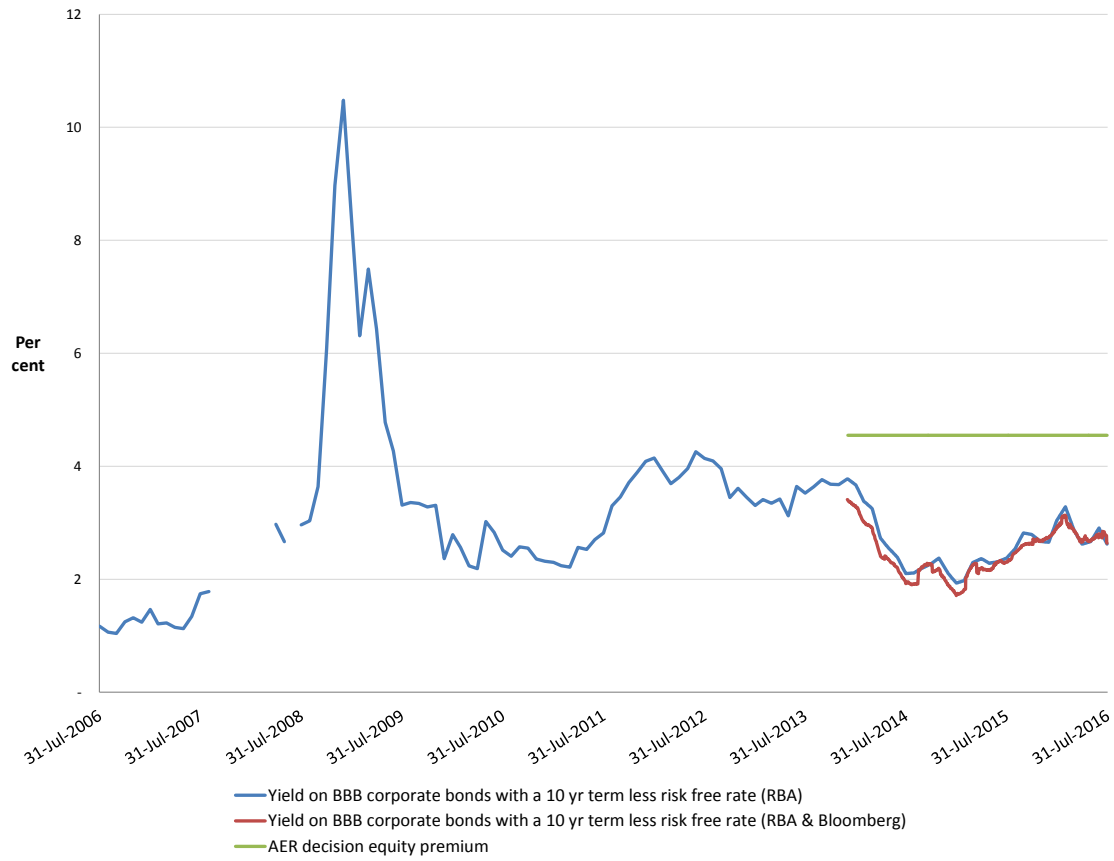
398 Where all the debt measures have a 3-year term.

399 Efficient financing costs for a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of regulated services. See: NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR, r.87(3).

400 Based on the spread to Australian Government securities from our estimation of the cost of debt (based on an average of the RBA's data (on yield to maturity on BBB-rated corporate bonds with a ten year term and the Bloomberg BBB–rated AUD BVAL curve).

Figure 3-10 Comparison of equity risk premium and indicative debt risk premiums



Source: AER analysis, RBA interest rates statistics, Bloomberg data.

We note that the overall directional evidence shows that debt risk premiums generally increased from around 2015 to February 2016, before decreasing to July 2016. Debt risk premiums have persistently remained below the December 2013 levels, when our Rate of Return Guideline was published, as shown in Figure 3-10.

We do not consider that the current 191 basis points difference between the equity risk premium allowed in this decision and debt risk premiums[401] to be too low, on the basis of:

- the low risk nature of a benchmark efficient entity as outlined above
- the gap between the equity risk premium and debt risk premium is likely to be wider than stated above, since it compares a promised, pre-tax return on debt to an expected, post-tax return on equity.[402]

[401] The debt risk premiums are calculated as the extrapolated effective annual yield to maturity on BBB rated debt with 10 years to maturity less the effective annual yield to maturity on Australian Government securities with 10 years to maturity. Broad BBB rated bond yields have been used instead of BBB+ because the RBA quotes broad BBB yields to maturity.

A.4 Other practitioner's return on equity estimates

Other market practitioners may, in the course of their operations, produce return on equity estimates for entities with a similar degree of risk as TasNetworks. Other practitioners may also produce estimates of input parameters required in the Sharpe-Lintner CAPM (our foundation model). These estimates may be relevant material that can inform our return on equity estimation.

Relevant estimates of other market practitioners are typically sourced from surveys, broker reports, valuation reports, and other regulators' decisions. Such estimates are discussed further in the subsections below.

We have focused on return on equity estimates for companies with a similar degree of risk as TasNetworks in providing regulated services. This means that greater reliance is placed on electricity and gas network service providers over other types of businesses. Greater reliance is also placed on businesses with revenues that are substantially regulated over businesses with less regulated revenue. We take this approach as it better reflects the degree of risk of TasNetworks in relation to the provision of regulated services.

We have also focused on the equity risk premium rather than the overall return on equity to isolate the business-specific risk premium from movements in the risk free rate.[403]

Some service providers stated that past decisions of other regulators should not be used as direct evidence of the required return on equity, as they are, 'at best, secondary evidence of the prevailing return on equity at previous points in time' and 'use of such decisions will be circular and self-perpetuating'.[404] We note that some

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[402] We consider that promised returns will always exceed expected returns and pre-tax returns will always exceed corresponding post-tax returns. For further explanation, see McKenzie and Partington, *Report to the AER: The relationship between the cost of debt and the cost of equity*, March 2013, pp. 7, 21; AER, *Final decision: Access arrangement final decision—Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd 2013-17*, March 2013, Part 3, p. 48.

[403] We do not consider that removing the risk free rate and examining the equity risk premium will bias the results. Note that the valuation reports show there is a general consensus among valuers on the estimation methods for the risk free rate. Valuers typically estimate the risk free rate as the current yield to maturity on long term (10 year) Australian Government securities. We acknowledge that there is some evidence suggesting that there is a tendency for valuers to adopt risk free rates exceeding the yields on Australian Government securities when these yields are low, but we consider this practice to be neither widespread nor persistent (for more detail, see section F.5 of Attachment 3 to our final decision on AusNet Services 2016-20 distribution determination).

[404] CitiPower, *Revised regulatory proposal 2016–2020*, pp. 321; Powercor, *Revised regulatory proposal 2016–2020*, pp. 315; JEN (Vic), *2016–20 Electricity distribution price review regulatory proposal revocation and substitution submission: Attachment 6–1 Rate of return, gamma, forecast inflation, and debt and equity raising costs,* 6 January 2016, p. 80; AusNet Services, *Electricity distribution price review 2016–20 Revised regulatory proposal: Chapter 7 Rate of return & gamma*, 6 January 2016, pp. 74–75, United Energy, *Response to AER Preliminary Determination Re: Rate of return and gamma*, January 2016, p. 75; ActewAGL, *Revised 2016–21 access arrangement proposal Response to the AER's draft decision, Appendix 5.01 Detailed response to rate of return, gamma and inflation*, January 2016, p. 101; AGN, *2016–17 to 2020/21 Access Arrangement information response to draft decision: Attachment 10.26 Response to draft decision: rate of return*, January 2016, pp. 78–79.

estimates from other market practitioners—including from survey respondents, brokers and valuers—may be affected to some extent by 'herding' behaviour.[405] We continue to consider that it is relevant for us to have some regard to these estimates, as long as we remain aware of their limitations.

A.4.1 Prevailing estimates: surveys

Survey estimates explore investor expectations about the market risk premium. They achieve this by directly asking investors and market practitioners what their expectations are and/or what they apply in practice. We place some reliance on survey estimates in estimating the market risk premium.

Table 3-21 shows that market risk premium estimates, from surveys published since 2013, cluster around 6.0 per cent. The 2016 survey estimates are generally equal to or lower than their 2013 and 2014 counterparts. This provides some evidence to suggest that investor expectations of the market risk premium have not increased, and may have eased.

Table 3-21 Key findings on market risk premium from recent surveys

Survey	Numbers of responses	Mean (%)	Median (%)	Mode (%)
Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 82 Countries in 2012*, IESE Business School, January 2013	73	5.9	6.0	N/A
KPMG, *Valuation Practices Survey 2013*, February 2013 [a]	19	N/A	6.0	6.0
Fernandez, Arguirreamalloa and Linares, *Market Risk Premium and Risk Free Rate used for 51 countries in 2013*, IESE Business School, June 2013	17	6.8	5.8	N/A
Asher and Hickling, *Equity Risk Premium Survey*, Actuary Australia, December 2013	46	4.8	5.0	6.0
Fernandez, Linares, Acín, *Market Risk Premium used in 88 countries in 2014*, IESE Business School, June 2014 [b]	93	5.9	6.0	N/A
Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015 [c]	27	4.4	4.6	6.0
Fernandez, Ortiz, Acín, *Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey*, April 2015	40	6.0	5.1	N/A
KPMG, *Australian valuation practices survey 2015*, May 2015 [d]	~27	N/A	6.0	6.0
Fernandez, Ortiz, Acín, *Market Risk Premium used in 71 countries in 2016: a survey with 6,932 answers*, May 2016	87	6.0	6.0	N/A

Notes: a) While this survey had 23 market participants, 19 specified what market risk premium they used.
b) The 2014 survey did not report the response rate. AER staff obtained this information from Professor Fernandez via email correspondence on 22 July 2014.

[405] McKenzie and Partington, *Report to the AER: Part A: Return on Equity*, October 2014, p. 46.

c) The response rate for this survey is lower than the response rate in previous Asher and Hickling surveys because the survey took place from 5 December 2014 to 14 December 2014, which was very close to Christmas. AER staff obtained the mode from Associate Professor Anthony Asher via email correspondence on 17 September 2015.

d) The KPMG (2015) survey had 29 market participants, but figure 24 indicates that not all the market participants gave a response for the market risk premium. However, visual inspection indicates that the response rate was approximately 27.

Several factors should be considered when examining survey evidence:[406]

- Timing of the survey—we consider the timing of each survey is clear in all but two surveys we consider. The earliest survey we consider was published in January 2013 but its questionnaires were sent out in May and June 2012.[407]
- Sample of respondents—financial managers and analysts, expert valuers, actuaries, finance academics, investment banks, professional services firms and infrastructure funds were among the target respondents of surveys. These professionals apply the market risk premium, so we consider the surveys' target populations can make informed judgments about the market risk premium. Each survey also sets out the selection of the sample surveyed (or respondents).[408]
- Wording of survey questionnaires—we consider the adequacy of survey wording can be subjective to judge and often relies on the quality of the authors. However, we also consider confidence in this area can be enhanced when the work is published in a refereed academic journal, or when the survey is repeated. In our sample, only the KPMG survey has not been conducted at least three times.
- Survey response rate and non-response bias—McKenzie and Partington suggested a sample size of more than 30 is sufficiently large statistically so a representative sample of 30 respondents is expected to be adequate.[409]

After having regard to the above factors, we consider that the survey estimates in Table 3-21 are useful for informing our market risk premium estimate. We note that triangulation across surveys can reduce the limitations associated with particular survey evidence.[410]

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406 As noted in: Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 11 January 2012, paragraphs 165–166.

407 The KPMG valuation practices surveys do not clearly state the time period over which the survey was made. Fernandez, Ortiz, Acín, *Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey*, April 2015, p. 2; Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015, p. 1; Fernandez, Linares, Acín, *Market Risk Premium used in 88 countries in 2014*, IESE Business School, June 2014, p. 2.

408 KPMG, *Australian valuation practices survey 2015*, May 2015, p. 2; Fernandez, Ortiz, Acín, *Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey*, April 2015, p. 3; Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015, p. 1; Fernandez, Linares, Acín, *Market Risk Premium used in 88 countries in 2014*, IESE Business School, June 2014, p. 2.

409 McKenzie and Partington, *Supplementary report on the MRP*, February 2012, pp. 17–18.

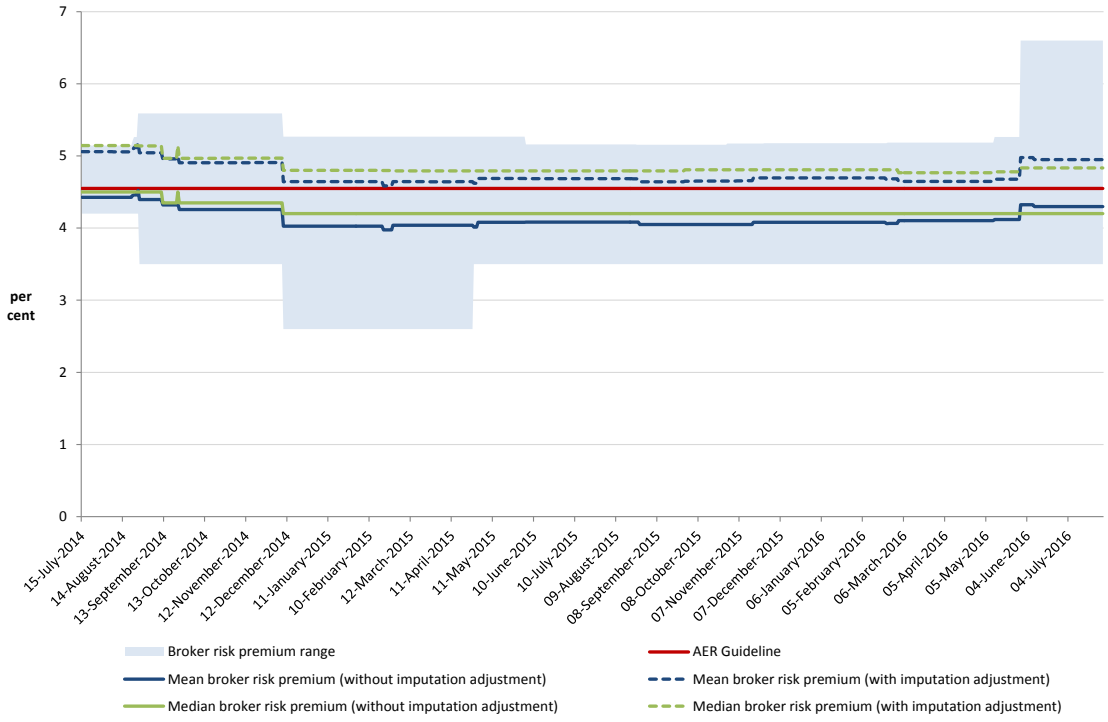
410 McKenzie and Partington considered triangulation increases their confidence in the results from survey evidence. McKenzie and Partington, *Supplementary report on the MRP*, February 2012, pp. 17, 19–20.

A.4.2 Prevailing estimates: broker reports

The equity risk premium from the AER's foundation model of 4.55 per cent is within the range of premiums recently estimated by brokers, as shown in Figure 3-11.

Directionally, the range of equity risk premium estimates from broker reports appears fairly stable. Our equity risk premium estimate remains, in general, below the imputation-adjusted broker estimates and above the unadjusted broker estimates. We do not consider that the directional evidence currently supports a move away from the return on equity resulting from our Guideline approach.

Figure 3-11 Equity risk premium estimates from broker reports



Source: AER analysis of broker reports by Credit Suisse, JP Morgan, Morgan Stanley, and Macquarie Bank that include a valuation for AusNet Services, Spark Infrastructure, APA Group, and/or DUET Group.

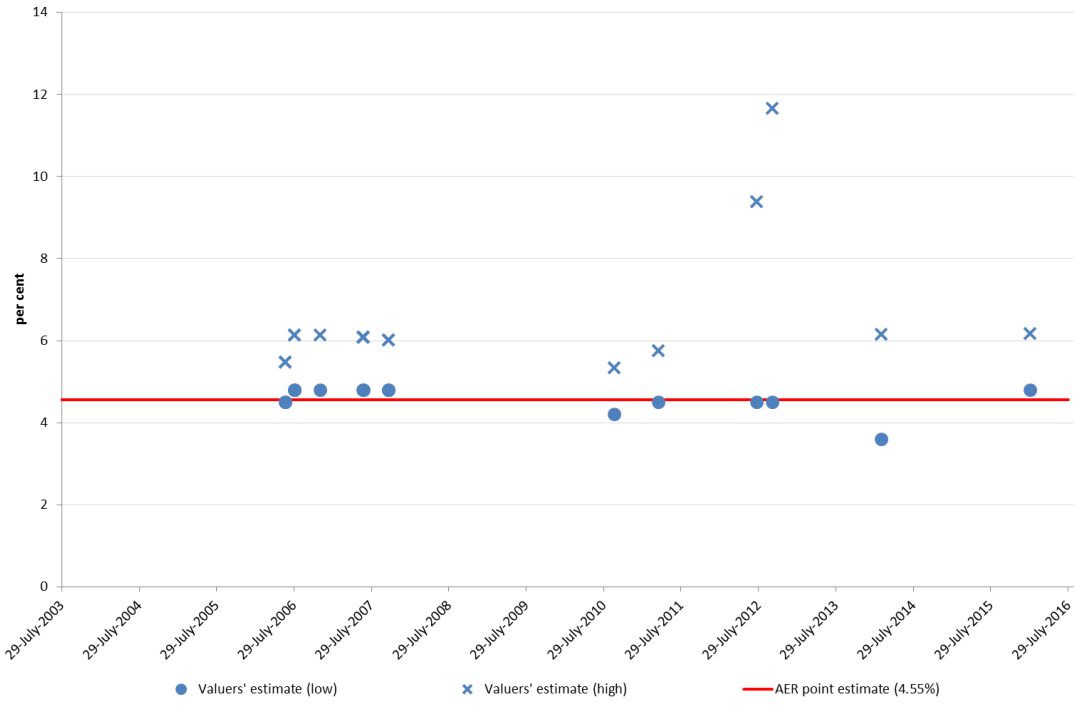
Notes: Average broker equity risk premium is the mean of equity risk premium estimates from all brokers and for all businesses available at the time. We treat a broker's estimate for each business as remaining relevant until a new estimate is published.

A.4.3 Prevailing estimates: valuation reports

Figure 3-12 outlines the range of return on equity and equity risk premium estimates from relevant independent valuation reports. We consider that the number of reports is

too low and the concentration of reports among only a few valuers is too high to be able to place significant reliance on the evidence from valuation reports.[411]

Figure 3-12 Equity risk premium from relevant valuation reports over time



Source: AER analysis of reports from the Thomson Reuters Connect4 database

Notes: We have shown the equity risk premium based on a nominal vanilla weighted average cost of capital, expert reports using a different cost of capital form have been adjusted accordingly. This equity risk premium ('Valuers estimate-high') also reflects the impact of any discretionary uplifts applied by the independent valuer.

There have been only 19 relevant independent valuation reports spanning a period going back to 1991.[412] Only 13 reports included a discounted cash flow analysis with information on a return on equity estimate. These 13 reports were provided by only 3 independent valuation firms, with 9 of the 13 reports being provided by Grant Samuel & Associates.

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411 We note that the correction of a small number of errors in Incenta Economic Consulting's analysis of valuation reports resulted in material changes to its results. See: Incenta Economic Consulting, *Addendum to report titled 'Update on evidence on the required return on equity from independent expert reports'*, 20 August 2014, p. 1.

412 The Thomson Reuters' Connect 4 database contains reports going back to 1991, but contains no reports between 1991 and 1998 for comparable electricity or gas network businesses. A list of the reports assessed in this report can be found in Table 3-20 of AER, *Draft Decision: TransGrid transmission determination*, 2015–16 to 2017–18, Attachment 3–Rate of return, November 2014. A further relevant independent valuation report—Longergan Edwards' 31 March 2016 report for Ethane Pipeline Income Fund—has subsequently been released after November 2014.

We note that the ranges for return on equity and equity risk premium estimates contained in Figure 3-12 include the final values used in the independent valuation reports and reflect any uplifts applied. However, we have concerns about the applicability of these uplifts to the allowed rate of return objective.[413] We also have concerns that the adjustment for dividend imputation may not be appropriate.[414] The risk premium appropriately reflecting dividend imputation is likely somewhere between the adjusted and unadjusted premiums, but we are unable to distil a precise estimate due to the limited of transparency of valuation reports.

The most recent report for a regulated energy network business is Lonergan Edwards' report for Ethane Pipeline Income Fund on 31 March 2016. We find that this evidence does not support a move away from our foundation model estimate of 4.55 per cent. We note that:

- The Moomba-to-Sydney ethane pipeline is the sole asset of Ethane Pipeline Income Fund. Currently, none of the revenues from the pipeline are subject to revenue cap regulation of the type applied to TasNetworks. We consider that the regulatory regime contains a number of mechanisms that shield TasNetworks from systematic risk.[415] The regulatory regime is therefore likely to result in an equity beta for TasNetworks that is lower than it may otherwise be (and lower than the 0.8 to 0.9 equity beta range for Ethane Pipeline Income Fund estimated by Lonergan Edwards).[416]
- Ethane Pipeline Income Fund has limited diversification, having only one customer. Lonergan Edwards noted this as a consideration in its estimation of equity beta.[417] We consider the greater diversification of TasNetworks' regulated services customer base may indicate a lower equity beta than the range of 0.8 to 0.9 for Ethane Pipeline Income Fund estimated by Lonergan Edwards.

The second most recent relevant report is Grant Samuel's report for Envestra on 4 March 2014. We find that this evidence does not support a move away from our foundation model estimate of 4.55 per cent. We note that:

- Grant Samuel's initial Sharpe-Lintner CAPM-based return on equity estimate provides an equity risk premium range of 3.6 to 4.2 per cent (without adjustment for dividend imputation, 4.1 to 4.8 per cent including our estimated adjustment for dividend imputation).

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413 For more detail, see section E.6 of Attachment 3 to our preliminary decision on CitiPower's 2016-20 distribution determination.

414 For more detail, see section E.6 of Attachment 3 to our preliminary decision on CitiPower's 2016-20 distribution determination.

415 For more information, see section pages 96 to 99 of Attachment 3 to our preliminary decision for AusNet Services' 2016-20 distribution determination.

416 Lonergan Edwards & Associates Limited, *Independent expert report on takeover offer for the Ethane Pipeline Income Fund*, 31 March 2016, p. 50.

417 Lonergan Edwards also took into account the lack of diversification when considering gearing levels. Lonergan Edwards & Associates Limited, *Independent expert report on takeover offer for the Ethane Pipeline Income Fund*, 31 March 2016, pp. 50–51.

- Grant Samuel outlined four separate uplift scenarios that supported its discretionary uplift to its rate of return above the initial Sharpe-Lintner CAPM-based estimate.[418] Although we have concerns with the applicability of these uplifts to the allowed rate of return objective, our foundation model premium is above or within the equity risk premium range in three of the four scenarios if no adjustments are made for dividend imputation.[419]

A.4.4 Prevailing estimates: other regulators

The equity risk premium from our foundation model of 4.55 per cent is within the range of premiums recently estimated by other regulators. Directionally, as shown in Figure 3-13, the range of equity risk premium estimates does not appear to be changing materially and is relatively constant at about 4 per cent to 6.5 per cent.[420]

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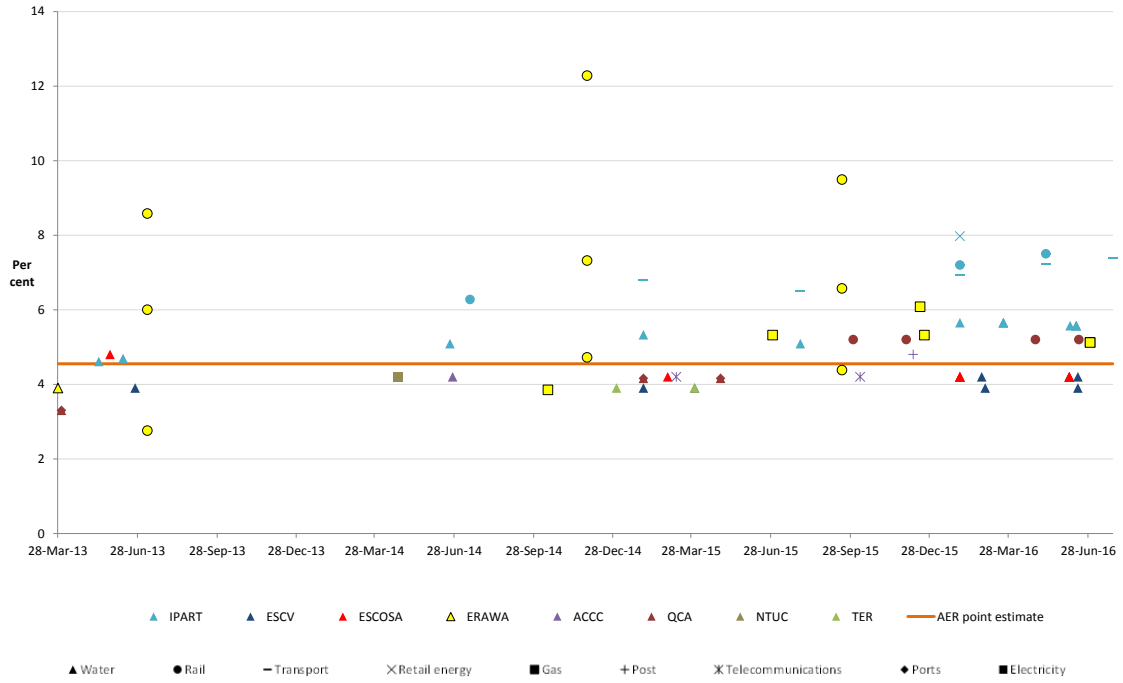
[418] These being (1) increased risk free rate, (2) increased market risk premium, (3) broker estimates of return on equity, and (4) dividend growth model estimates of return on equity.

[419] Grant Samuel's submission in response to our November 2014 decisions provided some clarification about its use of uplifts and dividend imputation in its Envestra valuation report. However, we considered that this clarification did not affect the fundamental premise of our concerns and hence did not support a change to our approach (see sections E.3 and E.6 of Attachment 3 to our draft decision on CitiPower's 2016-20 distribution determination). In its revised proposal, CitiPower submitted that our consideration of both imputation-adjusted estimates and unadjusted estimates is illogical given Grant Samuel's submission [CitiPower, *Revised regulatory proposal 2016–2020*, pp. 320]. CitiPower provided no additional information about Grant Samuel's Envestra valuation report and hence our consideration of it is unchanged.

[420] Note that the risk characteristics of rail businesses such as The Pilbara Infrastructure Pty Ltd (an operator of a rail network that transports iron ore freight) may be significantly different to those of the benchmark efficient entity (for example, due to demand risk). Similar concerns may be expressed about Brookfield Rail and IPART Transport decisions. We also note that the ERA's use of the Wright approach to estimating market risk premium is influenced by its annuity pricing framework. The ERA states: "A key consideration in the context of the rail WACC relates to the purpose. The estimate is required to contribute to the annuity that will deliver the value of the rail infrastructure assets, over their economic life. Given the length of the rail asset economic lives, the estimate is long term." [ERA, *Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railway Networks – Revised Draft Decision*, November 2014, p. 89.] Nevertheless, we have included these decisions for comparative purposes.

Figure 3-13 Equity risk premium estimates from other regulators' decisions

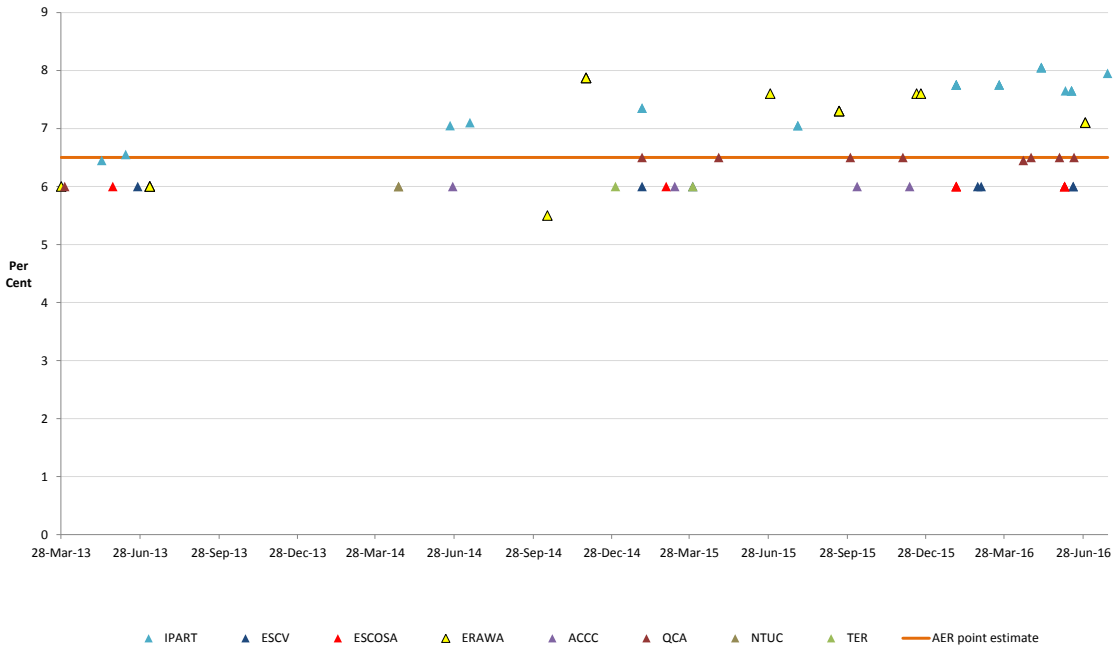


Source: Independent Pricing and Regulatory Tribunal, *Fact sheet: WACC biannual update*, August 2015; Economic Regulatory Authority of Western Australia, *Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railway Networks*, 18 September 2015; Queensland Competition Authority, *Queensland Rail's 2015 Draft Access Undertaking: Draft Decision*, October 2015; Australian Competition and Consumer Commission, *Public inquiry into final access determinations for fixed line services: Final decision*, October 2015; Queensland Competition Authority, *Aurizon Network 2014 Draft Access Undertaking — Volume IV: Maximum Allowable Revenue*, December 2015; Australian Competition and Consumer Commission, *ACCC decision on Australian Postal Corporation 2015 price notification*, December 2015; Economic Regulatory Authority of Western Australia, *Draft Decision on Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline*, 17 December 2015; Economic Regulatory Authority of Western Australia, *Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016–2020*, 22 December 2015; Independent Pricing and Regulatory Tribunal, *Fact sheet: WACC biannual update*, February 2016; ESCOSA, *SA Water Regulatory Determination 2016 - Draft Determination: Statement of Reasons*, February 2016; Essential Services Commission of Victoria, *Goulburn-Murray Water Price Review 2016: Draft decisio*n, February 2016; Essential Services Commission of Victoria, *Melbourne Water Price Review 2016: Draft Decision*, March 2016; Independent Pricing and Regulatory Tribunal, *Review of prices for Sydney Water Corporation from 1 July 2016 to 30 June 2020 - Draft report*, March 2016; Independent Pricing and Regulatory Tribunal, *Review of prices for Hunter Water Corporation from 1 July 2016 to 30 June 2020 - Draft report*, March 2016; Independent Pricing and Regulatory Tribunal, *Review of prices for WaterNSW from 1 July 2016 to 30 June 2020 - Draft report*, March 2016; Australian Competition and Consumer Commission, WaterNSW: Annual review of regulated charges 2016-17 - Draft decision, April 2016; Queensland competition authority, Draft decision DBCT Management's 2015 draft access undertaking, 19 April 2016; Queensland competition authority, Final decision Aurizon Network 2014 Access Undertaking-Volume IV-Maximum allowable revenue, 28 April 2016; IPART, Weighted average cost of capital (WACC) Final report - information paper 10, 10 May 2016; Australian Competition and Consumer Commission, WaterNSW: Annual review of regulated charges 2016-17 -Final decision, May 2016; QCA, Regulated retail electricity prices for 2016-17,

Final determination, 31 May 2016; ESCOSA, SA Water Regulatory Determination 2016 Final Decision, June 2016; IPART, Review of prices for the Water Administration Ministerial Corporation, 7 June 2016; IPART, Review of prices for Sydney Water Corporation, Final Report, 14 June 2016; IPART, Review of prices for Hunter Water Corporation, Final Report, 14 June 2016; IPART, Review of prices for WaterNSW, Final Report, 14 June 2016; ESCV, Goulbourn-Murray Water Price Review 2016, 16 June 2016; ESCV, Melbourne Water Price Review 2016 final decision, 16 June 2016; QCA, Queensland Rail's Draft Access Undertaking, Decision, 17 June 2016; ACCC, Australian Rail Track Corporation's application to vary the 2011 Hunter Valley Access Undertaking - extension of term, 22 June 2016; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020, Appendix 4 Rate of Return, 30 June 2016; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline, 30 June 2016; IPART, Maximum fees and charges for cruise ships in Sydney Harbour Draft decision, 26 July 2016.

Figure 3-14 shows that our estimate (6.5 per cent) of the market risk premium is consistent with the range of estimates from other regulators over time. Directionally, the range of market risk premium estimates from other regulators' decisions appears relatively constant between 6 per cent and 8 per cent.

Figure 3-14 Market risk premium estimates from other regulators' decisions



Source: As per Figure 3-13.

A.5 Empirical estimates of equity beta

Empirical estimates of equity beta are based on regressions that relate the returns on a set of comparator firms to the return on the market.

As discussed in section 3.4.1, empirical estimates using a comparator set of listed Australian energy network firms from Henry's 2014 report are the main determinants of our equity beta estimate. Henry's 2014 report is one of a number of Australian empirical studies. We also have regard to these other Australian empirical studies.

We also have regard to empirical estimates of equity beta for international energy firms. However, we place only limited reliance on this evidence as we do not consider the international firms are sufficiently comparable to a benchmark efficient entity with a similar degree of risk as TasNetworks in providing regulated services.

A.5.1 Australian empirical estimates from Henry's 2014 report

For our Australian empirical analysis we commissioned an expert report from Professor Olan Henry, which provided an update on his 2009 econometric analysis of equity beta.[421] We consider the evidence presented in Henry's 2014 report in detail because it uses the most recent data and this is relevant in selecting an equity beta (and return on equity) that is reflective of prevailing market conditions.[422]

Henry's 2014 report presented empirical estimates of equity beta for our comparator set of nine Australian energy network firms,[423] using available data from 29 May 1992 to 28 June 2013.[424] Based on our detailed discussion of methodological choices in recent decisions,[425] we consider the most useful empirical estimates:

- use the Ordinary Least Squares (OLS) estimator (with the Least Absolute Deviation (LAD) estimator used as a robustness check for outliers in the underlying data)
- are measured over multiple estimation periods
- use weekly return intervals (with monthly returns used as a robustness check)
- use the Brealey–Myers formula to de- and re-lever raw[426] estimates to a benchmark gearing of 60 per cent, although we consider both raw and re-levered estimates
- are based on averages of individual firm estimates and fixed weight portfolios (equal weighting and value weighting)
- do not apply a Blume or Vasicek adjustment.[427]

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421 Henry, *Estimating β*, April 2009; Henry, *Estimating β: An update*, April 2014.

422 NER, cll. 6A.6.2(g) and 6.5.2(g); NGR, rule 87(7). It is the most recent AER report.

423 Being AGL Energy Limited (AGK), Alinta (AAN), APA Group (APA), AusNet Services (AST), DUET Group (DUE), Envestra Limited (ENV), GasNet (GAS), Hastings Diversified Utilities Fund (HDF), and Spark Infrastructure Limited (SKI).

424 Henry, *Estimating β: An update*, April 2014, p. 9.

425 See, for example, AER, *Draft decision: Australian Gas Networks Access Arrangement 2016 to 2021—Attachment 3: Rate of return*, November 2015, section D.2.2.

426 Raw equity beta estimates are those that are observed from the initial regression

427 Henry does not apply a Blume or Vasicek adjustment of any of his estimates, as specified in our terms of reference.

We consider the equity beta estimates presented in Henry's empirical analysis support a range of 0.4 to 0.7. Table 3-22 and table 3-23 set out Henry's re-levered OLS equity beta estimates for the individual comparator firms (averaged across firms) and fixed weight portfolios respectively. The results show that:

- The re-levered individual firm estimates (averaged across firms) range from 0.46 to 0.56. The corresponding raw (that is, observed market gearing level) estimates range from 0.48 to 0.50.[428]
- The re-levered fixed weight portfolio estimates range from 0.39 to 0.70. The corresponding raw estimates range from 0.42 to 0.58.[429]

Table 3-22 Average of re-levered equity beta estimates (individual firm) from Henry's 2014 analysis (OLS, weekly)

Issue	Longest available period	2002 to 2013 (excluding GFC)	Last five years [(a)]
Re-levered OLS estimates	0.52	0.56	0.46

Source: AER analysis; Henry, *Estimating β: An update*, April 2014.

(a) AAN, AGL and GAS were not used for this estimation period because Henry only uses data up to 2006 or 2007 for these firms. See: Henry, *Estimating β: An update*, April 2014, p. 17.

Table 3-23 Re-levered fixed weight portfolio equity beta estimates from Henry's 2014 analysis (OLS, weekly)

	P1	P2	P3	P4	P5
Firms	APA, ENV	AAN, AGK, APA, ENV, GAS	APA, DUE, ENV, HDF, AST	APA, DUE, ENV, HDF, SKI, AST	APA, DUE, ENV, SKI, AST
Equal weighted					
Longest available period[(a)]	0.46	0.52	0.50	0.48	0.39
Longest period available (excl. tech boom & GFC)	0.49	0.52	0.5	0.53	0.45
Value weighted					
Longest available period[(a)]	0.50	0.70	0.44	0.42	0.39
Longest period available (excl. tech boom & GFC)	0.54	0.70	0.52	0.50	0.48

Source: AER analysis; Henry, *Estimating β: An update*, April 2014.

Note: Henry's 2014 report also presented time varying portfolio estimates of equity beta (which range from 0.39 to 0.53, see Henry, *Estimating β: An update*, April 2014, p. 56). We do not place any material reliance on these

[428] The raw equity beta estimates are those that are observed from the initial regression. They have not been de-levered and re-levered to a benchmark gearing of 60 per cent. These estimates are not presented but can be found at: Henry, *Estimating β: An update*, April 2014, pp. 87–89.

[429] These estimates are not presented but can be found at: Henry, *Estimating β: An update*, April 2014, pp. 90–93.

estimates for reasons discussed in section D.2.2 of Attachment 3 to our draft and final decisions in October and November 2015.

(a) The longest available period is June 2000–June 2013 for P1; December 2001–October 2006 for P2; December 2005–November 2012 for P3; March 2007–November 2012 for P4; March 2007–June 2013 for P5.

Additionally, Henry's 2014 report presented LAD (weekly) estimates as a robustness check for outliers in the underlying data. He also presented OLS estimates using monthly return intervals as a robustness check of the estimates using weekly return intervals. Henry stated the difference between the re-levered OLS and LAD equity beta estimates are 'almost universally statistically insignificant'.[430] The results are as follows:[431]

- the re-levered LAD estimates range from 0.38 to 0.58 and the raw LAD estimates range from 0.31 to 0.60.[432]
- the OLS estimates using monthly return intervals range from 0.37 to 0.58.[433]

Henry also performed various robustness and sensitivity tests on the equity beta estimates. These included the Dimson adjustment for thin trading, as well as recursive estimates and the Hansen test for parameter stability and sensitivity. Henry concluded that there is little to no evidence of thin trading across all regression permutations and 'no overwhelming issue with instability'.[434] Therefore, we are satisfied the estimates presented in Henry's 2014 report are reasonably stable and not significantly affected by thin trading. We also note Associate Professor Graham Partington stated that:[435]

> A final comment may be made with reference to a number of the reports that allege instability in the estimates of β. Henry (2008, 2009, 2014) provides a range of evidence demonstrating the stability of the estimates.

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[430] Henry, *Estimating β: An update*, April 2014, p. 62.

[431] These equity beta estimates are not presented but can be found at: Henry, *Estimating β: An update*, April 2014, pp. 17–43. We consider fixed weight portfolio estimates (equal weighting and value weighting) and averages of individual firm estimates.

[432] The raw LAD estimates can be found at: Henry, *Estimating β: An update*, April 2014, pp. 87–89 (for averages of individual firm estimates) and Henry, *Estimating β: An update*, April 2014, pp. 90–93 (for fixed weight portfolio estimates). Henry also presented LAD equity beta estimates for time varying portfolios, and these estimates range from 0.39 to 0.53. See: *Henry, Estimating β: An update*, April 2014, p. 56.

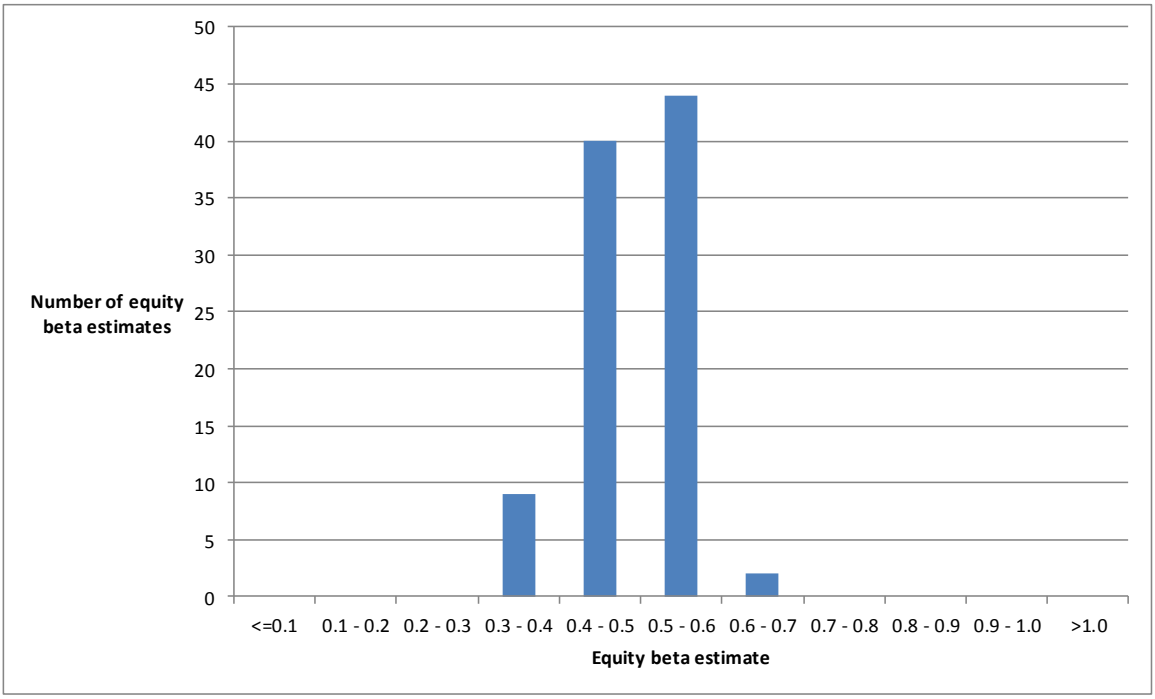
[433] Henry did not present raw estimates for monthly return intervals. Henry also did not present LAD estimates using monthly return intervals. Henry did present time varying portfolio OLS estimates using monthly return intervals, and these estimates range from 0.39 to 0.47. See: *Henry, Estimating β: An update*, April 2014, p. 58. Henry also suggested that the individual firm estimates based on monthly returns be treated with a degree of caution because some estimates are statistically insignificant. See: *Henry, Estimating β: An update*, April 2014, p. 27.

[434] Henry, *Estimating β: An update*, April 2014, p. 62. Henry explains that where the Hansen test does show evidence of instability, it is almost uniformly due to a change in the error variance in the regression model. He states that 'there is no evidence of parameter instability associated with the coefficients of the regression models themselves'. However, the Hansen test for equal and value weighted portfolio estimates for P2 (over the longest available period) shows some evidence of parameter instability for beta and should be treated with a degree of caution. See: Henry, *Estimating β: An update*, April 2014, pp. 50–51, 62.

[435] Partington, *Report to the AER: Return on equity (updated)*, April 2015, p. 22.

We consider the equity beta estimates presented in Henry's 2014 report are consistent across a range of different regression permutations, as outlined above. Henry used credible econometric techniques and incorporated robustness checks for data outliers, thin trading and parameter instability in his analysis. Therefore, we have confidence that the equity beta estimate for a benchmark efficient entity falls within the range of 0.4 to 0.7. We also consider Henry's 2014 results indicate a best empirical estimate of approximately 0.5 for a benchmark efficient entity. This is because most of the estimates are clustered around 0.5, as shown in figure 3-15.

Figure 3-15 Equity beta estimates from Henry's 2014 report (average of individual firm estimates and fixed weight portfolio estimates)



Source: AER analysis; Henry, *Estimating β: An update*, April 2014.

Note: This figure contains all averages of individual firm estimates and fixed weight portfolio estimates presented in Henry's 2014 report (95 estimates in total). This includes OLS and LAD estimates, raw and re-levered estimates, weekly and monthly return intervals and all estimation periods.

A.5.2 Australian empirical estimates from other studies

We consider the equity beta estimates presented in Henry's 2014 report are generally consistent with other empirical studies based on Australian energy network firms, as set out in table 3-24. These other empirical studies use different econometric techniques and/or comparator sets to our empirical analysis, some of which are not necessarily consistent with our methodological choices.[436] Nonetheless, the empirical

[436] As set out in section D.2.2 of Attachment 3 to our draft decision on AusNet Services' 2016-20 distribution determination.

estimates presented give us confidence that there is an extensive pattern of support for an empirical equity beta within a range of 0.4 to 0.7.

Table 3-24 Equity beta estimates for Australian energy network firms

Source	Time period	Individual firm averages	Fixed portfolios	Varying portfolios	Summary of regression permutations
Henry 2014	1992–2013	0.37–0.56	0.31–0.70[(b)]	0.39–0.53	weekly/monthly return intervals, multiple estimation periods, OLS/LAD regressions, value/equal weight fixed portfolios, average/median varying portfolios, raw/re-levered estimates, 9 comparators
Grant Samuel 2014	2009–2014[(c)]	0.42–0.64	n/a	n/a	weekly/monthly return intervals, multiple estimation periods, OLS regressions, Bloomberg adjusted betas, raw estimates, 5 comparators
ERA 2013	2002–2013	0.48–0.52	0.39–0.59	n/a	weekly return intervals, OLS/LAD/MM/TS regressions, value/equal weight fixed portfolios, multiple estimation periods, re-levered estimates, 6 comparators
SFG 2013	2002–2013	0.60	n/a	0.55	OLS regressions, four weekly repeat sampling, Vasicek adjustment, re-levered estimates, 9 comparators
ERA 2012	2002–2011	0.44–0.60	n/a	n/a	weekly/monthly return intervals, OLS/LAD regressions, re-levered estimates, 9 comparators
Henry 2009	2002–2008	0.45–0.71	0.35–0.94[(d)]	0.41–0.78	weekly/monthly return intervals, various estimation periods, OLS/LAD regressions, value/equal weight fixed portfolios, average/median varying portfolios, re-levered estimates, 9 comparators
ACG 2009	1990–2008	0.50–0.58	n/a	0.69–0.91	monthly return intervals, OLS/LAD regressions, multiple estimation periods, raw/re-levered estimates, average/median varying portfolios, 9 comparators
Henry 2008	2002–2008	0.35–0.67	0.31–0.77[(e)]	n/a	daily/weekly/monthly return intervals, discrete/continuous returns, various estimation periods, OLS/LAD regressions, value/equal weight portfolios, raw/re-levered estimates, no adjustment/Vasicek/Blume, 10 comparators

Source: AER analysis.[437]

[437] Based on the following reports: ACG, *Empirical evidence on proxy beta values for regulated gas transmission activities: final report*, July 2002, pp. 35, 39–40; Henry, *Econometric advice and beta estimation*, November 2008; ACG, *Australian Energy Regulator's draft conclusions on the weighted average cost of capital parameters: commentary on the AER's analysis of the equity beta*, January 2009, pp. 22, 25; Henry, *Estimating β*, April 2009; ERA, D*raft decision on proposed revisions to the access arrangement for the Western Power network*, March 2012, pp. 202, 204; SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 12–15; ERA, *Explanatory statement for the rate of return guidelines*, December 2013, pp. 171, 173; Grant Samuel

(a) We place no material reliance on the estimates from time varying portfolios as they are not grounded in financial theory and are prone to measurement error. See: Henry, *Estimating β: An update*, April 2014, p. 52.

(b) 0.31 is a raw LAD estimate, which we place less reliance on. The minimum re-levered LAD estimate is 0.38 and the minimum OLS estimate is 0.39.

(c) Grant Samuel uses equity beta estimates from the Australian Graduate School of Management (AGSM) and Bloomberg. This time period reflects AGSM's estimation, which uses a four year estimation period as at September 2013, and Bloomberg, which uses a four year estimation period as at February 2014.

(d) 0.94 is an LAD estimate based on a portfolio with only 18 monthly observations. If this portfolio is excluded the maximum estimate is 0.75, which is again an LAD estimate (which we place less reliance on). The maximum OLS estimate is 0.62.

(e) 0.31 is an LAD estimate, which we place less reliance on. The minimum OLS estimate is 0.42. 0.77 is a Blume–adjusted estimate, which we do not rely on. The maximum unadjusted estimate is 0.68, and the maximum OLS estimate is 0.66.

(f) ACG did not make it clear what time period its data covered. However, it noted that equity beta estimates were only used where there were more than 20 observations.

A.5.3 International empirical estimates

The international empirical estimates we consider in this decision are set out in table 3-25 and range from 0.3 to 1.0.[438] We consider this evidence provides some limited support for an equity beta point estimate towards the upper end of our empirical range. We do not include these firms in our comparator set (for our primary empirical analysis) because we do not consider they are sufficiently comparable to a benchmark efficient entity with a similar degree of risk as TasNetworks in providing regulated services.

Table 3-25 International empirical estimates of equity beta

Report	Details	Raw estimate	Re-levered estimate (to 60 per cent gearing)
SFG, *Regression-based estimates of risk parameters*, June 2013, pp. 15, 19 CEG, *Information on equity beta from US*	The CEG report prepared as a part of the ENA submission to the Guideline process suggested a sample of 56 US–listed energy network companies to be included in our comparator set of Australian–listed energy network firms. Based on the comparator sample provided by CEG, SFG computed OLS equity beta estimates over an 11	0.68—average of individual firm estimates (0.67 without a Vasicek adjustment)	0.88—average of individual firm estimates 0.91—average equity beta of an equal–weighted

and Associates, *Envestra financial services guide and independent expert's report (appendix 3)*, March 2014, p. 6; Henry, *Estimating β: an update*, April 2014.

438 This range includes raw and re-levered equity beta estimates. The re-levered estimates presented have been calculated using the Brealey-Myers formula set out in our recent decisions (see, for example, AER, *Draft decision: Australian Gas Networks Access Arrangement 2016 to 2021—Attachment 3: Rate of return*, November 2015, section D.2.2). Also, the studies we consider in this section are largely the same as those considered in our recent decisions.

Report	Details	Raw estimate	Re-levered estimate (to 60 per cent gearing)
companies, June 2013	year period from 2 January 2002 to 19 November 2012. SFG's results incorporate a Vasicek adjustment to its OLS equity beta estimates.		index of firm returns[439]
Damodaran, *Updated data: The Data page*, *Levered and Unlevered Betas by Industry: Download detail*, Stern school of Business New York University, last updated 5 January 2016, viewed 18 March 2016	The Damodaran equity beta estimates for US industry groups have been updated for 2015 market data. However, Damodaran has changed his industry classifications since 2013. The only industry that reports energy network firms is 'Utility (general)'. It contains electricity and gas network businesses, as well as vertically integrated businesses. Damodaran uses OLS estimation, weekly return intervals and a five year estimation period (up to 2015 year–end).	0.55	0.81*
FTI Consulting, *Cost of capital study for the RIIO-T1 and GD1 price controls*, July 2012, p. 42	This report for Ofgem provided equity beta estimates for three UK–listed energy network firms. FTI Consulting used OLS estimation, daily return intervals and calculated the average daily returns for the sector as the market–capitalisation weighted average of the returns for National Grid, Scottish and Southern Energy and Scottish Power.	0.45—over 10 May 2011 to 9 May 2012 0.48—over 10 May 2010 to 9 May 2012	We are not able to provide re-levered equity beta estimates because the report does not provide the appropriate gearing data.
Alberta Utilities Commission, *2013 Generic Cost of Capital*, 23 March 2015, pp. 1, 24–26	This 2013 Generic Cost of Capital report sets out the AUC's approved return on equity for several utilities for the years 2013, 2014, and 2015. The AUC considered advice from the following experts on the equity beta based on estimates of Canadian utilities: • Dr Sean Cleary of Queens University recommended an equity beta range of 0.3 to 0.6. He calculated an average beta of 0.29 using monthly returns over the 1988–2012 period. He also calculated an average beta of 0.25 using 60 months of returns up to 20 December 2013. • Dr Laurence Booth of the University of Toronto recommended an equity beta range of 0.45 to 0.55 for Canadian stand-alone utilities based on long run beta estimates. • Ms Kathleen McShane (president and senior consultant with Foster Associates Inc.) was critical of historical equity betas, but used beta estimates from Bloomberg and Value Line. These betas range from 0.65 to 0.7. These betas also incorporate an adjustment towards 1.0 (Blume or Vasicek).	0.3–0.7	This report did not specify whether the equity betas were raw or re-levered to a benchmark gearing.

[439] SFG defines its equal weighted index as an index of firm returns, which allows it to 'construct one time series in each market that is available over the entire 11 year period'. See: SFG, *Regression-based estimates of risk parameters*, June 2013, p. 2.

Report	Details	Raw estimate	Re-levered estimate (to 60 per cent gearing)
PwC, *Appreciating Value New Zealand, Edition six*, March 2015, p. 20 (See also: http://www.pwc.co.nz/appreciating-value/pwc-wacc-formula)	An annual report on the cost of capital (and equity beta) for a number of New Zealand companies classified by industry. The equity beta estimates are based on an average of monthly returns over (up to) five years for two comparable firms (Horizon Energy Distribution Limited and Vector Limited). PwC's March 2015 report presents estimates as at 31 December 2014.	0.6—average of individual form estimates	0.88—average of individual firm estimates*
The Brattle Group, *The WACC for the Dutch TSOs, DSOs, water companies and the Dutch pilotage organisation*, March 2013, pp. 16–18	This report for the Netherlands Competition Authority estimated equity beta for a set of seven European and three US energy network firms. It used a three year estimation period and daily return intervals. In response to CEG's concerns, we have used the Dimson beta where the adjustment is significant.[440]	0.58—average of European individual firm estimates 0.60—average of US individual firm estimates 0.58—average of European and US individual firm estimates	0.71—average of European individual firm estimates* 1.01—average of US individual firm estimates* 0.80—average of European and US individual firm estimates*

Notes: * We have de-levered and re-levered these raw equity beta estimates.

[440] See: CEG, *Estimating the cost of equity, equity beta and MRP*, January 2015, p. 37.

B Return on debt approach

We transition the return on debt[441] from an on-the-day approach in the first regulatory year to a trailing average by updating 10 per cent of the debt portfolio over 10 years (a full transition). This appendix explains why, if we move to a trailing average approach, doing so requires a full transition to achieve the allowed rate of return objective (ARORO). It also explains why we consider the on-the-day approach should apply if there is no transition between the current approach and the trailing average.

In setting out our reasons for this view, this appendix is structured as follows:

- Section B.1 establishes how we interpret the ARORO. This is with a particular focus on defining efficient financing costs (section B.1.1) and how the concept of a benchmark efficient entity interacts with the ARORO (section B.1.2).
- Section B.2 sets out what is required for us to form an allowed return on debt that contributes to the achievement of the ARORO. This includes:
    - section B.2.1—the need to provide ex-ante compensation for efficient financing costs (ex-ante efficient compensation) as opposed to providing compensation for historically incurred costs
    - section B.2.2—why we consider our approach is consistent with the National Electricity Law / National Gas Law (NEL/NGL)
    - section B.2.3—why we consider a revenue-neutral transition (in a present value sense) is required if there is a change in the methodology (or approach) for estimating the allowed return on debt (assuming that both methodologies can achieve the ARORO but produce different estimates at a given point in time).
- Section B.3 analyses the on-the-day and trailing average approaches to establish the extent these approaches can contribute to the achievement of the ARORO.
- Section B.4 establishes why a full transition can contribute to the achievement of the ARORO when moving from an on-the-day to a trailing average approach.
- Section B.5 explains why an immediate (or hybrid) transition will not achieve the ARORO given current interest rates relative to historical interest rates. This section also explains why, to achieve the ARORO, the on-the-day approach continues if there is no revenue-neutral transition from the current on-the-day approach.

B.1 Interpretation of the ARORO

The ARORO provides that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the

[441] For clarity, that is 100% of the base rate and debt risk premium components of the allowed return on debt.

provision of standard control, prescribed transmission or reference services (regulated services).[442] Given this, applying the ARORO requires an understanding of:

- efficient financing costs
- the degree of risk that applies to a benchmark efficient service provider in respect of the provision of regulated services.

We elaborate on these components of the ARORO in the following sections.

B.1.1 Efficient financing costs

The ARORO provides for a rate of return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of regulated services. Given this, it is important to understand efficient financing costs.

Economists typically think of efficiency in three dimensions: productive, allocative and dynamic. Table 3-26 sets out how this applies in the context of debt financing.

Table 3-26 Application of economic efficiency to debt financing

Dimension of efficiency	Economic meaning[443]	Application to debt financing[444]
Productive efficiency	Achieved when output production is at minimum cost. This occurs when no more output can be produced, given available resources. The economy is on its production possibility frontier. Productive efficiency incorporates technically efficiency. This refers to the extent that it is technically feasible to reduce input without decreasing the output or increasing any other input.	Refers to least cost financing (that is, the lowest required return on debt) 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.

[442] NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR, r. 87(3).

[443] See Productivity Commission, *On efficiency and effectiveness: Some definitions*, May 2013, p. 3

[444] We have previously discussed this in AER, *Better regulation: Rate of return guidelines consultation paper*, May 2013, pp. 75–76.

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

Because the market for capital finance is competitive, a benchmark efficient entity is expected to face competitive prices in the market for funds. Therefore, we consider efficient debt financing costs are reflected in the prevailing cost of debt observed in capital markets for an investment with a similar degree of risk as that which applies to a service provider in respect of the provision of regulated services.[445] As Alfred Kahn stated:[446]

> The public utility company competes with all other companies in the economy for the various inputs of its production process—for labour, materials, and capital. To the extent that these are supplied in open markets (instead of, for example, under negotiated bids), in principle there ought to be readily available objective measures of the prices of these inputs that have to be incorporated in the cost of service. This is clearly true of the capital input: since the regulated company must go to the open capital market and sell its securities in competition with every other would-be issuer, there is clearly a market price (a rate of interest on borrowed funds, an expected return on equity) that it must be permitted and enabled to pay for the capital it requires

Similarly, Associate Professor Graham Partington and Professor Stephen Satchell (Partington and Satchell) interpret efficient financing costs as the opportunity cost of capital, which is a market rate of return for assets with a given level of risk.[447] They advise the opportunity cost of debt is generally measured using the (appropriately benchmarked) yield to maturity.[448] They also consider our use of a benchmark BBB+ credit rating and ten year term is appropriate.[449]

We consider that productive, allocative and dynamic efficiency are advanced by employing a return on debt that reflects prevailing rates in the market for funds. This will also promote the long term interests of consumers in line with the National Electricity Objective / National Gas Objective (NEO/NGO).[450]

B.1.2 Benchmark efficient entity

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445 We note the cost of debt (from a firm's perspective) is also known as investors' required rate of return on debt (from an investors' perspective).

446 Kahn, A.E., 'The economics of regulation: Principles and institutions', The MIT Press, Massachusetts, 1988, p. 45.

447 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 15.

448 However, Partington and Satchell note the yield to maturity overstates the (expected) opportunity cost of risky debt because it is based on the promised return, which exceeds the expected return on risky debt (due to default risk). See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 28.

449 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 31.

450 The NEO is to 'promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to - (a) price, quality, safety, reliability and security of supply of electricity; and (b) the reliability, safety and security of the national electricity system'. Similarly the NGO is to 'promote efficient investment in, and efficient operation and use of natural gas services for the long term interest of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas'.

We consider a benchmark efficient entity would be 'a pure play, regulated energy network business operating within Australia'. This has been adopted in:

- The rate of return guidelines published in December 2013 (the Guideline).[451] It is worth noting that while some service providers raised concerns with this during the Guideline development process, none objected to a notion that' a benchmark efficient entity' as referenced in the ARORO, would be an entity providing regulated services. [452] To the contrary, stakeholders recognised that price and revenue caps had particular roles in mitigating risk as well as other features of the regulatory framework such as maintenance of the regulatory asset base. [453]
- Our previous 2009 weighted average cost of capital review.[454]
- Our rate of return decisions following the publication of the Guideline.[455]

We have devoted considerable time to considering the characteristics of a benchmark efficient entity in the Guideline and this decision. We consider a 'benchmark' is a reference point or standard against which performance of achievements can be assessed.[456] For a benchmark to be useful, it must 'fairly and accurately represent the key attributes of the market segment or financial instrument in question'.[457] As the AEMC recognised (underline added for emphasis):[458]

> In order to meet the NEO and the NGO, this [allowed rate of return] objective reflected the need for the rate of return to "correspond to" the efficient financing costs of a benchmark efficient entity, this entity being one with similar circumstances and degree of risk to the service provider.

Since the submission of proposals in the matters under consideration, a debate has arisen as to whether a benchmark efficient entity would necessarily be unregulated. In their recent revised proposals, service providers submitted that a benchmark efficient entity with a similar degree of risk in respect of the provision of regulated services must be an unregulated business.[459] This followed the Tribunal hearing in an application for

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451 AER, *Better regulation: Rate of return guideline*, December 2013, p. 7.

452 AER, *Draft rate of return guideline*, August 2013, p. 9.

453 APA Group, *Submissions responding to AER draft rate of return guideline*, 11 October 2013, pp. 12–16; APIA, *Meeting the ARORO? A submission to the AER's draft rate of return guideline*, 11 October 2013, p. 11; MEU, *Comments on the draft guideline*, October 2013, p. 12.

454 AER, *WACC review, final decision*, May 2009, p. 82.

455 These include decisions for ActewAGL gas, Amadeus gas pipeline, Australian Gas Networks, Ausgrid, AusNet Services distribution , CitiPower, Directlink, Endeavour Energy, Energex, Ergon Energy, Essential Energy, , Jemena Electricity Networks, Jemena Gas Networks, Powercor, SA Power Networks, TasNetworks, TransGrid and United Energy.

456 The World Bank and OECD have used this definition in OECD, *Glossary of key terms in evaluation and results based management*, 2002, p. 18, World Bank, *How to build M&E systems to support better government*, p. 138.

457 CFA Institute, *Benchmarks and indices: Issue Brief*, April 2013, p. 2.

458 AEMC, *Rule determination: Economic regulation of network service providers and price and revenue regulation of gas services*, 29 November 2012. p. 43.

459 ActewAGL, *Appendix 5.01 detailed response to rate of return, gamma and inflation*, January 2016, p. 18; AGN, *Attachment 10.26 response to draft decision: Rate of return*, January 2016, p. 25; APA Group, *Amadeus Gas Pipeline access arrangement information*, January 2016, p. 24; AusNet Electricity Services, *Revised regulatory*

review of revenue determinations by Networks NSW, and ActewAGL which resulted in the Tribunal recently forming the view that a benchmark efficient entity referred to in the ARORO is likely not a regulated entity.[460]

We did not consider this issue prior to the Tribunal's decision because it had not been raised substantively by any service provider.[461] Consequently, the Tribunal did not have our fully formed view and reasoning before it when it considered this issue. We consider the Tribunal may have come to its position because it did not have our fully formed arguments before it. We intend to reconsider this issue fully when we undertake the remittal of the ACT and NSW electricity distribution service providers and JGN decisions. We base our analysis in this decision on the brief material submitted by ActewAGL and other service providers with coincident decisions.

After considering the material submitted in recent revised proposals, we maintain our view that the characteristic 'regulated' should be retained for a benchmark efficient entity when carrying out our analyses.[462] For our analysis, see 'elements of the ARORO' under section 3.3.3 of attachment three.

Regulation has a fundamental impact on the risk characteristics of a service provider in the provision of regulated services. Regulation provides a range of risk mitigation treatments that are unavailable to firms in competitive markets such as a revenue cap (or price cap), preservation of capital in a regulated asset base, pass through arrangements and shipwreck clauses.[463]

Nevertheless, even if a benchmark efficient entity was necessarily unregulated, we do not consider this would affect our conclusions. Our approach to the cost of debt would be applicable to an unregulated firm if it had a similar degree of risk to the service provider in providing regulated services. Further, irrespective of whether a firm is regulated or not, efficient financing costs reflect the current (or prevailing) forward looking costs observed in capital markets.

B.2 Requirements under the ARORO

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proposal, 6 January 2016, p. 163; CitiPower, *Revised Regulatory Proposal 2016—2020*, 6 January 2016, p. 332; JEN, *Attachment 6-1 rate of return, gamma, forecast inflation, and debt and equity raising costs*, 6 January 2016, p. 16; Powercor, *Revised regulatory proposal 2016–20*, 6 January 2016, p. 326; United Energy, *2016 to 2020 revised regulatory proposal*, 6 January 2016, p. 79.

460 Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 914.

461 The AER submitted before the Tribunal that the contention raised before the Tribunal by Networks NSW and ActewAGL that the benchmark efficient entity was an unregulated firm was not raised and maintained before the AER, and was therefore precluded from being raised in submissions to the Tribunal by reason of s71O of the NEL. The Tribunal formed the view that the issue was raised by Networks NSW and by ActewAGL in submissions before the AER. The AER has sought judicial review by the Federal Court of this component of the Tribunal's decision.

462 That is, revised proposals submitted by ActewAGL, AGN, APTNT, AusNet Services distribution, CitiPower, JEN, Powercor and United Energy.

463 NGR, cl. 87(3). Similar wording is found in NER, cl. 6.5.2(c) and NER, cl. 6A.6.2(c).

The ARORO provides that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of regulated services.[464] We consider this requires us to set an allowed rate of return that appropriately compensates investors on their capital investments (in an ex-ante sense) and aims to minimise the long run cost of capital (all else being equal).[465] By appropriate compensation we mean that the ex-ante return should be commensurate with the expected return in the capital market for an investment with a similar degree of risk as that of a benchmark efficient entity in the position of the service provider supplying regulated services.[466] We consider this is the efficient return expected in a competitive capital market, consistent with models underpinning financial theory on efficient markets.[467]

We elaborate on this in the following sections by setting out why and how a rate of return that meets the ARORO must:

- provide for ex-ante efficient compensation
- be consistent with the NEL/NGL
- require a revenue-neutral transition if there is a change in the methodology used to estimate the allowed return on debt (assuming that both methodologies can meet the ARORO but produce different estimates across time).

B.2.1 Ex-ante efficient compensation

We consider a rate of return that meets the ARORO provides ex-ante compensation for efficient financing costs (we refer to this as ex-ante efficient compensation).

We consider ex-ante efficient compensation should result in the ex-ante allowed return on capital cash flows having a present value equal to the present value of the ex-ante efficient cost of capital cash flows required to finance the regulatory asset base (RAB). This means we must set, ex-ante, an allowed rate of return for a benchmark efficient

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[464] NER, cl. 6.5.2(c); NER, cl. 6A.6.2(c); NGR, r. 87(3).

[465] We must also apply the rules in a manner consistent with the RPPs in the NEL. This requires providing regulated service providers a reasonable opportunity to recover at least efficient costs and allowing for a return commensurate with the regulatory and commercial risk involved in providing direct control services. We should also provide effective incentives to promote economic efficiency and have regard to the economic costs and risk of the potential for under and over investment by a regulated service provider.

[466] We consider this is commensurate with definition of a 'fair return' to capital in Leland, H.E., 'Regulation of natural monopolies and the fair rate of return, *The Bell Journal of Economics and Management Science*, Vol. 5, No. 1, spring 1974, p. 7. Here, a fair return to capital is a pattern of profits across states of nature just sufficient to attract capital to its present use, which is equivalent to the stock market value of the firm equalling the value of a firm's assets.

[467] For instance, this is consistent with zero expected returns in excess of equilibrium expected returns and 'fair game' models of expected returns. For a brief explanation of 'fair games' see Malkiel, B. G. and Fama, E. F. 'Efficient capital markets: A review of theory and empirical work, *The Journal of Finance,* 25: 383-417, 1970.

entity such that the return on its investment (in its RAB) equals its efficient cost.[468] This is a zero net present value (NPV) investment condition,[469] which is a forward looking concept that shows a benchmark efficient entity is provided with a reasonable opportunity to recover at least efficient financing costs over the life of its investment (in its RAB). Partington and Satchell described it as follows:[470]

> 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.

As discussed in section 3.3.3 and B.1.1, we consider efficient financing costs, for debt and equity, should be based on (appropriately benchmarked) prevailing market rates. This reflects the current opportunity cost of capital for investments of similar risk to a benchmark efficient entity in the position of a service provider supplying regulated services.[471] The opportunity cost of capital is the rate used to discount firms' expected future cash flows in NPV calculations.[472]

Under the ex-ante regulatory regime, we reset the allowed rate of return (through the returns on debt and equity) at the commencement of each regulatory period (or annually for the allowed return on debt if we use a trailing average). If the allowed rate of return is reset to reflect the prevailing market cost of capital, it provides ex-ante efficient compensation over each reset period.[473]

As shown in section B.3, the on-the-day approach resets the allowed return on debt to reflect the prevailing market cost of debt at the commencement of each regulatory period. Therefore, it provides ex-ante efficient compensation on debt capital over each regulatory period and over the life of the investment (that is, over the term of the

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[468] See SFG, *Preliminary analysis of rule change proposals: Report for AEMC*, February 2012, p. 41; Brennan, *Depreciation, investor compensation and, welfare under rate-of-return regulation*, Review of industrial organisation, 1991, 6, p. 75. In his article, Brennan stated, 'With regard to investor compensation, the basic goal of regulation is to give investors an income stream just sufficient to cover the costs of their assets, and no more'.

[469] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

[470] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

[471] See, Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill, Ed. 10, 2009, pp. 427, 434; Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 15.

[472] Partington and Satchell state that, 'the opportunity cost of capital is the discount rate that determines the market value of the benchmark efficient entity' (see Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 15, 29).

[473] See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 14–15; SFG, *Preliminary analysis of rule change proposals: Report for AEMC*, February 2012, p. 47.

RAB).[474] The trailing average approach resets one tenth of the allowed return on debt to reflect the prevailing market cost of debt at the commencement of each regulatory year. As such, it provides ex-ante efficient compensation on debt capital only over the term of the RAB if a full transition is applied.[475]

The concept of ex-ante efficient compensation can be likened to the valuation of a coupon paying security with interest payments that are either fixed at issuance or reset periodically. Similarly, the regulatory regime allows the regulator to set (ex-ante) a series of fixed cash inflows (revenues) for a service provider that is reset periodically. The basic pricing formula for a debt security (for example, a bond) at time $t = 0$ is as follows:[476]

$$P_0 = \sum_{t=1}^{T} \frac{C_t}{(1+r_0)^t} + \frac{P_T}{(1+r_0)^T}$$

where: P_0 is the price of the bond at time 0

C_t is the coupon (or interest) payment at time t—$C_t = c * P_T$

c is the coupon rate

r_0 is the required rate of return or cost of capital (based on market rates) at time 0

P_T is the face (or par) value of the bond (or principal repayment) at maturity.

The above formula shows that for a bond's price to equal its face (or par) value, at any time 0, the coupon rate (which is akin to the allowed rate of return) must be set (or reset) to equal the prevailing cost of capital.[477] If the coupon rate is set (or reset) to a value above (below) the prevailing cost of capital, the price of the bond would trade above (below) its face value. This means the investor that paid the face value would be ex-ante over (under) compensated relative to other investments of similar risk.

Compensation for historically incurred costs

[474] The expected future cash flows under an on-the-day methodology can be likened to a long term floating rate security where the coupon rate is reset at the commencement of each regulatory period.

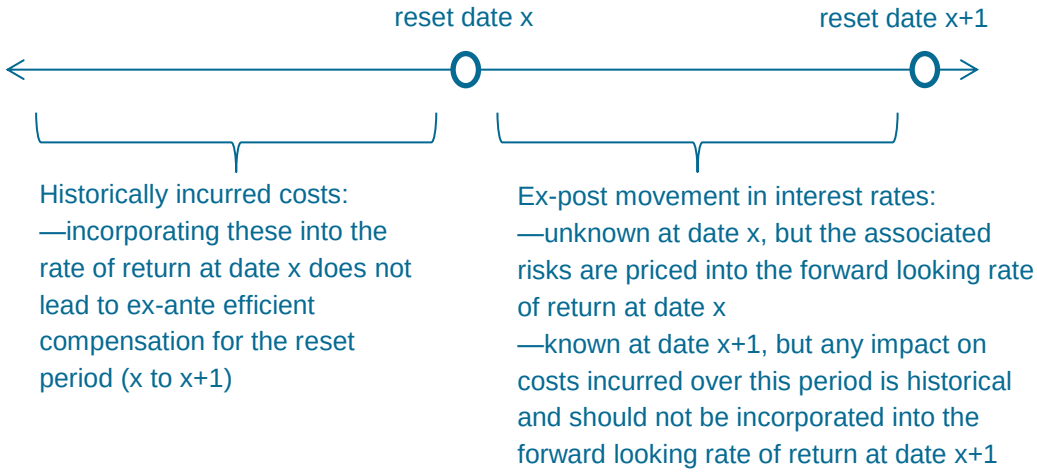
[475] The expected future cash flows under a trailing average methodology can be likened to 10 long term floating rate securities where the coupon rates are reset every ten years. Each floating rate security covers a 10 per cent 'investment portion' in the RAB where they receive the net operating cash flows generated from these investment portions.

[476] Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill, Ed. 10, 2009, p. 85.

[477] The required rate of return for a fixed term bond is the par yield in the market for fixed term bonds with similar characteristics (e.g. term and credit rating). However, we note that for a floating rate bond, the yield to equate the price to the face value may only equal the par yield on a fixed term bond with a maturity equal to the reset date of the variable rate note under certain assumptions. This may not include future default risk beyond the reset date. We discuss the valuation of a long term floating rate security as a conceptual analogy to our regulatory regime. This does not imply that the allowed return on debt should be equal to the required return on a floating rate bond. We use the par yield on fixed-term debt to calculate the allowed return on debt. Given we benchmark the cost of debt from the private sector service providers we regulate, we consider our use of the par yield on fixed term debt is appropriate.

We do not interpret the ARORO to require us to compensate a benchmark efficient entity for historically incurred financing costs where this will lead to compensation that would not be ex-ante efficient.

We consider setting an allowed rate of return that provides ex-ante efficient compensation gives a benchmark efficient entity a reasonable opportunity to recover at least efficient financing costs. This sets a forward looking return on investment based on investor expectations, and does not provide compensation for actual (historical) cost outcomes that can only be identified ex-post. As such, we consider ex-post movement in interest rates (after the allowed rate of return has been set for a regulatory period) do not affect the principle of ex-ante efficient compensation as long as the ex-ante rate of return appropriately reflects the risk of the investment in the RAB.[478] Partington and Satchell agree with this view.[479] The timeline below shows how we consider ex-post movements in interest rates (and historical costs) relate to ex-ante efficient compensation.



If, at reset date x+1, we set an allowed rate of return that provides compensation for a service provider's actual (historical) cost outcomes from the previous period, we would effectively remove realised gains or losses from risk it had previously borne. The regulatory regime is an ex-ante regime that is not intended to remove all risk from service providers and their capital investors. We set a forward looking allowed rate of return that compensates investors with a risk premium over the risk free rate for the compensable risk of their investment. The risk premiums we set (on both debt and equity) are based on appropriate benchmark returns from capital markets. If we

[478] Specifically, under the rules, the rate of return must reflect the risk of a benchmark efficient entity with a similar degree of risk as a service provider supplying regulated services. This is consistent with Partington and Satchell's advice that 'the fundamental principle is that what drives the required return on the investment is the risk of the assets' (see Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 21–22).

[479] See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 35–36.

removed all risks facing capital investors then the appropriate return would theoretically be the risk free rate.

Critically, if an investor, at date x+1, looks back and sees it made a gain (or loss) in relation to an investment it made at date x, this does not mean the investor is incorrectly over (or under) compensated. The gain (or loss) is due to the realisation of risk that was associated with the investment when it was made at date x. Likewise, service providers (and their investors) are not incorrectly compensated because they (at date x+1, looking back) have made a loss (or gain) due to ex-post movements in interest rates impacting the value of their liabilities differently to their regulated revenue set at date x. Again, the gain (or loss) is due to an ex-post realisation of risk, risk for which investors received ex-ante compensation for bearing. This is accepted risk, which is a critical part of the choice to make a risky investment.

In an investment context there is no need to compensate investors for gains or losses resulting from a realisation of risk for which they have been ex ante efficiently compensated for bearing. In our regulatory context, investors have invested in the service providers we regulate under the knowledge they would bear the interest rate risk associated with the on-the-day methodology. In addition, the way we benchmark the allowed rate of return (in particular, the return on equity) provides compensation for bearing this risk (see below). On this basis, we consider no further compensation for the gains or losses associated with ex-post movements in interest rates is required or appropriate.[480]

Desirability of minimising mismatch

In determining the allowed return on debt, we are required to have regard to the 'mismatch' between a benchmark efficient entity's actual debt cost outcomes (or cash outflows) and the return on debt allowance.[481] However, we do not consider that this permits us to set a rate of return that will not meet the ARORO or will not achieve the NEO/NGO.

Rather, some mismatch between the actual (cash) debt costs and the regulated debt allowance is an intrinsic part of incentive regulation—whether the allowance is set using a trailing average approach or otherwise. This is because a mismatch can only be identified ex-post and we set an ex-ante fixed regulatory allowance based on forecast efficient costs. This allowance is not revised ex-post for a service provider's actual (historical) costs (see above).[482] SFG recognised this in its report for the

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[480] Also see Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 32–37, 39, 43.

[481] As required under NER, cl 6.5.3(k) & 6A.6.2(k), which requires us to have regard to 'the desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the allowed rate of return objective'.

[482] See, for example, AER, *Submission to the Productivity Commission: inquiry into electricity network regulation*, April 2012, p. 4. It is worth noting that while the rules establish an ex-ante regulatory regime, they also include some ex-post elements. For example, see provisions on cost pass throughs under NER, cl. 6.6.1; NER, cl. 6A.7.3; NGR, r. 97(1)(c).

Australian Energy Market Commission (AEMC). Here, SFG considered a mismatch between a firm's debt service payments and the regulatory allowance could arise for a number of reasons, including:[483]

- 'because the cost of capital is, in fact, variable over time' rather than because there is problem with the measurement
- because 'there may be a difference between the rate at which the business can borrow and the regulatory benchmark'.

We consider a service provider's ex-post mismatch does not (of itself) imply the regulator is setting a rate of return that will not appropriately compensate a benchmark efficient entity for its efficient cost of debt finance. A mismatch does not mean the present value of the ex-ante allowed return on debt (or return on capital) cash flows will not equal the present value of a benchmark efficient entity's ex-ante efficient debt financing costs (or overall capital financing costs). Rather, we consider it is the risk of a mismatch occurring that is relevant to ex-ante regulation. This risk is a form of interest rate risk.

In section B.3.3, we show (through present value relationships) that both an on-the-day and trailing average approach (with a full transition) should, in principle, provide the same ex-ante compensation for a benchmark efficient entity's efficient financing costs over the term of the RAB. We consider these present value relationships show both approaches can provide a benchmark efficient entity with ex-ante efficient compensation and meet the ARORO. There is no ex-ante over- or under-compensation overall (that is, over the term of the RAB), regardless of a benchmark efficient entity's actual (ex-post) cost outcomes.

We consider ex-ante systematic over- or under-compensation can only occur if the interest rate risk arising from an expected mismatch affects a benchmark efficient entity's cost of capital and the allowed rate of return does not reflect this. However, we benchmark the allowed rate of return (which requires consistently benchmarking the return on debt, return on equity and gearing)[484] on observed data from service providers comparable to a benchmark efficient entity operating under an on-the-day approach (where the risk of mismatch is likely more material).[485] Therefore, the allowed rate of return should be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as a regulated service provider operating under this approach. To the extent a benchmark efficient entity's investors

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[483] SFG, *Rule change proposals relating to the debt component of the regulatory rate of* return, August 2012, p. 35.

[484] In particular, we consider any mismatch between the regulatory return on debt allowance and a benchmark efficient entity's actual debt costs will flow through to equity holders (as they are residual claimants). The equity beta is determined using historical data (when an on-the-day approach was in effect). We consider this should capture any interest rate risk associated with an on-the-day approach, to the extent that it is systematic.

[485] For instance, we use the equity returns of service providers comparable to a benchmark efficient entity ('comparator firms') when estimating the equity beta. We also used comparator firms when estimating the credit rating and gearing of a benchmark efficient entity. This assists us in estimating an allowed rate of return that would compensate a benchmark efficient entity for the default risk and systematic risk more broadly that it would have faced under an on-the-day approach.

expect that moving to a trailing average approach would reduce the risk they require compensation for, our allowed return on debt will likely be generous to service providers.[486] In particular, our estimate of systematic risk (beta) includes historical data, which will capture the systematic risk that a benchmark efficient entity would have been exposed to under the on-the-day approach.

We also note that Partington and Satchell consider mismatch between a service provider's actual incurred cost of debt and allowed return on debt is a consequence of its particular debt financing choices. They do not consider this affects a benchmark efficient entity's opportunity to earn the efficient return on its RAB.[487]

Moreover, the desirability of minimising (ex-post) debt cash flow mismatch is not the only type of interest rate mismatch risk we consider relevant. The rules require us to have regard to the desirability of minimising this type of mismatch for a benchmark efficient entity. However, there can also be a mismatch between the allowed return on debt and the prevailing cost of debt for a benchmark efficient entity at the time at which the allowed rate of return is reset. We consider this can affect the ability of a return on debt approach to provide ex-ante efficient compensation, and can also result in investment distortions.[488] To the extent that this type of mismatch results in compensation that is not ex-ante efficient, we consider this would not meet the ARORO.

While a trailing average approach is expected to reduce the former type of mismatch relative to an on-the-day approach, an on-the-day approach is expected to reduce the latter type of mismatch relative to a trailing average approach.

B.2.2 Consistency with the NEL/NGL

We consider an allowed rate of return that meets the ARORO should lead to economically efficient investment, provision of and use of infrastructure, consistent with the NEL/NGL.[489] This allowed rate of return should also provide service providers with a reasonable opportunity to recover their efficient costs. We consider our interpretation of the ARORO is consistent with the wording in the NEO/NGO in the NEL/NGL. Our view appears consistent with the views of the AEMC when it stated:[490]

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[486] Compensable risk could decrease if investors consider a benchmark efficient entity is less exposed to interest rate risk under the trailing average approach. This could occur if the trailing average approach allows a benchmark efficient entity to better match its debt cash outflows to its allowance than under the on-the-day approach. However, we note Partington and Satchell consider that, 'It is difficult to see how the use of the trailing average will materially reduce the financing costs of firms since such costs are primarily driven by the assets the firms invest in'. See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 38.

[487] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 18, 35–36.

[488] See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 37–38; SFG, *Preliminary analysis of rule change proposals: Report for AEMC*, February 2012, p. 41.

[489] NEL, s. 7A(3); NGL, s. (24)(3).

[490] AEMC, *Final Rule Determination: Economic regulation of network service providers, and price and revenue regulation of gas services*, 29 November 2012, p. 14.

> If the rate of return estimate is set to the efficient required return, there will be no incentive for under- or over- investment. Such incentives for inefficient investment become more pronounced when the rate of return estimate differs from the efficient required return.

The concept that a reasonable return to investment is important to achieving efficient regulatory investment appears common sense. Setting too high (or low) an expected return relative to the expected return on alternate equivalent risk investments would be expected to lead to distorted over (or under) investment in regulated assets (all else being equal). The aim of setting an expected return to achieve efficient investment also appears broadly accepted in regulatory literature.[491] This is also consistent with advice from several CCP members that stated:[492]

> The AER must have regard to the impact of their RoR decision on capex incentives. Given that the DNSPs' revised proposal is significantly above current costs of capital for BBB/BBB+ rated companies, there will be perverse incentives to overinvest in the network.

Similarly, Partington and Satchell consider the rule requirements are consistent with the zero NPV investment condition, stating:[493]

> The national electricity and gas objectives are 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. There is very clear criterion that can be applied to meet these requirements. That criterion is that investment in regulated assets should be a zero NPV activity.

B.2.3 Requirement for a revenue-neutral transition if there is a regime change

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[491] Averch and Johnson show that if a regulatory rate of return exceeds the firm's true cost of capital, it has an incentive to choose too much capital relative to labour. Averch, H, Johnson, L.L., 'Behaviour of the Firm under Regulatory Constraint', *American Economic Review*, Vol. 52, No. 5, December 1962, pp. 1062–1069. Littlechild describes, 'Revenues need to be adequate to cover operating expenses and to ensure finance for necessary investment. They should not be so excessive as to encourage their dissipation on dubious schemes'. Littlechild, S., 'Economic regulation of privatised water authorities and some further reflections, *Oxford review of economic policy*, Vol. 4, No. 2, summer 1988, p. 47. Cambini and Rondi find the cost of capital is positively correlated with investment under incentive regulation. Cambini, C., Rondi, L., 'Incentive regulation and investment: evidence from European energy utilities, *Journal of Regulatory Economics*, Vol. 38, 2010, p. 18. Greenwald notes that 'less than "fair" rates of return should simply elicit no investment' in Greenwald, B.C., 'Rate base selection and the structure of regulation', *The RAND Journal of Economics*, Vol. 15, No. 1, Spring 1984, p. 85.

[492] CCP (David Headberry, Bev Hughson and David Prins), *Submission to the AER: An overview—Response to the AER Preliminary Decisions and revised proposals from Victorian electricity DNSPs for a revenue reset for the 2016–2020 regulatory period*, 22 February 2016, p. 35.

[493] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

We consider that both an on-the-day methodology to setting the cost of debt and a trailing average methodology can meet the ARORO. However, in moving between different approaches, a transition that is revenue-neutral in a present value sense will meet the ARORO. Section B.3 further discusses the position that either approach can result in a reasonable return on capital (and therefore could meet the ARORO). This position also appears consistent with SFG's view that the AEMC noted in its final rule determination where it stated:[494]

> In its report, SFG highlighted that for a given definition of the return on debt for an efficient benchmark service provider (in particular, the assumed credit rating and term to maturity) the average cost of debt will be the same over the long run. This is regardless of whether the return on debt estimate is based on the prevailing debt cost spot rate or an average of that spot rate. Changing to an averaging approach will not, in itself, systematically reduce or increase the allowed return on debt in the long run. SFG observed that averaging approaches will by definition result in smoother estimates of the return on debt over time.

We note that when undertaking the rule change in 2012 the AEMC added in clause 6A.6.2(k)(4) that states (emphasis added):

> (k) In estimating the return on debt under paragraph (h), regard must be had to the following factors…
>
> (4) any impacts (including in relation to the costs of servicing debt across regulatory control periods) on a benchmark efficient entity referred to in the allowed rate of return objective that could arise **as a result of changing the methodology** that is used to estimate the return on debt from one regulatory control period to the next.

This clause is explicit in requiring us to have regard to any impacts on a benchmark efficient entity that could arise as a result of a change of methodology. This would include having regard to any material changes in the present value of a benchmark efficient entity's regulated revenue purely due to changing the debt estimation methodology. If such changes increased a benchmark efficient entity's value, then this would benefit its equity holders at the expense of consumers. Conversely, if such changes decreased a benchmark efficient entity's value, then this would cost its equity holders but provide a short term financial benefit to consumers (which may not be a long-term benefit to the extent this results in underinvestment). As such, this methodological change may also have a material negative impact on the confidence in the predictability of the regulatory regime.[495] We consider the AEMC's guidance on the intent of this clause is consistent with our approach (emphasis added):[496]

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494 AEMC, *Final Rule Determination: Economic regulation of network service providers, and price and revenue regulation of gas services*, 29 November 2012, pp. 74–75.

495 HoustonKemp, *Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 5.

496 AEMC, *Final Rule Determination: Economic regulation of network service providers, and price and revenue regulation of gas services*, 29 November 2012, p. 85.

> The purpose of the fourth factor is for the regulator to have regard to **impacts of changes in the methodology** for estimating the return on debt from one regulatory control period to another. Consideration should be given to the potential for consumers and service providers to face a significant and unexpected change in costs or prices that may have negative effects on confidence in the predictability of the regulatory arrangements.

We have taken this factor into account and consider our transitional approach is consistent with the intent of this factor. Nevertheless, we consider that irrespective of this factor, our transition approach meets the requirements of the ARORO, NEO/NGO and RPPs. Partington and Satchell and members of the CCP formed a similar view that the full transition to a trailing average in the Guideline would better satisfy the ARORO than the service providers' revised proposals.[497] We also consider that an immediate (or hybrid) transition to a trailing average would result in a material and unexpected change in the present value of a benchmark efficient entity relative to a value consistent with investor expectations formed under the on-the-day regime. If this occurred it would likely increase expected regulatory uncertainty going forward. We consider this may both undermine confidence in the predictability of the regulatory arrangements and not minimise efficient financing costs (all else being equal).[498] For these reasons, we consider a lack of transition to limit uncertainty of regulatory changes affecting the value of the benchmark efficient entity is unlikely to be consistent with achieving the NEO/NGO and the RPPs.

Similarly, SFG advised the AEMC that a transition may be required to limit 'regulatory risk' and to avoid being inconsistent with the NEO and RPPs.[499] SFG also considered that the transition we proposed (the QTC method) would be an appropriate means of transitioning from the current rules (that used an on-the-day methodology) to the use of a historical average cost of debt approach.[500] The desirability for predictability was also commented on by an Expert Panel on Energy Access pricing for the Ministerial Council on Energy in 2006 who noted [emphasis added]:[501]

> Regulatory (and hence investor and user) risk can greatly be reduced if decisions are made in a timely and predictable manner. Timeliness in access decisions (including any merits and judicial review process) is important for

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497 CCP (David Headberry, Bev Hughson and David Prins), *Submission to the AER: An overview—Response to the AER Preliminary Decisions and revised proposals from Victorian electricity DNSPs for a revenue reset for the 2016–2020 regulatory period*, 22 February 2016, p. 36; CCP (David Headberry, Bev Hughson and David Prins), *Submission to the AER: Response to the AER Preliminary Decisions and revised proposals from Victorian electricity DNSPs for a revenue reset for the 2016–2020 regulatory period*, 25 February 2016, p. 88; Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 52.

498 HoustonKemp also held this view in *Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 5.

499 SFG, *Rule change proposals relating to the debt component of the regulatory rate of* return, August 2012, p. 45. Similarly, Partington and Satchell consider an immediate transition to a trailing average approach can be regarded as a material regulatory risk (Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 42).

500 SFG, *Rule change proposals relating to the debt component of the regulatory rate of* return, August 2012, p. 46.

501 Expert Panel on Energy Access Pricing, *Report to the Ministerial Council on Energy*, April 2006, p. 59.

> both reducing the costs of the regime and minimising uncertainty associated with the outcome of the review…
>
> **Equally important is the predictability of those decisions** – that is the development of an approach that gives energy users and investors in transmission and distribution infrastructure confidence that access and pricing outcomes will be guided by known principles that are applied in a consistent manner.

We consider our approach is consistent with the desire for predictability in regulatory decisions by using a transition to avoid material wealth impacts from the change in methodology. HoustonKemp also provided support for a transition when it advised the Essential Services Commission of SA (ESCOSA):[502]

> Consistent with regulatory best practice, a regulatory authority should seek to avoid imposing windfall gains or losses as a result of regulatory changes. A regulatory change that imposes windfall gains or losses will be to the detriment of regulatory certainty and will likely increase the perceived level of regulatory risk, and so the cost of capital.

A transition is also likely to be important for maintaining the incentives on service providers to adopt efficient financing practices under the regulatory regime. We consider this is consistent with the RPPs, which indicate regulated firms should be provided with a range of incentives including incentives that should promote the efficient provision of electricity network/pipeline services.[503] These principles show our regime is intended to be an incentive base regime as opposed to a cost of service regime. To promote efficiency incentives, we consider regulated firms should be required to bear the consequences of their chosen financing approach from the prior regulatory period where returns were set under the on-the-day methodology and any financing decisions they made over this period were made in the expectation this methodology would continue. It could significantly undermine service providers' incentives to manage financial risk efficiently if we provide an allowed return on debt in this decision that results in regulated firms not bearing the consequences of their chosen financing practices. This is because service providers were required to bear and manage this risk.[504]

B.3 On-the-day and trailing average approaches

In this section, we analyse the on-the-day and trailing average approaches to establish whether these approaches can contribute to the achievement of the ARORO. We also explain that, while we consider both approaches would be open to us; we would expect either approach to produce different estimates at given points in time.

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[502] HoustonKemp, *Appropriate objective to guide the setting the cost of debt allowance*, March 2015, p. 5.

[503] NEL, s. 7A(3)(b); NGL, s. 24(3)(b).

[504] See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 42.

From establishing this, we can demonstrate that in changing approaches from the on-the-day to the trailing average approach (or vice versa); a revenue neutral transition (in present value terms) is required to contribute to the achievement of the ARORO.

B.3.1 On-the-day approach

The on-the-day approach estimates the allowed return on debt for a service provider as the prevailing cost of debt as close as possible to the start of the regulatory period.[505] The on-the-day approach is the longstanding return on debt approach adopted by us and generally by other regulators in Australia.[506] While the NER/NGR no longer mandate that we adopt this approach, they still make it available to us.[507] Prior to the rules changes in 2012, the on-the-day approach was used to not only set the return on debt but was used to set the overall allowed rate of return. Post the rule changes, the on-the-day approach will continue to be used to set the allowed return on equity as this remains mandated by the rules.[508]

We consider the on-the-day approach can estimate an allowed rate of return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as a service provider in the provision of regulated services. This is because the on-the-day approach provides service providers with a reasonable opportunity to recover at least efficient costs over the term of the RAB and over each regulatory period (see section B.3.3). Ex-ante efficient compensation holds for each regulatory period under this approach because the entire allowed rate of return is reset to reflect the prevailing market cost of capital at the commencement of each regulatory period. In this way, the allowed revenue under the on-the-day approach can be likened to a form of long term floating rate security where the interest (or coupon) rate is reset to reflect prevailing market rates at the start of each regulatory period. Any compensable risk from the resetting process under the on-the-day approach is largely born by equity holders of the regulated firms. As SFG advised the AEMC, 'any mis-match between the cash inflows and cash outflows in relation to the return on debt will flow through to the equity holders'.[509]

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505 The on-the-day benchmark requires estimating the return of debt of a service provider on the first day of the regulatory period because, in theory, an on-the-day rate is considered the best indication of the opportunity cost of capital at a given point in time. However, in practice, it entails estimating the return on debt over a short averaging period as close as practically possible to the start of the regulatory period. This is because using the on-the-day approach exposes the service provider to day-to-day volatility in the market rates.

506 The on-the-day approach has been used to estimate the return on debt of service providers in Australia since at least 1998, by the ACCC/AER as well as other state regulators. See, for example, ACCC, *Final decision: APA GasNet transmission*, October 1998, p. xvi; ACCC, *Statement of principles for the regulation of electricity transmission revenues—background paper*, December 2004, pp. 96, 109. At this time, the risk free rate and debt risk premium were estimated separately and added together to generate a return on debt estimate.

507 See NER, cl. 6.5.2(j)(1); NER, cl. 6A.6.2(j)(1); NGR, r. 87(10)(a).

508 NER, cl. 6.5.2(g); NER, cl. 6A.6.2(g); NGR, cl. 87(7).

509 SFG, *Rule change proposals relating to the debt component of the regulated rate of return: Report for AEMC*, August 2012, p. 5.

While we have chosen to move towards a trailing average approach (section B.3.2 explains why we consider a trailing average approach is open to us), this does not imply that the on-the-day approach provides an 'incorrect' outcome or an outcome inconsistent with the ARORO. Rather, we consider the on-the-day approach has advantages, including:

- It is consistent with the prevailing market cost of debt as close as possible to the commencement of the regulatory period. As such, it is commensurate with efficient financing costs at the commencement of the regulatory period and can promote efficient investment decisions. It is also internally consistent with how we estimate other components of the allowed rate of return and other building block components.
- It leads to an estimate that is likely to more closely imitate the outcomes of a competitive market near the start of the regulatory period than a trailing average approach.

Consistent with prevailing market cost of debt

As discussed in section B.1.1 and B.2.1, we consider efficient financing costs, for debt and equity, should be based on (appropriately benchmarked) prevailing market rates. As shown mathematically in section B.3, the on-the-day approach resets the entire allowed rate of return (which includes the return on debt) to reflect, as closely as possible, the prevailing market cost of capital (which includes the cost of debt) at the commencement of each regulatory period.

We consider an allowed return on debt that reflects the prevailing market cost of debt promotes efficient investment decisions. When firms make investment decisions, they estimate the cost of capital based on prevailing market rates. This is important because the cost of capital is based on investors' expectations of future returns.[510] Firms then use this estimate to set a discount rate at which they discount the expected future cash flows of the proposed investment in order to determine its viability (that is, whether the NPV of the expected cash flows is greater than or equal to zero).

As discussed in section B.2.1, we consider the ARORO requires us to set an allowed rate of return for a benchmark efficient entity such that the return on its investment in its RAB equals its efficient cost (that is, the zero NPV investment condition). The prevailing market cost of capital is the only discount rate that sets the present value of expected future cash flows equal to the RAB. In its 2012 report to the AEMC, SFG summarised this point by stating:[511]

> The principle which underpins the regulatory framework in Australia is to estimate a price which equates the present value of expected cash flows to the regulated asset base. If the regulated rate of return is set at a rate other than

[510] Peirson, Brown, Easton, Howard, Pinder, *Business Finance*, McGraw-Hill, Ed. 10, 2009, p. 434.

[511] SFG, *Preliminary analysis of rule change proposals: Report for AEMC*, February 2012, p. 4.

> the cost of capital this will no longer hold. Investment decisions will be distorted.

Similarly, Partington and Satchell (who recommend the on-the-day approach) stated:[512]

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

Therefore, we consider the on-the-day approach provides an appropriate signal for investment decisions made near the commencement of the regulatory period. We consider this would promote efficient investment decisions that increase dynamic efficiency. This aligns with the AEMC's view that:[513]

> [the return on debt framework] should try to create an incentive for service providers to adopt efficient financing practices and minimise the risk of creating distortions in the service provider's investment decisions.

If we were to set the allowed return on debt in a different way, it would no longer be an estimate of the cost of debt (and thus the cost of capital) at the time of the determination or access arrangement. For example, under a trailing average approach, the overall allowed return on debt predominately compensates for historical interest rates, rather than for the risk of providing debt finance in the future.[514] Only 10 per cent of the allowed return on debt will compensate for the risk of providing debt finance in the future because 10 per cent of the return on debt is updated annually to reflect prevailing interest rates. As discussed in section B.2.1, this results in a mismatch between the allowed return on debt and the prevailing cost of debt for a benchmark efficient entity at the time of the determination or access arrangement.

Moreover, estimating a forward looking return on debt at the time of the determination or access arrangement is consistent with how we determine the return on equity and other components of the building block model. For example, we determine an allowed return on equity that reflects, as closely as possible, the prevailing market cost of equity at the time of the determination or access arrangement. We also forecast the operating expenditure that will apply for each year of the upcoming regulatory period. Determining the allowed revenue for the regulatory period ex-ante, without within-period revisions, is consistent with the principles of incentive regulation.[515]

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512 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 17.

513 AEMC, *Final Rule Determination: Economic regulation of network service providers, and price and revenue regulation of gas services*, 29 November 2012, p. 73.

514 SFG, *Preliminary analysis of rule change proposals: Report for AEMC*, February 2012, p. 46.

515 See Office of the Regulator General, *Submission to the Productivity Commission review of the national access regime (part IIIA of the trade practices act) position paper*, 2001, p. 6.

Imitates the outcomes of a competitive market

We consider an allowed return on debt that reflects the prevailing market cost of debt at the time of the determination or access arrangement (that is, an on-the-day approach) is likely to promote economic efficiency because:

- Productive efficiency refers to least cost financing (that is, the lowest required return on debt). An allowed return on debt that reflects the (appropriately benchmarked) prevailing market cost of debt will likely promote productive efficiency. This is because a benchmark efficient entity faces competitive prices in the market for funds.
- Allocative efficiency refers to the allowed return on debt reflecting investors' opportunity cost of debt for investments of similar risk. The prevailing market cost of debt at any given time is likely to reflect investors' opportunity cost. This is because the market for capital finance is competitive with many buyers and sellers.
- Dynamic efficiency refers to the existence of appropriate investment incentives. As discussed above, a return on debt that reflects the prevailing market cost of debt provides an appropriate signal for new investment and promotes efficient investment decisions.

Moreover, a return on debt that better reflects the prevailing market cost of debt more closely imitates the outcomes of a competitive market. This is because the current market cost of debt reflects investors' opportunity cost of debt for investments of similar risk.

The current market cost of debt represents the costs that other service providers will face to enter the market. The on-the-day approach is more consistent than the trailing average approach with the theory that prices in a competitive market would be constrained by the entry, or threat of entry, of new providers. This is because in a competitive market, prices are theoretically constrained by entry or the threat of entry.[516] As observed by HoustonKemp:[517]

> when economic regulation was first introduced regulators sought to imitate the outcomes of a competitive market. That is, regulators sought to set prices consistent with the theory that in a competitive market prices would be constrained by the entry, or threat of entry, of new providers. This is colloquially known as the 'new entrant price'.

Similarly, Chairmont captured this concept when it advised:[518]

> The solution should take current market rates and use those to project forward, rather than taking trailing averages as an indicator of future financing costs.

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[516] HoustonKemp, *Memo: Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 1.

[517] HoustonKemp, *Memo: Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 1. Also see Chairmont, *Cost of debt comparative analysis*, November 2013, p. 4.

[518] Chairmont, *Cost of debt comparative analysis*, November 2013, p. 4.

> The look forward approach is consistent with measuring the opportunity cost of capital and for the typical pressures, including from new entrants, faced by participants in an efficient competitive market.

We also note that Partington and Satchell considered the on-the-day approach is consistent with competitive market outcomes, stating:[519]

> The equilibrium in a competitive market is that investments in assets are zero NPV. This implies that firms can expect to recover the current cost of capital, which in the form of the WACC includes the current cost of debt.

B.3.2 Trailing average approach

The trailing average approach estimates the allowed return on debt for a service provider as an average of the cost of debt over 10 years (which is annually updated). This approach is available to us under the NER/NGR.[520]

We consider the trailing average approach can estimate an allowed rate of return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as a service provider in the provision of regulated services. Under the trailing average approach, ex-ante efficient compensation is unlikely to hold for each regulatory period. However, if there is an appropriate (full) transition, it should hold over the term of the RAB. Therefore, service providers would have a reasonable opportunity to recover at least efficient costs over the term of the RAB. We show this in section B.3.3.

Further, the trailing average approach may have particular benefits that an on-the-day approach cannot achieve. For instance, when it advised the AEMC, SFG stated that 'if it can be demonstrated that the benefits of a regulated rate of return which is less variable over time outweigh the costs associated with investment distortions, then a trailing average should be considered'.[521] The potential benefits mainly relate to smoother prices and a potentially reduced mismatch between a benchmark efficient entity's actual debt cost outcomes (or cash outflows) and the allowed return on debt (see section B.2.1), which we discuss further below.

However, the trailing average also has disadvantages relative to an on-the-day approach (see sections 2.1 and 3.1). Given the trade-offs, we do not consider the trailing average is clearly preferable to the continued use of the on-the-day approach. For the reasons discussed in this appendix, we consider a change in methodology (to a trailing average approach) would not contribute to the achievement of the ARORO or meet the NEO/NGO unless it was revenue-neutral (in present value terms) as this would result in incorrect ex-ante compensation.

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519 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 46.

520 See NER, cl. 6.5.2(j)(2); NER, cl. 6A.6.2(j)(2); NGR, r. 87(10)(b).

521 SFG, *Preliminary analysis of rule change proposals: Report for AEMC*, February 2012, p. 41.

Reduced mismatch

In section B.2.1, we introduce and discuss the concept of an ex-post 'mismatch' between a benchmark efficient entity's actual debt cost outcomes (or cash outflows) and the regulatory return on debt allowance in determining the allowed return on debt. We consider an ex-post mismatch can occur for a number of reasons, including because a benchmark efficient entity does not (or cannot) engage in debt financing practices that result in debt cash outflows that match the regulatory return on debt allowance. We explain this below in the context of comparing the trailing average with the on-the-day approach to estimating the return on debt.

In any given regulatory period, a benchmark efficient entity will have existing debt that was previously issued and not yet matured. It will need to pay interest on this debt during the regulatory period, and these interest payments will be based on historical interest rates that prevailed in a previous period. If we adopt an on-the-day approach, then cash outflows from existing debt would be effectively revalued at current market rates.[522] Unless a benchmark efficient entity can engage in debt financing practices that align its debt cash outflows with the regulatory allowance (all else being equal), it is expected that an ex-post mismatch may result. From our observations of past financing practices, it appears that individual service providers (and a benchmark efficient entity) are unlikely to engage in financing practices that fully align its debt cash outflows with the regulatory allowance under the on-the-day approach.

In contrast to the on-the-day approach, a trailing average approach is expected to better account for a benchmark efficient entity's actual (cash) debt costs within a regulatory period because it provides service providers with a return on debt allowance that they can more readily match each regulatory period.[523] As such, this will likely reduce the mismatch between actual debt interest costs of regulated firms and the regulated return on debt allowance.[524] Given that a trailing average approach reduces the risk of cash flow mismatch (a form of interest rate risk), it might better lead to productive efficiency. All else being equal, this reduced risk and the reduced need to enter hedging arrangements might lower the cost of financing.[525]

Nevertheless, it is important to note that an ex-post mismatch does not result in a benchmark efficient entity being ex-ante over- or under-compensated for its efficient debt financing costs for a regulatory period or over the life of its assets (see sections B.2.1 and B.3.3).

B.3.3 Mathematical explanation

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522 Lally, *The cost of debt*, 10 October 2014, p. 3.

523 See AER, *Final decision: TransGrid transmission determination, Attachment 3*, April 2015, p. 150.

524 HoustonKemp, *Memo: Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, p. 4.

525 However, we note Partington and Satchell consider that, 'It is difficult to see how the use of the trailing average will materially reduce the financing costs of firms since such costs are primarily driven by the assets the firms invest in'.

This section provides a mathematical explanation of the difference between the on-the-day and trailing average regimes in present value terms. While the mathematical explanation employs simplifying assumptions, this is for illustrative purposes and the principles hold true in more general situations. That is, mathematically, we demonstrate that in principle:

- The on-the-day approach provides service providers with the reasonable opportunity to recover at least efficient costs over each regulatory period and over the term of the RAB.[526]
- The trailing average approach provides service providers with the reasonable opportunity to recover at least efficient costs over the term of the RAB.

If switching between regimes, a full transition provides service providers with the reasonable opportunity to recover at least efficient costs over the term of the RAB. That is, the same ex-ante compensation should be achieved under: an on-the-day regime, a trailing average regime, or a switch from one regime to the other (but only if the switch is revenue neutral).

We use the following notation:

- CF_t denotes net operating cash flows for year t[527]—that is, revenue less operating expenditure (opex).[528] Under our depreciation assumptions, this can be expressed as $CF_t = r_t \times K_{t-1}$, where $r_t \times K_{t-1}$ is the return on capital cash flow.
- r_t is the allowed rate of return (which is reset periodically).[529]
- K_t is the closing RAB at the end of year t (which equals the opening RAB at the beginning of year $t+1$).
- $r_{i,j}$ is the ex-ante cost of capital prevailing in the market for the investment at time i,[530] with a term of j years—used to discount the expected cash flows.
- $E[.]$ denotes expected value.
- PV_t denotes present value, at year t (can also be referred to as market value).

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526 This is consistent with NEL s.7A(2). Lally advised that this principle in the NEL is 'equivalent' to the NPV principle. See Lally, *The risk free rate and the present value principle*, 22 August, 2012. SFG also appears to support using the NPV principle to assess rate of return approaches. SFG, *Preliminary analysis on rule change proposals: Report for AEMC*, February 2012, p. 47.

527 We assume the expected net operating cash flows for year t are equal to those allowed through our regulatory determinations / access arrangements.

528 That is, CF_t entails subtracting operating expenditure (opex) from total revenue on the assumption that the regulatory allowance for opex covers actual opex costs incurred. For clarity, this assumption is for ease of exposition and does not affect whether the ARORO is satisfied.

529 r_t is the allowed rate of return applied to year t (that is, to determine the net operating cash flow for year t). However, it is calculated using data in year $t-1$.

530 The investment is an investment with similar degree of risk as a service provider with respect to the provision of regulated services.

For simplicity, we assume within-period investment equals depreciation in all periods prior to the end of the term of the RAB (year $t = T$),[531] where all initial capital (K_0) is returned (as K_T).[532] Therefore, within-period investment cancels out and $K_0 = D_1 + D_2 + \cdots + D_T = K_T$, where D_t is depreciation (or return of capital) for year t.

We note the mathematical explanation in this section is a simplification of reality. We use it to demonstrate the principle that the allowed rate of return should be set (and periodically reset) such that the ex-ante allowed return on (and of) capital cash flows equals the ex-ante cost of a benchmark efficient entity's investment in its RAB (in present value terms). This gives service providers a reasonable opportunity to recover at least efficient financing costs over the term of the RAB. As Brennan (1991) stated:[533]

> With regard to investor compensation, the basic goal of regulation is to give investors an income stream just sufficient to cover the costs of their assets, and no more

On-the-day approach

For simplicity, assume the term of the risk free rate matches the regulatory period (five years) under the on-the-day approach.[534] If we provide service providers with a reasonable opportunity to recover at least efficient costs over a regulatory period commencing year t, then the present value of expected net operating cash flows over this period plus the closing RAB (at $t + 5$) should equal the opening RAB (at t). Under our depreciation assumptions, the opening RAB (at t) will equal its initial value (at $t = 0$).

This present value principle should hold under the on-the-day approach because we reset the allowed rate of return to reflect the (appropriately benchmarked) prevailing market cost of capital ($r_{t,5}$)[535] at the commencement of each regulatory period. We show this below:

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[531] The end of the term of the RAB occurs at time T when the final return on capital and return of capital revenue allowances are provided. After this year there is no more capital finance to return to investors.

[532] We note there are academic articles which support the view that the depreciation schedule does not affect the zero NPV investment condition (all else equal). See for example Schmalansee, *An expository note on depreciation and profitability under rate of return regulation*, Journal of Regulatory Economics, 1989, 1, pp. 293–298.

[533] Brennan, *Depreciation, investor compensation and, welfare under rate-of-return regulation*, Review of industrial organisation, 1991, 6, p. 75.

[534] In practice, we have used a 10 year term to estimate the allowed rate of return. Given interest rates on longer-term debt securities are often higher than those on shorter-term debt securities, this would lead to overcompensation all else being equal. However, we assume no material overcompensation given this excess allowance on the return on debt may compensate service providers for their hedging costs in relation to debt capital. And, in relation to the return on equity, we assume no material overcompensation given we use a market risk premium estimate which his partly reliant on historical market risk premium estimates, which are estimated using the yield to maturity on 10 year Australian Government Securities.

[535] This is the weighted average cost of capital for an investment with similar degree of risk as a service provider in the provision of regulated services, at time t. That is, $r_{t,5} = \frac{E}{V} * r(e)_{t,5} + \frac{D}{V} * r(d)_{t,5}$, where $\frac{E}{V}$ is the proportion of equity capital; $r(e)_{t,5}$ is the cost of equity; $\frac{D}{V}$ is the proportion of debt capital; and $r(d)_{t,5}$ is the cost of debt.

$$PV_t = E\left[\frac{CF_{t+1}}{(1+r_{t,5})^1} + \frac{CF_{t+2}}{(1+r_{t,5})^2} + \frac{CF_{t+3}}{(1+r_{t,5})^3} + \frac{CF_{t+4}}{(1+r_{t,5})^4} + \frac{CF_{t+5}}{(1+r_{t,5})^5} + \frac{K_{t+5}}{(1+r_{t,5})^5}\right]$$

$$= K_{t-1}$$[536]

where the allowed rate of return (in the cash flows) equals $\hat{r}_{t,5}$,[537] and the present value (at time $t+5$) of expected future cash flows over the remaining term of the RAB equals the closing RAB at the end of year $t+5$ (that is, $PV_{t+5} = K_{t+5}$).

Under our assumptions, $K_{t-1} = K_0$, and:[538]

$$CF_i = r_i * K_{i-1} = \hat{r}_{t,5} * K_0$$

$$= (\widehat{r(e)}_{t,5} * 0.4 * K_0) + (\widehat{r(d)}_{t,5} * 0.6 * K_0), \ \ for\ i = t+1, \dots, t+5$$

$$K_{t+5} = K_0$$

We can show $PV_{t+5} = K_{t+5}\ (= K_0)$ through the following sequences of equalities, which collapse down to PV_{t+5}:[539]

$$PV_{t+5} = E\left[\sum_{i=t+6}^{t+10} \frac{CF_i}{(1+r_{t+5,5})^{i-5}} + \frac{K_{t+10}}{(1+r_{t+5,5})^5}\right]$$

$$PV_{t+10} = E\left[\sum_{i=t+11}^{t+15} \frac{CF_i}{(1+r_{t+10,5})^{i-10}} + \frac{K_{t+15}}{(1+r_{t+10,5})^5}\right]$$

...

$$PV_{T-5} = E\left[\sum_{i=(T-4)}^{T} \frac{CF_i}{(1+r_{(T-5),5})^{i-(T-5)}} + \frac{K_T}{(1+r_{(T-5),5})^5}\right]$$

The above present value principle should hold under any regulatory period under the on-the-day approach, and therefore should hold over the term of the RAB, which would comprise of multiple regulatory periods.[540] The allowed rate of return is reset to reflect

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536 This is the closing RAB at the end of year t-1, which equals the opening RAB at the beginning of year t.

537 $\widehat{r_{t,5}}$ is our best estimate of the prevailing market cost of capital $r_{t,5}$. It consists of, $\widehat{r(e)}_{t,5}$—our best estimate of the prevailing market cost of equity $r(e)_{t,5}$; $\widehat{r(d)}_{t,5}$—our best estimate of the prevailing market cost of debt $r(d)_{t,5}$; 0.4—our best estimate of $\frac{E}{V}$; and 0.6—our best estimate of $\frac{D}{V}$.

538 These assumptions are: we ignore changes to the capital stock and assume all initial capital is returned at the end of the term of the RAB.

539 These equalities hold under the expectation that the allowed rate of return is reset at the commencement of each regulatory period to reflect the prevailing market cost of capital at that time ($r_{t+5,5}$, $r_{t+10,5}$, etc.). However, these future rates are unknown at time t. Also, under our assumptions, $K_0 = D_1 + D_2 + \cdots + D_T = K_T$.

540 The resetting of the allowed rate of return at the commencement of each regulatory period means the end-of-period closing RAB has a present value equal to its statutory value at that point in time. However, any cash flow with a present value equal to the statutory value of the end-of-period closing RAB K_{t+5} at that time (for example, a cash flow transitioning to a trailing average) should result in the equality holding.

the (appropriately benchmarked) prevailing market cost of capital at the commencement of each regulatory period. Therefore, the present (or market) value of the RAB is reset to its statutory value (or, under our assumptions, its initial value K_0) at the commencement of each regulatory period. This is supported by Partington and Satchell.[541] To this extent, the regulatory regime under an on-the-day approach can be likened to a long term floating rate security where the allowed rate of return is the coupon rate, reset at the start of each regulatory period such that the present (or market) value of the bond equals its par (or face) value.[542]

We consider this section shows the on-the-day approach provides service providers with a reasonable opportunity to recover at least efficient costs.[543] That is, at the commencement of each regulatory period, the present value of expected future cash flows will equal the RAB. We note that given the ARORO is standalone, the ARORO will be achieved if the present value of expected return on (and of) capital cash flows equal the start-of-period opening RAB.

Trailing average approach

Under the trailing average approach, the service provider would not necessarily have a reasonable opportunity to recover at least efficient costs over a regulatory period. However, the service provider would still have a reasonable opportunity to recover at least efficient costs over the term of the RAB.

Assume we set the allowed rate of return based on a trailing average return on debt for a particular regulatory period (commencing year t). As set out above, for the present value principle to hold over the regulatory period commencing year t, the present value of expected net operating cash flows over this period plus the closing RAB (at $t+5$) should equate to the opening RAB (at t). Under our depreciation assumptions, this should result in the opening RAB (at t) being equal to its initial value (at $t=0$). That is, for the present value principle to hold over a regulatory period commencing year t, the following equality must hold:

$$PV_t = E\left[\frac{CF_{t+1}}{(1+r_{t,5})^1} + \frac{CF_{t+2}}{(1+r_{t,5})^2} + \frac{CF_{t+3}}{(1+r_{t,5})^3} + \frac{CF_{t+4}}{(1+r_{t,5})^4} + \frac{CF_{t+5}}{(1+r_{t,5})^5} + \frac{K_{t+5}}{(1+r_{t,5})^5}\right]$$

$$= K_{t-1} \ (= K_0)$$

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[541] See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 17.

[542] For clarity, we make this analogy to demonstrate why the rate of return should be reset on each reset date. We do not consider our return on debt cash flows are equivalent to a floating rate bond or require the allowed rate of return to be determined as such. We consider our benchmarked return on debt and return on equity estimates reasonably reflects the prevailing cost of debt and cost of equity for an investment with a similar degree of risk as a service provider in providing regulated services.

[543] Assuming the correct discount rate (or cost of capital) is used to benchmark the allowed rate of return (and therefore reset the RAB to its statutory value) at each reset date.

where, under an immediate trailing average approach (under our assumptions):[544]

$$CF_i = r_i * K_{i-1} = r_i * K_0$$

$$= (\widehat{r(e)}_{t,5} * 0.4 * K_0) + (0.1 * \sum_{s=i-10}^{i-1} [r_{s,10}] * 0.6 * K_0), \ \ for\ i = t+1, \dots, t+5$$

The above equality is unlikely to hold for any given regulatory period. The only way this can hold is if the geometric average allowed rate of return used over the period equals $r_{t,5}$,[545] and $PV_{t+5} = K_{t+5}$ (which equals K_0 under our assumptions).

Despite this, we can show the service provider would have a reasonable opportunity to recover at least efficient costs over the term of the RAB. We previously observed that the on-the-day approach can be likened to a long term floating rate security where the coupon rate is reset to reflect the prevailing market cost of capital at the start of each regulatory period. Similarly, we can interpret the trailing average approach as 10 long term floating rate securities each covering a 10 per cent 'investment portion' in the RAB where the coupon rate is reset to reflect the prevailing market cost of (debt) capital every 10 years.

There are three different components to the trailing average approach: the transition in, the full staggered portfolio, and the transition out at the end of the investment horizon (or end of the term of the RAB). We show these below.

The allowed return on equity continues to be reset to reflect the prevailing market cost of equity at the commencement of each regulatory period. Therefore, we can reasonably assume the present value of expected return on equity cash flows equals the equity financed component of the RAB each regulatory period, although Partington and Satchell note there are likely to be complications associated with leverage.[546] Because of this, in the following sections we focus on the return on debt cash flows and assume, for simplicity, the RAB is 100 per cent debt financed.

Transition into the staggered portfolio

On the first year of a trailing average, a business would either:

- Raise an equal-weighted portfolio of 1, 2, 3 ... 9, 10 year debt. Each year 10 per cent of this would expire and the business would replace this with 10 year debt.

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[544] The allowed rate of return (r_i) is no longer an estimate of the prevailing market cost of capital $r_{t,5}$. The allowed rate of return consists of $\widehat{r(e)}_{t,5}$—our best estimate of the prevailing market cost of equity $r(e)_{t,5}$; 0.1*$\sum_{s=i-10}^{i-1} [r_{s,10}]$—a 10 year historical average cost of debt that is updated annually; 0.4—our best estimate of $\frac{E}{V}$; and 0.6—our best estimate of $\frac{D}{V}$.

[545] We consider this is consistent with Partington and Satchell's view that, 'if all future cash flows are positive, then there is a unique solution for the rate of return that sets the NPV to zero' (over each regulatory period). Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 45.

[546] That is, they consider it is likely that the 'cost of equity will diverge from that assumed at a 60% leverage level'. See Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 21.

- Raise 10 year debt. Each year it would refinance 10 per cent of this and replace this with more 10 year debt.

We have calculated the return on debt allowance assuming the latter option. Since we expect this would be the higher cost option given interest rates on longer-term debt securities are often higher than those on shorter-term debt securities, our debt allowance should be conservative in the service providers' favour.

Valuing the return on debt allowance using the first of the two options would be expected to provide a benchmark efficient entity a reasonable opportunity to recover at least efficient costs for its initial investment at $t = 0$ as this would allow the following equality to hold:[547]

$$PV_0 = E\left[\frac{1*CF_1+0.1*K_1}{(1+r_{0,1})^1} + \frac{0.9*CF_2+0.1*K_2}{(1+r_{0,2})^2} + \cdots + \frac{0.2*CF_9+0.1*K_9}{(1+r_{0,9})^9} + \frac{0.1*CF_{10}+0.1*K_{10}}{(1+r_{0,10})^{10}}\right] = K_{-1}$$ [548]

where, under our assumptions:[549]

$$CF_i = r_i * K_{i-1} = r_i * K_0$$

$$= \frac{1}{11-i}\sum_{j=i}^{10}[r_{0,j}] * K_0, \ \ for\ i = 1, 2, 3, \ldots, 10$$

$$0.1 * \left(\sum_{i=1}^{10} K_i\right) = K_0.$$

As demonstrated under 'On-the-day approach', this equality holds because, for each one-tenth portion of the RAB:

- the expected net operating cash flows are, effectively, based on an allowed rate of return that reflects prevailing market rates at year $t = 0$, with the expectation that the allowed rate of return will be periodically reset to prevailing market rates
- the present (or market) value of the closing RAB (portion) at the end of each 'reset period' equals its statutory value.

For example, at $t = 0$, portion one of the initial RAB is financed through debt with a term of one year. The present value of expected net operating cash flows generated from portion one of the RAB plus portion one of the closing RAB at $t = 1$, should equal portion one of the opening RAB at $t = 0$. This is because it is expected that, at $t = 1$, we reset the allowed rate of return on portion one of the RAB to reflect the prevailing market cost of capital, and continue resetting every ten years (see equalities under 'The staggered portfolio' and 'End of the term of the RAB' below).

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[547] We have used spot rates $r_{0,t}$ to discount the cash flows for years t=1 to t=10 because the debt portfolio consists of debt with different maturities. The cost of (debt) capital in this case is a complicated average of the spot rates.

[548] This equals the opening RAB at the beginning of year 0—because the opening RAB at the beginning of year t equals the closing RAB at the end of year t-1.

[549] The allowed rate of return (r_i) is an average of estimates of the spot rates (at time 0) for different terms. The allowed rate of return differs each year because the proportion of expected net operating cash flow allocated to this debt portfolio reduces as each tranche of debt matures and the staggered portfolio is formed (see next section).

Similarly, at $t = 0$, portion two of the initial RAB is financed through debt with a term of two years, and the present value relationship holds for portion two over the two year period. The same logic applies to portions three to ten.

What this shows, is that at the beginning of the transition into a trailing average approach, the present value of expected future cash flows should equal the RAB (all else equal).

The staggered portfolio

A noted previously, the trailing average regime can be likened to 10 long term floating rate securities covering a 10 per cent 'investment portion' in the RAB where they receive the net operating cash flows generated from these investment portions. We refer to these portions[550] as $p1$ to $p10$. From $t = 1$ to $t = 10$, the present value relationships can be presented as:

$$PV[p1]_1 = E\left[\frac{0.1*CF_2}{(1+r_{1,10})^1} + \frac{0.1*CF_3}{(1+r_{1,10})^2} + \cdots + \frac{0.1*CF_{10}}{(1+r_{1,10})^9} + \frac{0.1*CF_{11}}{(1+r_{1,10})^{10}} + \frac{0.1*K_{11}}{(1+r_{1,10})^{10}}\right] = 0.1 * K_0$$[551]

$$PV[p2]_2 = E\left[\frac{0.1*CF_3}{(1+r_{2,10})^1} + \frac{0.1*CF_4}{(1+r_{2,10})^2} + \cdots + \frac{0.1*CF_{11}}{(1+r_{2,10})^9} + \frac{0.1*CF_{12}}{(1+r_{2,10})^{10}} + \frac{0.1*K_{12}}{(1+r_{2,10})^{10}}\right] = 0.1 * K_1$$

…

$$PV[p10]_{10} = E\left[\frac{0.1*CF_{11}}{(1+r_{10,10})^1} + \frac{0.1*CF_{12}}{(1+r_{10,10})^2} + \cdots + \frac{0.1*CF_{19}}{(1+r_{10,10})^9} + \frac{0.1*CF_{20}}{(1+r_{10,10})^{10}} + \frac{0.1*K_{20}}{(1+r_{10,10})^{10}}\right] = 0.1 * K_9$$

where the expected net operating cash flow generated each year from portions 1 to 10 of the RAB is based on the portion of the allowed rate of return that reflects the prevailing market cost of capital at time 1 to 10 respectively;[552] that is:[553]

$$0.1 * CF_i = \hat{r}_{t,10} * 0.1 * K_t,\ for\ t = 1, \ldots, 10\ and\ i = 2, \ldots, 20$$

and, under our assumptions, $K_t = K_0$.

As demonstrated under 'On-the-day approach', the above equalities hold because, for each portion of the RAB:

- the expected net operating cash flows are, effectively, based on an allowed rate of return that reflects prevailing market rates at year $t = 1 \ldots 10$ respectively, with the

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[550] Or, the expected cash flows generated from these portions.

[551] The opening RAB at the beginning of year t equals the closing RAB at the end of year t-1.

[552] In likening this approach to ten long term floating rate securities, the proportion of expected net operating cash flow generated each year from portions 1 to 10 of the RAB can be seen as the fixed interest payments on the ten securities. One security is issued (at par value) each year 1 to 10 and the interest rate on each equals the prevailing market cost of capital at the time of issuance, until it is reset in ten years.

[553] Where $\hat{r}_{t,10}$ is our best estimate of the prevailing market cost of (debt) capital at time t ($r_{t,10}$). We note this represents only one tenth of the trailing average rate of return (on debt).

expectation that the allowed rate of return will be reset to prevailing market rates every ten years

- the present (or market) value of the closing RAB (portion) at the end of each 'reset period' equals its statutory value.

In this way, the staggered portfolio can be seen as ten on-the-day approaches on ten portions of the RAB. Therefore, for each portion of the RAB, the present value of expected net operating cash flows over the ten year 'reset period' plus the closing RAB (portion) at $t + 10$ should equal the opening RAB (portion) at t.

We also note that while Partington and Satchell recommend the on-the-day approach, they acknowledge 'since the trailing average approach resets one tenth of the cost of debt to the market rate each year, the compensation is correctly set for one tenth of the debt each year'.[554]

End of the term of the RAB

Nearing the end of the term of the RAB, the business must wind up its debt fund, which can be likened to 10 long term floating rate securities covering a 10 per cent 'investment portion' in the RAB. At $t = T - 10$, the business could either:[555]

- Raise 9, 8 … 2, 1 year debt on a staggered basis. All its debt would thus expire in year T and it would repay the entire initial value of the RAB back to its investors.
- Allow its staggered portfolio to gradually expire, repaying 10 per cent of the initial value of the RAB to investors each year.

This means our return on debt allowance would have to allow for a transition out of the staggered portfolio. Valuing the return on debt allowance using the first of the two options would be expected to provide a benchmark efficient entity a reasonable opportunity to recover at least efficient costs as this would allow the following equalities to hold (from $t = T - 10$ to $t = T - 1$):

$$PV[p1]_{T-10} = E\left[\frac{0.1*CF_{(T-9)}}{(1+r_{(T-10),9})^1} + \frac{0.1*CF_{(T-8)}}{(1+r_{(T-10),9})^2} + \cdots + \frac{0.1*CF_{1(T-1)}}{(1+r_{(T-10),9})8} + \frac{0.1*CF_T+0.1*K_T}{(1+r_{(T-10),9})^9}\right] = 0.1 * K_{T-11}$$ [556]

$$PV[p2]_{T-9} = E\left[\frac{0.1*CF_{(T-8)}}{(1+r_{(T-9),8})^1} + \frac{0.1*CF_{(T-7)}}{(1+r_{(T-9),8})^2} + \cdots + \frac{0.1*CF_{1(T-1)}}{(1+r_{(T-9),8})7} + \frac{0.1*CF_T+0.1*K_T}{(1+r_{(T-9),8})^8}\right] = 0.1 * K_{T-10}$$

…

$$PV[p10]_{T-1} = E\left[\frac{0.1*CF_T+0.1*K_T}{(1+r_{(T-1),1})^1}\right] = 0.1 * K_{T-2}$$

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554 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 17.

555 Note we ignore the treatment of changes to the capital stock before the end of the assets life (where we assume all capital is returned).

556 The opening RAB at the beginning of year t equals the closing RAB at the end of year t-1.

where the proportion of net operating cash flow generated from each portion of the RAB each year equals the interest payment on that tranche of debt; that is:[557]

$$0.1 * CF_i = \hat{r}_{t,10} * 0.1 * K_t, \ for\ t = T-10, \dots, T-1\ and\ i = T-9, \dots, T$$

and, under our assumptions, $K_t = K_0$.

As shown in the above sections, the above equalities hold because, for each portion of the RAB:

- the expected net operating cash flows are, effectively, based on an allowed rate of return that reflects prevailing market rates at year $t = T-10 \dots T-1$ respectively
- the present (or market) value of the closing RAB (portion) at the end of each period equals its statutory value.

Given these equalities hold, the service provider would expect to have a reasonable opportunity to recover at least efficient costs for each of its investment portions. Since this applies to all stages of the trailing average approach, the service provider would expect to have a reasonable opportunity to recover at least efficient costs over the entire term of the RAB.

The sections above show that the key distinction between an on-the-day and a trailing average approach is:

- the on-the-day approach results in the entire allowed rate of return being reset to reflect prevailing market (or efficient) rates near the commencement of the regulatory period
- the trailing average approach results in one tenth of the allowed rate of return being reset to reflect prevailing market (or efficient) rates each year.

However, both approaches to setting the allowed rate of return, if appropriately implemented (in a forward looking manner) should result in the same ex-ante compensation for a benchmark efficient entity's ex-ante efficient financing costs over the term of the RAB.

B.4 A full transition satisfies the ARORO

If moving from the on-the-day to the trailing average approach, we consider a full transition is required to meet the ARORO and the objectives of the NEL/NGL. A full transition is revenue neutral in a present value sense.[558] Assuming the on-the-day or trailing average approach would contribute to the achievement of the ARORO, a revenue neutral transition will also contribute to the achievement of the ARORO.

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[557] Where $\hat{r}_{t,10}$ is our best estimate of the prevailing market cost of (debt) capital at time t $r_{t,10}$.

[558] Wherever we say revenue neutral we mean revenue neutral in a present value sense. This is equivalent to avoiding wealth transfers from the change in methodology. This is also equivalent to saying there are no windfall gains or losses from the change in methodology (as HoustonKemp appear to use the term in their advice to ESCOSSA).

As shown in section B.3.3, ex-ante efficient compensation can hold under either the on-the-day approach or the trailing average approach (if a transition is applied). As such, both approaches are capable of being approximately equivalent over the term of the RAB (which will be multiple regulatory periods).

For this reason, setting the return on debt allowance under the assumption that the service provider does not instantly have a trailing average debt portfolio, but rather has to develop, it should neither have a positive or negative affect on the service provider. Rather, we expect this would be NPV neutral.

We show in section B.3.3 that under the trailing average approach, service providers expect to have a reasonable opportunity to recover at least efficient financing costs over the term of the RAB. However, for any given regulatory period, the present value of expected net operating cash flows over the regulatory period plus the closing RAB will not necessarily equal the opening RAB. That is, at the start of any given regulatory period, the present value of expected future cash flows will unlikely equal the RAB because the cash flows based on historical interest rates will either be higher or too low (relative to the prevailing cost of debt in the market). Given this, switching between regimes without a full transition would not satisfy the requirement to provide service providers with a reasonable opportunity to recover at least efficient costs over either the regulatory period or over the term of the RAB.

B.5 An immediate (or hybrid) transition will not satisfy the ARORO

We consider a full transition to a trailing average will result in an ex-ante reasonable return and would contribute to the achievement of the ARORO (see section B.4). Conversely, we do not consider that an immediate (or hybrid) transition to a trailing average will result in an ex-ante reasonable return and would contribute to the achievement of the ARORO. This is because these approaches are not revenue neutral (in a present value sense). Rather, because these approaches would not be revenue-neutral, these would result in ex-ante overcompensation if moving from a high to a low interest rate environment. Conversely, these would result in ex-ante undercompensation if moving from a low to a high interest rate environment. We show the difference between our approach and the service providers' proposed approach mathematically in section B.5.1.

It is also worth noting that while stakeholders generally supported moving to a trailing average approach when we developed the Guideline, the trailing average cannot be

considered in isolation of the transition set out in the Guideline.[559] This is supported by CCP members (David Headberry, Bev Hughson and David Prins) in advising:[560]

> consumer acceptance for the 10-year trailing average cost of debt (rather than continuation of the "on-the-day" or a 5-year trailing average aligned with the regulatory period) during the Better Regulation process was, arguably, contingent on the AER having an effective transition process that would prevent windfall gains or losses by either consumers or the businesses. The DNSPs' revised proposals for transition violate this implicit understanding that has underpinned the consumers' support of the 10-year rolling average approach.

For this reason, the CCP members also advised that, 'the significant impact on consumers of the DNSPs' proposed departure from the RoR Guideline risks a collapse in consumer confidence in the regulatory process'.[561]

Moreover, Partington and Satchell advise that, given a move to the trailing average approach, our full transition is preferable to an immediate (or hybrid) transition.[562] They also state that:[563]

> …it is appropriate in the present case, of significant divergence between the trailing average and the current cost of debt, that a transition should be made to the trailing average rather than immediately moving to full implementation.

Consequently, we consider the on-the-day approach should continue in the absence of a full transition to the trailing average approach. This is because the on-the-day approach produces a return on debt estimate that, in conjunction with the return on equity, satisfies the ARORO. As shown in section B.3.3, the on-the-day approach provides ex-ante efficient compensation for a benchmark efficient entity's efficient cost of financing over each regulatory period and over the term of the RAB.

B.5.1 Mathematical explanation

This section demonstrates the difference (in present value terms) between our full transition and the immediate transition to the trailing average approach that the majority of service providers have recently favoured.[564] We use the following notation:

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559 The change in the return on debt approach and the associated transition were necessarily discussed, consulted on and determined upon together. See AER, *Explanatory statement to the rate of return guideline*, December 2013, pp. 98–125; AER, *Explanatory statement to the draft rate of return guideline*, August 2013, pp. 73–97; AER, *Consultation paper: Rate of return guidelines*, May 2013, pp. 49–55.

560 CCP (David Headberry, Bev Hughson and David Prins), *Submission to the AER: Response to AER Preliminary Decisions and revised proposals from Victorian electricity DNSPs for revenue reset for the 2016–20 regulatory period*, 25 February 2016, p. 109.

561 CCP (David Headberry, Bev Hughson and David Prins), *Submission to the AER: An overview —Response to AER Preliminary Decisions and revised proposals from Victorian electricity DNSPs for revenue reset for the 2016–20 regulatory period*, 22 February 2016, p. 35.

562 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 52.

563 Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, pp. 45–46.

- PV_t denotes present value, at year t
- $E[.]$ denotes expected value
- K_t is the closing RAB at the end of year t (which equals the opening RAB at the beginning of year $t+1$).
- 0.6 is the proportion of the RAB that is debt financed
- rd_t are the estimates of the return on debt used to calculate the return on capital cash flows
- $r_{t,j}$ is the (spot) discount rate at year t for a term of j years.

The present value of our proposed return on debt allowance over the next ten years (under a full transition) at time $t = 0$ is as follows:[565]

$$PV[AER]_0 = \frac{rd_0 \times 0.6 \times K_0}{(1+r_{0,1})^1}$$

$$+ \frac{(rd_0 \times 0.9 + E[rd_1] \times 0.1) \times 0.6 \times E[K_1]}{(1+r_{0,2})^2}$$

$$+ \frac{(rd_0 \times 0.8 + E[rd_1] \times 0.1 + E[rd_2] \times 0.1) \times 0.6 \times E[K_2]}{(1+r_{0,3})^3}$$

$$+ \cdots$$

$$+ \frac{0.1 \times (rd_0 + E[rd_1 + rd_2 + rd_3 + rd_4 + rd_5 + rd_6 + rd_7 + rd_8 + rd_9]) \times 0.6 \times E[K_9]}{(1+r_{0,10})^{10}}$$

The present value of the return on debt allowance over the next ten years when immediately moving to the trailing averaging at time $t = 0$ is as follows:

$$PV[SP]_0 = \frac{0.1 \times (rd_0 + rd_{-1} + rd_{-2} + rd_{-3} + rd_{-4} + rd_{-5} + rd_{-6} + rd_{-7} + rd_{-8} + rd_{-9}) \times 0.6 \times K_0}{(1+r_{0,1})^1}$$

$$+ \frac{0.1 \times (E[rd_1] + rd_0 + rd_{-1} + rd_{-2} + rd_{-3} + rd_{-4} + rd_{-5} + rd_{-6} + rd_{-7} + rd_{-8}) \times 0.6 \times E[K_1]}{(1+r_{0,2})^2}$$

$$+ \frac{0.1 \times (E[rd_2] + E[rd_1] + rd_0 + rd_{-1} + rd_{-2} + rd_{-3} + rd_{-4} + rd_{-5} + rd_{-6} + rd_{-7}) \times 0.6 \times E[K_2]}{(1+r_{0,3})^3}$$

$$+ \cdots$$

$$+ \frac{0.1 \times (rd_0 + E[rd_1 + rd_2 + rd_3 + rd_4 + rd_5 + rd_6 + rd_7 + rd_8 + rd_9]) \times 0.6 \times E[K_9]}{(1+r_{0,10})^{10}}$$

Subtracting the present value of our return on debt allowance over the next ten years from the present value of the return on debt allowance over the next ten years when

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564 This was the preferred transitional approach in recent revised proposals from ActewAGL distribution (gas), AGN, APTNT, AusNet Services (distribution), CitiPower, Jen, Powercor and United Energy.

565 This example does not consider expected allowed return on debt cash flows beyond year ten because beyond year ten because these are the same under both transitional approaches (all else being equal).

immediately moving to a trailing average gives the following difference in present value terms:

$$PV[SP]_0 - PV[AER]_0$$

$$= \frac{(0.1\times(rd_{-1}+rd_{-2}+rd_{-3}+rd_{-4}+rd_{-5}+rd_{-6}+rd_{-7}+rd_{-8}+rd_{-9})-0.9\times rd_0)\times 0.6\times K_0}{(1+r_{0,1})^1}$$

$$+\frac{(0.1\times(rd_{-1}+rd_{-2}+rd_{-3}+rd_{-4}+rd_{-5}+rd_{-6}+rd_{-7}+rd_{-8})-0.8\times rd_0)\times 0.6\times E[K_1]}{(1+r_{0,2})^2}$$

$$+\frac{(0.1\times(rd_{-1}+rd_{-2}+rd_{-3}+rd_{-4}+rd_{-5}+rd_{-6}+rd_{-7})-0.7\times rd_0)\times 0.6\times E[K_2]}{(1+r_{0,3})^3}$$

$$+\frac{(0.1\times(rd_{-1}+rd_{-2}+rd_{-3}+rd_{-4}+rd_{-5}+rd_{-6})-0.6\times rd_0)\times 0.6\times E[K_3]}{(1+r_{0,4})^4}$$

$$+\frac{(0.1\times(rd_{-1}+rd_{-2}+rd_{-3}+rd_{-4}+rd_{-5})-0.5\times rd_0)\times 0.6\times E[K_4]}{(1+r_{0,5})^5}$$

$$+\frac{(0.1\times(rd_{-1}+rd_{-2}+rd_{-3}+rd_{-4})-0.4\times rd_0)\times 0.6\times E[K_5]}{(1+r_{0,6})^6}$$

$$+\frac{(0.1\times(rd_{-1}+rd_{-2}+rd_{-3})-0.3\times rd_0)\times 0.6\times E[K_6]}{(1+r_{0,7})^7}$$

$$+\frac{(0.1\times(rd_{-1}+rd_{-2})-0.2\times rd_0)\times 0.6\times E[K_7]}{(1+r_{0,8})^8}$$

$$+\frac{(0.1\times(rd_{-1})-0.1\times rd_0)\times 0.6\times E[K_8]}{(1+r_{0,9})^9}$$

$$+0$$

We can conclude several things from the above calculation in relation to the expected return on debt allowance:

- Assuming you use the same data series, term and credit rating, the difference between the return on debt allowance under a full transition and return on debt allowance under no transition is a fixed amount in each of the first nine years.[566] There is no difference between these respective allowances from year 10 onwards.
- The present value of the difference in the debt allowance under these transitional approaches can be calculated today.[567] This total present value is a sum of the difference in values for each of the next nine years (as shown above).

[566] We note that forecast capital investment and depreciation affects the exact amount in each year. However, these forecasts will affect both transitional approaches, and the difference will still be a fixed amount which is a function of the known RAB at time 0 and the expected RAB at time 1 to 8.

[567] This assumes you have forecasts for the RAB at time 1 to 8. This may not be realistic for time 3 onwards (i.e. beyond the end of the next regulatory period). However, even in the absence of RAB forecasts for years 3 to 10 a reasonable approximation of the present value difference can be made today.

- Given that current interest rates are well below average historical rates over the last nine years, the allowance when immediately moving to a trailing average will have a materially higher present value than our proposed return on debt allowance (over both the upcoming regulatory period and the next nine years). For the reasons discussed earlier, this is inconsistent with the zero NPV investment condition and will not meet the ARORO or NEO/NGO. It is worth noting that current interest rates could have similarly moved above historical rates and this would have required a transition to avoid undercompensating a benchmark efficient entity.

The above propositions also hold when comparing our transitional approach with a hybrid transitional approach. That is, the difference between these allowances each year will be a fixed amount that can be quantified and valued. However, the magnitude of this difference will differ depending on the approach proposed.

In relation to the risk associated with different transitional approaches, the key interest rate risk associated with the allowed return on debt cash flow streams in each future year appears to come from rolling future interest rates into the trailing average. As all transitional approaches still result in rolling the same future interest rates in at a rate of 1/10 per year, the risk associated with the uncertainty from these rates should be the same across transition approaches. This implies that any mismatch risk associated with future interest rate uncertainty might be expected to be the same or similar under all transition approaches.[568]

This above analysis implies the key difference between our transitional approach and the other transitional approaches that service providers have recently proposed appears to be fixed changes in the present value of a benchmark efficient entity from the change in methodology. This change in value would represent a transfer between a benchmark efficient entity's shareholders and consumers, which would vary in quantum depending on the particular transition proposed. Partington and Satchell support this view, stating:[569]

> It is also clear that the change to a trailing average if fully implemented immediately has substantial wealth effects. Substantial wealth transfers, whether to or from the regulated businesses, simply as a consequence of a relatively sudden regulatory change is undesirable.

[568] Noting we do not consider if there was a lesser mismatch under one approach it would justify an approach that did not result in an efficient (forward looking) return on debt allowance.

[569] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 52.

C Equity and debt raising costs

In addition to compensating for the required rate of return on debt and equity, we provide an allowance for the transaction costs associated with raising debt and equity. We include debt raising costs in the opex forecast because these are regular and ongoing costs which are likely to be incurred each time service providers refinance their debt. On the other hand, we include equity raising costs in the capex forecast because these costs are only incurred once and would be associated with funding the particular capital investments.

Our draft decision forecasts for debt and equity raising costs are included in the opex and capex attachments, respectively. In this appendix, we set out our assessment approach and the reasons for those forecasts.

C.1 Equity raising costs

We have determined TasNetworks' equity raising costs for the 2017–19 period to be $0.32 million ($2016–17). We have determined this amount by applying the method we have established in recent determinations and that was proposed by TasNetworks.[570] Therefore, we accept TasNetworks' proposed approach and have updated the analysis to reflect our draft decision input parameters.

Equity raising costs are transaction costs incurred when a service provider raises new equity from outside its business. We use a benchmark approach to determine these costs and this approach allows the costs of two means by which a service provider could raise equity from outside its business—dividend reinvestment plans and seasoned equity offerings. Equity raising costs are an unavoidable aspect of raising equity that a prudent service provider acting efficiently would incur. Accordingly, we provide an allowance to recover an efficient amount of equity raising costs. This is where a service provider's capex forecast is large enough to require an external equity injection to maintain the benchmark gearing of 60 per cent.

While the rate of return guideline does not set out an approach for estimating these costs, we apply an established method for estimating equity raising costs. We initially based our method for determining benchmark equity raising costs on the 2007 advice from Allen Consulting Group (ACG).[571] We amended this method in our 2009 decisions

[570] TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, p. 118.

[571] ACG, *Estimation of Powerlink's SEO transaction cost allowance-Memorandum*, 5 February 2007.

for the ACT, NSW and Tasmanian electricity service providers.[572] We further refined this approach, as discussed and applied in the 2012 Powerlink decision.[573]

C.2 Debt raising costs

Debt raising costs are transaction costs incurred each time debt is raised or refinanced. These costs may include arrangement fees, legal fees, company credit rating fees and other transaction costs. Debt raising costs are an unavoidable cost of raising debt that would be incurred by a prudent service provider, and data exists such that we can estimate them. Accordingly, we provide an allowance to recover an efficient amount of debt raising costs.

C.2.1 Draft decision

We accept TasNetworks' proposed debt raising costs. We determine debt raising costs of $2.21 million ($ 2016–17) over the 2017–19 period, as set out in Table 3-27. We are satisfied this estimate contributes towards a total opex forecast that reasonably reflects efficient, prudent and realistic costs.

TasNetworks adopted our approach to estimating debt raising costs that we have established through past determinations.[574] This approach is set out in section C.2.2.

Table 3-27 AER's draft decision on debt raising costs (million, $ 2016–17)

	2017-18	2018-19	Total
Distribution	1.08	1.09	2.17
Metering	0.02	0.02	0.04
Total	1.1	1.11	2.21

Source: AER analysis.

C.2.2 AER's assessment approach

Our standard approach to forecasting debt raising costs is based on the approach in a report from the Allen Consulting Group (ACG), commissioned by the ACCC in 2004.[575] However, we relied on updated market data from 2008–13, as submitted in a recent report by PricewaterhouseCoopers (PwC) during the rate of return guideline

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572 AER, *Final decision, ACT distribution determination 2009–10 to 2013–14*, April 2009, appendix H; AER, *Final decision, NSW distribution determination 2009–10 to 2013–14*, April 2009, appendix N; AER, *Final decision, TransGrid transmission determination 2009–10 to 2013–14*, April 2009, appendix E; AER, *Final decision, Transend transmission determination 2009–10 to 2013–14*, April 2009, appendix E.

573 AER, *Final decision, Powerlink Transmission determination 2012-13 to 2016-17*, April 2012, pp. 151-152.

574 TasNetworks, *Tasmanian Distribution Regulatory Proposal Regulatory Control Period 1 July 2017 to 30 June 2019*, 29 January 2016, pp. 118, 119.

575 The Allen Consulting Group, Debt and equity raising transaction costs: Final report, December 2004.

process.[576] The approach uses a five year window of up to date bond data to reflect current market conditions. Where PwC has updated the data or the method, we have compared it against our standard approach and we are broadly satisfied it is reasonable.

The ACG method involves calculating the benchmark bond size, and the number of bond issues required to rollover the benchmark debt share (60 per cent) of the regulatory asset base. Our standard approach is to amortise the upfront costs that are incurred using the relevant nominal vanilla rate of return over a ten year amortisation period. This is then expressed in basis points per annum (bppa) as an input into the post-tax revenue model (PTRM). This rate is multiplied by the debt component of a service provider's projected regulatory asset base to determine the debt raising cost allowance. The ACG approach recognises that credit rating costs can be spread across multiple bond issues, which lowers the benchmark allowance (as expressed in bppa) as the number of bond issues increases.

[576] PricewaterhouseCoopers, Energy Networks Association: Debt financing costs, June 2013, p. i.

D Averaging periods – confidential appendix