Regulatory treatment of inflation

Preliminary position

October 2017

AUSTRALIAN ENERGY REGULATOR

Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 520
Melbourne Vic 3001

Tel: (03) 9290 1444
Fax: (03) 9290 1457

Email: AERInquiry@aer.gov.au

AER reference: 58744

Contents

Contents 3

Shortened forms and glossary 6

1 Introduction 7

1.1 Request for submissions 8

1.2 Next steps 9

2 Preliminary position overview 10

2.1 Outline of our current approach 10

2.2 Our consultation 11

2.3 Issue 1: What method should we use to estimate expected inflation? 12

2.4 Issue 2: Does the regulatory framework deliver appropriate compensation for inflation? 14

3 Key concepts 16

3.1 What is inflation? 16

3.1.1 Actual inflation measures 16

3.1.2 Why use the CPI as the measure of actual inflation? 17

3.1.3 Monetary policy 18

3.2 Best estimate of expected inflation 19

3.2.1 Expectations, forecasts, and outcomes 19

3.2.2 What is 'best'? 19

3.3 An efficient allowed rate of return 20

3.3.1 Appropriately accounting for inflation 20

3.3.2 Risk and return 21

3.3.3 Investment term 21

3.3.4 Model operations 22

4 Process 24

4.1 Developments before review 24

4.2 Stage one consultation 27

4.2.1 Discussion paper 27

4.2.2 Inflation forum 28

4.2.3 Submissions 28

4.3 Extended stage one consultation 35

4.3.1 Small group meetings 35

4.3.2 Technical workshop 36

4.4 Expert advice 37

4.4.1 ACCC/AER working paper advice 37

4.4.2 RBA correspondence 38

4.4.3 Shaun Vahey's advice 38

4.4.4 Sapere Research Group report 39

5 Analysis on methods for estimating expected inflation 41

5.1 Position and reasoning 41

5.2 Current method 42

5.2.1 Use of Consensus Economics survey as check 44

5.3 Modifications to current approach 44

5.3.1 Glide path 44

5.3.2 Change to the end target point 48

5.4 Surveys 50

5.5 Swaps 51

5.6 Bond breakeven approaches 53

5.6.1 Overview of bond breakeven approaches 53

5.6.2 Calculation 53

5.6.3 Bond breakeven without adjustment 53

5.6.4 Bond breakeven with adjustments 57

6 Analysis of the treatment of inflation in the regulatory framework ... 59

6.1 Position and reasoning 59

6.2 Delivery of initial real rate of return under the current approach 59

6.2.1 Delivery of initial real rate of return 60

6.2.2 Deviations from initial real rate of return 61

6.3 Should the target be the initial real rate of return? 69

6.3.1 Targeting the initial real rate of return 70

6.3.2 Targeting the initial nominal rate of return 75

6.3.3 Targeting the initial real return on equity 77

A Rule requirements 85

A.1 National Electricity Rules (NER) 85

A.2 National Gas Rules (NGR) 87

B Submissions on best estimate of inflation 89

Shortened forms and glossary

Shortened Form	Extended Form
ABS	Australian Bureau of Statistics
AER	Australian Energy Regulator
Annual pricing mechanism	Refers to the 'Consumer Price Index minus X' mechanism to determine the revenue level that feeds into the adjustment of prices from year to year.
Asset base	Refers to a regulatory asset base for electricity service providers as prescribed in the National Electricity Rules, or a capital base for gas service providers as prescribed in the National Gas Rules
CEG	Competition Economists Group
CGS	Commonwealth Government Securities, also known as Australian Government Securities
CPI	Consumer Price Index
Energy network	Refers to a network through which a service provider provides electricity network and gas pipeline services
Network services	Refers to electricity distribution, electricity transmission, and/or gas pipeline services
RBA	Reserve Bank of Australia
Regulatory period	Refers to a regulatory control period (for electricity service providers) and/or an access arrangement period (for gas service providers)
Regulatory proposal	Refers to a regulatory proposal, revised regulatory proposal, revenue proposal, revised revenue proposal, access arrangement proposal, or revised access arrangement proposal
Service provider	Refers to an electricity distribution network service provider, electricity transmission network services provider, and/or gas pipeline operator

1 Introduction

This preliminary position paper is the next step in our consultation process for reviewing the regulatory treatment of inflation in our determination of revenues and prices for electricity and gas network services.

The method for estimating expected inflation has been the subject of debate in recent regulatory determinations. We have chosen to conduct an industry-wide review before making any changes to the models given the widespread use of our post-tax revenue model (PTRM) and asset base roll forward model (RFM), and the requirements set out in the National Electricity Rules (NER) for consultation. Moreover, the general inflation rate is applicable across the economy, and therefore our treatment of inflation applies uniformly across all our determinations.

The April 2017 Discussion paper was the first step of our inflation review. We then undertook an extensive stakeholder consultation process. This included a public forum on the Discussion paper and receiving written submissions. Moreover, to fill an identified need for more education and engagement on technical matters, we held numerous staff-level meetings and a technical workshop. This workshop allowed stakeholders and us to concurrently engage on technical matters. We derived a common understanding in many areas and clarified other issues for further analysis.

In the Discussion paper we stated that our next step would be to release our proposed amended PTRM or RFM for consultation, if required. Under the NER, if we propose such amendments then we must also publish an explanatory statement.[1] However, our preliminary position is to maintain the current approach for our regulatory treatment of inflation. Given this, no proposed amended PTRM or RFM is required at this time.

We will hold a public forum on 31 October 2017. This forum will be held prior to the close of submissions on this preliminary position paper. This will provide an opportunity for us to present our preliminary positions and for interested stakeholders to be informed by the discussion at that forum before submissions close. We encourage stakeholders to continue engaging with us at this upcoming forum and acknowledge the positive engagement and robust insights up to now.[2]

We will release our final position in December 2017 after carefully considering the submissions and any further evidence presented to us. If we are persuaded to depart from our preliminary position and there is reason to amend the PTRM or RFM, we will publish our proposed amendment in January 2018 with an explanatory statement.

---

1 NER, cl 6.16(b)(2) and 6A.20(b)(2).

2 See the AER Inflation review project page at: https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-expected-inflation-2017/initiation

There would be an additional consultation period on the proposed amendment and then we would make a final decision on those amendments in April 2018.[3]

Sections 3 and 4 of this paper discuss key concepts and the process, respectively. The process section briefly sets out the development history of the current regulatory treatment of inflation approach, the extensive stakeholder engagement undertaken for this review up to now and advice we have received from experts we engaged.

We assess each of the alternative methods for estimating expected inflation in depth in section 5. We assess the current approach to target the initial real rate of return when setting revenues in the PTRM, and the delivery of this target when actual inflation flows through the annual pricing process and RFM in section 6.

1.1 Request for submissions

The Australian Energy Regulator (AER) invites interested parties to make written submissions regarding this paper by the close of business 6 November 2017.

Interested parties should send submissions electronically to: rateofreturn@aer.gov.au.

Alternatively, people can mail submissions to:

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

We prefer that all submissions be publicly available to facilitate an informed and transparent consultative process. We will treat submissions as public documents unless otherwise requested.

We request parties wishing to submit confidential information to:

- Clearly identify the information that is the subject of the confidentiality claim.
- Provide a non-confidential version of the submission in a form suitable for publication.

We will place all non-confidential submissions on our website at www.aer.gov.au. For further information regarding our use and disclosure of information provided to us, see the ACCC/AER Information Policy, June 2014 available on our website.

Please direct enquiries about this paper, or about lodging submissions, to rateofreturn@aer.gov.au or to the Network Reporting and Finance branch of the AER on (03) 9290 1444.

[3] The timetable would follow the legislated consultation procedures in order to align with NER cll. 6.4.1(b), 6.5.1(c), 6.16, 6A.5.2(b), 6A.6.1(c) and 6A.20.

1.2 Next steps

Step	Timeline
AER to hold stakeholder workshop on preliminary position	31 October 2017
Submissions on the Preliminary position	6 November 2017
Final position paper	End December 2017
Proposed amendments to PTRM/RFM (if appropriate)	January 2018
Submissions on proposed amendment	30 business days from step above
Final decision on amendments	End April 2018

2 Preliminary position overview

Recently, a number of service providers have questioned our approach to inflation. Some have submitted that our initial estimate of expected inflation is incorrect, and so we are incorrectly setting their revenue allowances. Others have submitted that our approach to inflation does not deliver the returns that were expected based on our regulatory determination. We have undertaken this comprehensive review of our regulatory treatment to inflation in order to address these submissions and to test whether our inflation approach remains appropriate.

2.1 Outline of our current approach

Inflation is a general measure of an increase in prices and fall in the purchasing value of money. Inflation refers to changes in the general or overall price level, rather than prices for particular products. The most common measure of inflation is the Consumer Price Index (CPI) published by the Australian Bureau of Statistics (ABS). The treatment of inflation is an important component of our regulatory framework.

Under our framework, we set the maximum revenue that service providers can recover from customers. We do this in a regulatory determination process in consultation with a wide range of stakeholders. We set the maximum revenue allowance broadly in a two-step process:

- **Step one** - we set target revenue for each year of the five year regulatory period so everyone has an initial indication of the prices that will be charged for the next five years.[4] We seek to establish a smooth trend in revenue across the five year period by setting an X factor for each year. The target revenue is made up of a number of components including operating and maintenance expenditure, a rate of return on the capital supplied by investors and a return of capital to investors to account for depreciation of assets. Step one uses our post-tax revenue model (PTRM).

  The target revenue anticipates expected inflation over the five year period so the target is sufficient to meet expected changes in purchasing power. In this way, the target revenue reflects the amount that the network businesses need to undertake a program of works to operate and maintain the network, and to attract capital from investors.

- **Step two** - as we progress through the five year regulatory period we update the revenue allowance each year by the value of actual inflation. If actual inflation in step two is different from the estimate of inflation we used in step one then the actual revenue being recovered over the five year period will be different to the initial target revenue we set in step one. However, the actual revenue recovered from customers through the period will reflect actual movements in inflation, and

[4] A regulatory period can be longer or shorter than five years; but we focus on the five year base case for simplicity.

the purchasing power of the network businesses and their investors is preserved. Step two uses both our roll forward model and the annual pricing process.

This type of regulatory framework is referred to as CPI–X incentive regulation.

It is important to note that our target revenue for the five year period is only ever used at the time of our determination to provide everyone with an indication of the prices that will occur over the regulatory period. Once we commence the regulatory period we start with our target revenue in the first year and then escalate this each year with actual inflation less the X factors we set in step one. This is the CPI–X mechanism in action.

The consequence of this approach is that as we progress through the regulatory period we effectively displace the estimate of expected inflation that was built into our target revenue with the actual inflation outcome in each year as it becomes known. This applies equally to the rate of return that is incorporated in our target revenue. This approach means that service providers and their investors ultimately receive a revenue allowance with the same purchasing power as initially targeted. This is known as a real rate of return.

2.2 Our consultation

In response to the submissions we received on the treatment of inflation we have initiated a full scale review of the treatment of inflation in our regulatory framework. This review has traversed a wide spectrum of issues as we have pursued the range of issues put to us by stakeholders. In general, stakeholders have put diverse positions to us. Different service providers have put forward different statements of the problem and different proposed solutions. However, in broad terms, we have distilled the review into two lines of inquiry:

1. What method should we use to estimate expected inflation (**Issue 1**)?
2. Does the regulatory framework deliver appropriate compensation for inflation (**Issue 2**)? There are two sub-issues here:
   (a) Does the regulatory framework achieve the currently targeted real rate of return outcome?
   (b) Should the regulatory framework instead target a different rate of return outcome?

These issues are complex and require a good level of knowledge of our regulatory framework including the financial models we employ, the annual pricing process and the technical financial details of estimating expected inflation. To provide the best opportunity for stakeholders to engage with the issues we have undertaken an extensive consultation process as outlined in the introduction. Our experience has been that it has taken stakeholders and ourselves quite some time to clearly identify the key concerns and then identify potential solutions.

We turn now to the two key issues we have identified.

2.3 Issue 1: What method should we use to estimate expected inflation?

This issue was identified quite early in the process. In step 1 of our regulatory process we employ an estimate of expected inflation to derive the target revenue for the five year regulatory period. Because we then use actual inflation to determine actual revenues throughout the five year period there can be a discrepancy between the target and actual revenues if actual inflation is different to expected inflation. To minimise the potential for this discrepancy we use the best available estimate of inflation. Some service providers have submitted that the approach we employ is not the best estimate and we should use a different approach.

The approach we currently use is relatively simple and transparent and has been employed in all of our decisions since 2008. We use forecasts of inflation published by the Reserve Bank of Australia (RBA) for the next two years, which is the limit of this forecast series. We combine these two values with the midpoint of the RBA's target band for inflation (currently 2.5 per cent) to extend the series out to ten years. The estimate of expected annual inflation is then the average of these ten yearly figures. We adopted this approach in 2008 after service providers proposed it as the best method for estimating inflation.

In broad terms, there are four potential approaches for estimating inflation:

1. Our current approach - known as the RBA method
2. Deriving an estimate from inflation linked bonds - known as the bond breakeven inflation rate (BBIR) approach
3. Deriving an estimate from swaps - known as the swaps method, and
4. Deriving an estimate from surveys.

Each approach has its strengths and weaknesses and clearly no forecast will be precisely correct (except by chance).

In our view, our current approach has the greatest strengths and fewest weaknesses and is therefore the best estimate of expected inflation. Briefly:

1. The RBA method is simple and transparent and can be replicated easily by stakeholders. The RBA is highly respected and has been generally successful in its inflation targeting. The ACCC/AER working paper ranked this method highest of the four potential approaches and a number of stakeholders (including consumer groups) have supported the current approach.
2. The bond breakeven approach is the method we used to estimate inflation prior to 2008. In 2008, service providers identified a range of problems with this approach and persuaded us to move to the RBA approach. On its face, this method offers the advantage of deriving the estimate of expected inflation using market data. However, upon closer examination, the method suffers from a range of deficiencies including a number of biases and premiums which are significant and time varying. Evidence of these deficiencies is present for the US and UK markets (more mature and liquid than the Australian market), as well as for the Australian market. Many of

these deficiencies were identified by service providers in 2008 and persist. The RBA in its letter to us said that this method is probably unviable.[5]

3. The swaps method has a number of positive attributes. Estimates of expected inflation using swaps are simple to calculate, can give daily estimates and the biases are arguably smaller than bond breakeven approach. Although there are these positive attributes, we do not prefer the inflation swaps method over the current method. The estimates produced using the inflation swaps methods are likely to incorporate biases and distortions (due to hedging costs, liquidity premium and other premiums) and these biases and distortions are likely time-varying. Additionally, the RBA in its letter to us said that this method is probably unviable.[6]
4. Surveys have the potential to rank highly as an approach. However, long term survey estimates are proprietary. Survey companies sell the inflation estimates derived from their surveys. If we used a survey estimate in our regulatory process it would be possible to reverse engineer the value which would undermine the business case of the survey company.

Some submissions by stakeholders to our Discussion paper proposed using a glide path approach. A glide path method involves a gradual movement from the RBA's short term inflation forecasts to the mid-point of its target range. The glide path method is based on the proposition that it may take a number of years for inflation to return to the mid-point of the RBA's target band following a disturbance. Some stakeholders submitted this may occur in the current global environment.[7] The Commerce Commission of New Zealand uses an equivalent version using Reserve Bank of New Zealand (RBNZ) forecasts.

We have reviewed the available evidence on the rate of reversion to the midpoint of the target band. This evidence suggests that reversion is relatively rapid in Australia - within one to two years. Further the evidence suggests that the midpoint of the target band is the best estimate of expected inflation beyond two years. A glide path approach would therefore not provide the best estimate of expected inflation.

Consideration of a glide path approach has arisen fairly late in our process and was not discussed in the ACCC/AER working paper or the Discussion paper. Considering the positives and negatives currently in front of us, we are not satisfied that there is enough evidence to change from the current approach to a glide path approach. However, we encourage stakeholders to provide more evidence on this issue in submissions to this paper. In particular, we are interested in hearing whether there is other evidence on the speed of reversion of inflation expectations.

---

5 RBA, *Letter re: Regulatory treatment of inflation - Inflation expectations*, 5 July 2017, p. 1.

6 RBA, *Letter re: Regulatory treatment of inflation - Inflation expectations*, 5 July 2017, p. 1.

7 CEPA, *Best Estimate of Inflation Expectations: Assessment of Approaches*, 28 June 2017, p. 31.

2.4 Issue 2: Does the regulatory framework deliver appropriate compensation for inflation?

During our consultation, it became clear that there was considerable confusion about the operation of the regulatory framework.

A foundational question was raised about what type of return to investors is required under the NER. We have reviewed the electricity rules carefully and consider that targeting a real rate of return is consistent with the NER. It is also consistent with the NGR. We have consistently employed a common approach across the gas and electricity sectors to avoid investment distortion between the two sectors.

Having settled the question of the approach that is consistent with the rules, we then turn to the question of whether our approach delivers a real return to investors. Initially, there was considerable diversity among stakeholders about whether our approach does achieve a real return. We spent considerable time discussing this issue with stakeholders in advance of our technical workshop. We asked stakeholders to model a range of base scenarios to test the operation of our approach. At the technical workshop there was a broad consensus that our approach does deliver a real return as required in the electricity rules. There are a few aspects within our approach that can cause minor deviations from a real return, but these deviations are minor and symmetrical and so do not affect our overall conclusion.

This then leads to a third question of whether our approach (and the rules) should target a different type of return for investors? Three alternatives have been suggested:

1. Maintain our current approach of an overall real rate of return
2. Apply our target revenues from our determination without fixing the real return (this approach is known as a nominal return)
3. Split our approach between debt and equity and provide a nominal return to debt and a real return to equity

Some stakeholders (particularly APA) have submitted that if we employ option 2 then estimating expected inflation becomes irrelevant and we no longer need to care about determining a best estimate.[8] This submission is partly correct—the estimate of expected inflation would be less important than at present, but it would still have a role. The determination of real values would still be required for some steps within the regulatory models, such as the calculation of real straight-line depreciation.

Other stakeholders (particularly Spark Infrastructure) submitted that when we changed our approach to determining a return on debt from the 'on-the-day' method to the 'trailing average portfolio' method we created an imbalance that introduced additional

[8] APA, *Regulatory treatment of inflation, APA submission in response to AER consultation*, 29 June 2017, pp. 3–4.

risk for equity investors.[9] To consider this submission it is necessary to understand the complexities of the two approaches to debt and their effect on the overall return to equity investors. We explain these concepts in section 6.3.3. The key scenario occurs where the firm issues debt fixed in nominal terms and actual inflation differs from expected. In this case, debt costs may depart from the return on debt included in the target real rate of return. The magnitude and direction of any such departure is unclear. Depending on the circumstances, there could be an increase or decrease in the overall inflation exposure. However, the key point is that if the service provider chooses to issue fixed nominal debt it has taken a position that exposes its equity holders to movements in inflation. That primary inflation exposure occurs under both the old approach to debt and the new approach and it is not clear that the change in debt approach materially impacts the overall level of exposure. Our consultant's report explores this issue in detail including setting out algebraic derivations.

Even if the change in debt approach does increase inflation exposure, this would need to be weighed against the non-inflation benefits of our new approach to debt. We moved to the debt portfolio because it better aligned the regulatory debt allowance with incurred debt costs, and so reduced both interest rate risk and refinancing risk. We expect that in current circumstances, equity investors are less exposed to risk in total than before the change to the debt approach.

Whether we then seek to target a different type of return for investors is a complex question which would potentially require a change to the rules. This question goes to the balance of risks between network businesses, their investors and customers. A change in approach has the potential to impact the balance of these risks and the ultimate level of compensation required. If we are going to change our approach, these effects need to be considered carefully.

We think the current return target performs well and that the overall package of inflation compensation is appropriate. Overall, we do not consider that the evidence before us indicates that the current approach needs to be changed.

---

[9] Spark, *Letter re: Submission to the AER's discussion paper on the regulatory treatment of inflation*, 29 June 2017, p. 6.

3 Key concepts

3.1 What is inflation?

Inflation is a general measure of an increase in prices and fall in the purchasing value of money. Inflation refers to changes in the general or overall price level, rather than prices for particular products. For example, over a period of time the price of oil may increase and the price of bread may decrease, but there may be no change to the overall price level in the economy.

The opposite of inflation is deflation: a decrease in the general price level. The NER and NGR refer to inflation,[10] but do not expressly refer to deflation. We consider that the term 'inflation' in the rules includes deflation as a negative amount of inflation.

The presence of inflation within the economy makes it difficult to compare prices across different time periods. In order to account for inflation, the terms real and nominal are used. The real value of a good has been adjusted for inflation and can therefore be used to compare prices over different periods. Conversely, the nominal value has not been adjusted for inflation.

In economics, the Fisher equation estimates the relationship between real and nominal returns with regard to inflation:

$$(1 + interest\ rate_{nominal}) = (1 + interest\ rate_{real}) \times (1 + inflation\ rate)$$

This equation shows that when inflation in positive the nominal return is greater than the real return.

Real returns (or real prices) are important to use because they are able to illustrate the purchasing power of a return regardless of what happens to price levels in the future. In essence, a real return removes the effects of inflation and allows the value to be seen in terms of the current period's purchasing power.

3.1.1 Actual inflation measures

There are a number of different measures of actual inflation. The most widely known and used measure is the CPI. The CPI is a measure of changes in the price level of a 'basket' of consumer goods and services purchased by households. The ABS monitors changes in the CPI and results are published quarterly.

Other measures of inflation may differ in the types of products and prices that are tracked over time. For example, commodity price indices measure changes in prices of specific commodities such as gold and iron ore. Core price indices may exclude certain goods and services whose prices are relatively more volatile (due to supply and

[10] NER, Chapter 6; NGR, Part 9.

demand factors in those specific markets), and this volatility may make it more difficult to track underlying trends in the overall price level. Producer price indices measure changes in price from the seller's perspective and the 'basket' of producer goods and services can be further classified by industries. Another common measure is the GDP deflator. It is a measure of inflation across all final goods and services produced within the economy during the period. Unlike some price indices (like CPI) the GDP deflator is not based on a fixed basket of goods and services, instead the basket is able to change with people's consumption and investment behaviours.

3.1.2 Why use the CPI as the measure of actual inflation?

The choice of which actual inflation measure is most suitable involves balancing timeliness, stability and simplicity. Despite being somewhat narrower in scope than other options available, the CPI is the most suitable method for measuring inflation due to its simplicity, relative timeliness and high degree of credibility and familiarity. The ABS describes the principal purpose and uses of CPI in the following terms:[11]

> The Consumer Price Index (CPI) is an important economic indicator. It provides a general measure of changes in prices of consumer goods and services purchased by Australian households. The CPI is used for a variety of purposes, such as in the development and analysis of government economic policy, the adjustment of some government benefits and in individual contracts. Because of this, the CPI directly or indirectly affects all Australians.

ABS describes the role of CPI in monetary policy:[12]

> A major use of the CPI is to assist government economists in conducting general economic policy, especially monetary policy. Since 1993, Australian monetary policy has been conducted with the aim of meeting a medium-term inflationary target. Since the introduction of the 13th series CPI in the September quarter 1998, that target has been the inflation rate as measured by the CPI.

The CPI is also widely used in industry price determinations:[13]

> The CPI, or one of its components, is also widely used in indexation arrangements in both the private and public sectors. These include indexing pension and superannuation payments, taxes and charges, some governmental bonds, and business contracts.

Other measures of actual inflation are subject to limitations which make them a less appropriate measure compared to the CPI. The GDP deflator offers a broad coverage

---

[11] ABS Cat 6440.0, *A Guide to the Consumer Price Index: 16th series,* 2011, Chapter 1, available at http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/6440.0Main+Features102011.

[12] ABS Cat 6461.0 - *Consumer Price Index: Concepts, Sources and Methods*, 2016, Chapter 2, available at http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/6461.0Main%20Features22016?opendocument&tabname=Summary&prodno=6461.0&issue=2016&num=&view.

[13] ABS Cat 6461.0 - *Consumer Price Index: Concepts, Sources and Methods*, 2016, Chapter 2.

of prices in the entire economy producing economy wide inflation, instead of just the narrow consumer basket used by CPI. However, it is not a practical option for use in industry regulatory determinations given its longer publication lag and frequent revisions. Producer price indices offer the potential of greater alignment with the industry subject to regulation, but in practice it may be difficult to find a close match of the regulated networks. Also, there is a concern whether producer prices appropriately incorporate productivity improvements to the same extent as consumer or retail prices.

The CPI is therefore the most appropriate measure of actual inflation because of its timeliness, stability and simplicity. It is widely used as the primary measure of inflation by regulators and government agencies across Australia.

Additionally, the NER provide that the revenue or prices for regulated electricity network services are to apply a 'CPI minus X' control mechanism.[14] The NER also provide that the value of a regulated electricity network's asset base is to be adjusted from one period to the next by increasing it for actual inflation, and that the measure of inflation is to be consistent with that used in the control mechanism (that is, CPI).[15]

The NGR does not mandate the use of CPI when determining prices or asset values, but rather provides that financial information must be based on some recognised basis for dealing with the effects of inflation.[16] We consider that CPI is a well-recognised measure of inflation, and is the most appropriate measure for the reasons outlined above.

3.1.3 Monetary policy

As a measure of the overall change in prices, inflation is often considered as a loss of value of currency. That is, inflation from 1 January 2015 to 1 January 2016 means that one dollar could be used to buy more goods and services on the 1st of January 2015 than one dollar could be used to buy on the 1st of January 2016. As fewer goods and services could be bought with a single dollar, the relative value of the dollar has decreased.

Similar to any other product, changes in the value of money (that is, inflation) may be affected by changes in the supply of and demand for money. The RBA is tasked with conducting monetary policy to control inflation through increasing or decreasing the money supply (or by slowing or accelerating growth in the money supply). The RBA

[14] This is the transmission requirement. The distribution requirement is that standard control services are to be controlled by a prospective CPI minus X mechanisms, or some incentive-based variant of CPI minus X. NER, cll. 6.2.6(a) and 6A.5.2(c)(3).

[15] NER cl. 6.5.1(e)(3).

[16] NGR r. 73(1).

Governor and the Federal Treasurer have agreed that the appropriate target for monetary policy is an inflation rate of 2 to 3 per cent per annum.[17]

3.2 Best estimate of expected inflation

3.2.1 Expectations, forecasts, and outcomes

We are required to estimate expected inflation in our regulatory framework, but the inflation outcome may turn out to be different to the original expectation. A difference between an initial expectation and the ultimate outcome does not necessarily mean that the expectation was not the best possible expectation available at the time.

The Competition Economics Group (CEG) submitted that expectations involve consideration of the probability of all possible outcomes, and may not simply reflect the most likely outcome.[18]

3.2.2 What is 'best'?

The NER states that the PTRM for electricity distribution and transmission must specify: 'a methodology that the AER determines is likely to result in the best estimates of expected inflation.'[19] The NGR states that an estimate must be arrived at on a reasonable basis and must represent the best forecast or estimate possible in the circumstances.[20]

We, in conjunction with the development of the ACCC/AER working paper #11, consider that there are four approaches that could be employed to derive the best estimates of expected inflation:

- The AER's current approach, which is a 10 year geometric annualised average of the RBA's forecast headline rate for 1 and 2 years ahead[21] and the midpoint of the RBA target inflation band of 2 to 3 per cent for years 3 to 10;
- The 10 year bond breakeven inflation rate (BBIR) implied by the difference between the yields-to-maturity on nominal and indexed CGS;
- The 10 year expected inflation rate implied from zero coupon inflation swaps; and
- Survey-based approaches of expected inflation.

---

17 On average, over the business cycle. See: Australian Government and RBA, *Statement on the Conduct of Monetary Policy*, 19 September 2016, available at https://www.rba.gov.au/monetary-policy/framework/stmt-conduct-mp-7-2016-09-19.html.

18 That is, the mean, median, and modal outcomes may not equate. Competition Economists Group, *Best estimate of expected inflation*, September 2016, page 9.

19 NER, cll. 6.4.2(b)(1) and 6A.5.3(b)(1).

20 NGR, r. 74.

21 Where the RBA forecast headline inflation rate one and two years ahead is a range, the midpoint of the range is used.

The ACCC/AER working paper #11 ranks the four approaches with respect to best estimates of expected inflation informed by five assessment criteria:

- relative congruence with the market-expected inflation rate (whether estimates of a particular approach more closely correspond to the market-expected inflation rate)
- robustness
- transparency
- replicability
- simplicity.

These issues are also relevant to the reasonableness of the basis upon which an estimate is arrived at.

We have used the criteria to help us assess which method is likely to result in the best estimate of expected inflation in line with clauses 6.4.2(b)(1) and 6A.5.3(b)(1) in the NER and rule 74 in the NGR.

3.3 An efficient allowed rate of return

We incorporate inflation in the PTRM, annual pricing review and the RFM. Inflation also affects many of the inputs to these models. These effects are individually accounted for in the current methodology. This section explores the current methodology and the issue of appropriately accounting for inflation, correct compensation for inflation risk and the term of the inflation expectations used.

3.3.1 Appropriately accounting for inflation

Inflation has an effect on revenues, costs faced and asset values of the networks. Inflation also impacts the inputs and outputs of the PTRM and RFM models. After adjusting for these considerations, the current models set a real rate of return over the total of the regulated asset base.

The NER and NGR require use of a nominal rate of return (that is, a nominal weighted average cost of capital or WACC) in setting total annual revenues.[22] The NER also require the RAB to be indexed and maintained in real terms.[23] The NGR require the capital base to be depreciated in a manner that ensures that an asset is depreciated only once and that asset values are adjusted for inflation.[24] Inflation is thus accounted for in both returns on and of capital.[25] To avoid double compensation for inflation we adjust by removing the indexation of asset base amount from total revenue.[26] We subtract this amount from the depreciation building block. The approach provides for

[22] NER, cll. 6.5.2(d) and 6A.6.2(d); NGR, r. 87.
[23] NER, cll. S6.2.3(c)(4) and S6A.2.4(c)(4).
[24] If the accounting method approved by the AER permits. See NGR, r. 89(d).
[25] NER, cll. 6.5.2(d) and 6A.6.2(d).
[26] NER, cll. 6.4.3(b)(1) and 6A.5.4(b)(1).

the same total annual revenue and asset base as if a real rate of return is used in combination with an indexed asset base.

3.3.2 Risk and return

The networks expect to receive a set real return on the overall regulated asset base, but inflation risk may be present due to lag effects. However, electricity service providers are likely to be compensated for these risks through the current setting of parameters in the PTRM as are gas service providers who propose use of the PTRM or a model with similar settings.

The equity beta calculated for the benchmark efficient entity (BEE) through the return on equity is based on equity returns of Australian energy utility firms we consider reasonably comparable to the BEE.[27] If inflation risk due to regulation meant that the networks faced systemic risk, then the calculated betas in the CAPM is likely to be higher than otherwise. The businesses are therefore likely to be compensated for their current levels of inflation risk.

The calculations for the appropriate return on debt are also sensitive to the networks' current level of risk. This is due to the BEE's credit rating being based on the networks' observed credit ratings. If inflation risk was significant and did change the networks' probability of defaulting on debt, then we would expect it to be captured in the networks' credit ratings.

3.3.3 Investment term

The length of years considered in the inflation expectations is an important consideration as inflation expectations can vary depending on the number of years included. In choosing the length used for inflation expectations we match the duration to that of the nominal risk free rate used in the nominal vanilla return on capital calculations.[28] The nominal risk free rate used in the calculation of the return on debt and the return on equity is the 10 year CGS rate. We therefore use 10 year expected inflation estimates.

Debt contracts (and therefore our return on debt calculations) are based on prices investors are willing to pay. These prices reflect investor expectations of the risk free rate, debt risk premium and inflation over their investment horizon at the time they raise this debt. Service providers, have in the past agreed that this horizon (or term) for the return on debt is 10 years. Therefore, while debt contracts may fix the nominal cost of debt, this cost incorporates investor expectations of inflation over the next 10 years. The term in these inflation expectations are what we want to match.

---

[27] AER, *Better Regulation, Rate of Return Guideline*, December 2013, p. 15.

[28] AER, *Final Decision: SP AusNet transmission determination 2008–09 to 2013–14*, 31 January 2008, p. 107; AER, *Revised access arrangement by GasNet Australia (Operations) for the Principal Transmission System*, 30 April 2008, p. 66.

3.3.4 Model operations

We included detailed descriptions of the operation of the PTRM, RFM and annual pricing process in our April 2017 Discussion paper.[29] We can summarise the key inflation aspects of the current regulatory framework as follows:

- In the PTRM:
    - Include expected inflation (embedded in the nominal rate of return) in the return on capital building block
    - Deduct expected inflation from the return of capital building block
    - Include expected inflation in the projected RAB roll forward (consistent with the deduction from the return of capital building block)
    - Generate first year nominal revenue and X factors consistent with the estimate of expected inflation, where the NPV of unsmoothed revenues equate to the NPV of smoothed revenues.[30]
- In the annual pricing process:
    - Adjust smoothed revenue to reflect actual inflation (CPI outcomes) within the regulatory period—effectively replacing the estimate of expected inflation for within-one regulatory period cashflows.[31]
- In the RFM:
    - Include actual inflation in the RAB roll forward—effectively replacing the estimate of expected inflation for all subsequent regulatory period cashflows.

Combined, this framework:

- derives an initial real rate of return from the initial nominal rate of return and estimate of expected inflation
- delivers the initial real rate of return plus ex post inflation outcomes.

When we calculate revenues in the PTRM, we must use an estimate of expected inflation as actual inflation is not yet available. Debt and equity investors similarly must make assessment of expected inflation, and seek nominal returns that recover expected inflation on top of their required real returns. We set our ex ante estimates of nominal rate of return and expected inflation to align with these investor expectations.

Then, as the regulatory period progresses and actual inflation becomes known, it replaces the estimate of expected inflation used in the PTRM. During the annual

---

[29] AER, *Regulatory treatment of inflation, Discussion paper*, April 2017, pp. 9–16.

[30] The X factors can be interpreted as the change in real revenue each year—that is, before the adjustment of revenue for inflation. They are expressed in negative terms by convention (so a negative X factor results in a real revenue increase).

[31] This describes the 'complete' pricing adjustment (implemented for APA VTS); the standard approach introduces a first year pricing effect (discussed in section 6.2.2 below).

pricing process, tariffs are varied using actual inflation to set the allowed revenue for the coming year. In this way the prices faced by consumers and the revenues received by the networks change by actual inflation, but are constant in real terms (while ignoring other non-inflation factors).

At the end of the regulatory period, the RFM process rolls forward the regulated asset base using actual inflation. In effect the service provider has its revenue adjusted by actual inflation in each annual revenue adjustment and its asset base is adjusted only at the end of each regulatory period.

Investors receive the initial real rate of return, derived from the initial nominal rate of return and the estimate of expected inflation, plus actual inflation outcomes.

4 Process

We are undertaking an extensive consultation process as part of this inflation review. Our intent is to be proactive in reaching out to stakeholders and to engage in genuine dialogue with them. This process helps us make better decisions and so serves the long term interests of consumers.

The positive outcomes from the consultation thus far reflect the constructive attitude of a diverse range of stakeholders, including consumer groups and service providers. The material provided has been helpful to us. In many cases, it served to help us understand the perspectives of the stakeholders. Stakeholder feedback to us has also emphasised how productive the consultation has been, including where stakeholders have benefitted from engagement with other stakeholders and alternative perspectives on inflation issues.

In response to stakeholder concerns, we departed from our initial consultation schedule and added an additional consultation phase. This reflects our commitment to a dynamic engagement strategy that adjusts to reflect stakeholder concerns. We publicly acknowledge the five different stakeholders who undertook to develop and publish models for the technical workshop. This work prompted productive discussions that helped to resolve and clarify several matters relating to 'issue 2'.

As noted in section 1.2 above, the consultation process will continue with a period for submissions in response to this preliminary position paper and a public forum.[32]

Our website includes the material that stakeholders have provided as part of this consultation, including written submissions, models, presentations and forum summaries.[33]

4.1 Developments before review

Prior to 2007 the AER (and the Australian Competition and Consumer Commission (ACCC) before it) had used the breakeven method to estimate expected inflation. The breakeven approach estimates expected inflation, using the Fisher equation, as the difference between yields on inflation-indexed Commonwealth government securities (CGS) and nominal (not indexed) CGS.

In 2007, during our review of AusNet Services' Victorian electricity transmission determination, a consultant for AusNet Services submitted that there were issues of illiquidity in the indexed CGS market. AusNet Services submitted that these liquidity issues were impacting on the yields for those bonds, distorting the breakeven inflation

---

[32] Depending on the position taken in our final position paper, there may also be another subsequent round of consultation on proposed amendments to the PTRM and/or RFM.

[33] Available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-expected-inflation-2017.

estimate. After investigation, the AER decided to estimate expected inflation using the Reserve Bank of Australia (RBA) forecasts and target band approach, rather than the breakeven approach, in its 31 January 2008 final decision for AusNet Services. This approach has since been set out the PTRM and applied by us consistently for all subsequent determinations.

In June 2015, a consultant on behalf of SA Power Networks (SAPN) and United Energy submitted that the AER should once again use the 10 year bond-breakeven inflation rate as an estimator of expected inflation.[34] The consultant noted that the supply of indexed CGS has increased by over 400 per cent[35] and the number of different maturity dates more than doubled from 3 to 7[36] (4 of the 7 outstanding securities have a maturity of approximately 10 years or less). This led the consultant to conclude that the shortage in the supply of indexed CGS is no longer a material concern.

Expected inflation became a contentious issue following SAPN's revised proposal in July 2015. Since then, we have received regulatory proposals from 20 businesses and 13 of these have proposed a change to our approach to estimating expected inflation.[37] These proposals submitted that the RBA forecasts and target band approach is, in the current market conditions, resulting in an estimate of inflation that is upwardly biased, and that the breakeven method would provide a better estimate.[38]

In our October 2015 final decisions for Energex, Ergon Energy, and SAPN, we stated that we could not change the method for estimating inflation as it is set out in the PTRM and the PTRM is binding on both service providers and the AER.[39] Any changes to the PTRM must follow the legislated consultation process. We were not in a position to fully evaluate the merits of the RBA forecasts and target band approach, the breakeven approach, or any other methods, in any case. Our decision to apply the approach set out in the PTRM was upheld by the Australian Competition Tribunal (Tribunal) in its October 2016 decision.[40]

---

34 Competition Economics Group (CEG), *Measuring expected inflation for the PTRM*, June 2015.

35 From 30 June 2007 to 30 June 2017, indexed CGS by outstanding issue value has increased by over 550 per cent. Australian Office of Financial Management, *Table H13: Government securities on issue at 30 June 1983 to 2017*, 2017, accessed 25 September 2017, https://cdn.tspace.gov.au/uploads/sites/31/2013/07/Table-H13.pdf.

36 In 2007-08 there were 3 outstanding tenors of indexed CGS. Currently (2017) there are 8 outstanding tenors of indexed CGS. Australian Office of Financial Management, *Treasury Indexed Bonds*, 2017, accessed 25 September 2017, http://aofm.gov.au/ags/treasury-indexed-bonds/.

37 Of those, AusNet Services (Gas), Multinet Gas, ElectraNet, Australian Gas Networks (Victoria & Albury), SA Power Networks, CitiPower, Powercor, Jemena Electricity Networks, AusNet Services (distribution), United Energy, ActewAGL Gas, Australian Gas Networks and AusNet Services (transmission) criticised our current approach to estimating expected inflation, while APTNT, APTPPL, Powerlink, TasNetworks, APA VTS, Murraylink and TransGrid did not.

38 See for example, Australian Gas Networks, *Final Plan Attachment 9.2*, December 2016, p. 12.

39 AER, *Final decision Energex distribution determination - Overview*, October 2015, p. 23.

40 SAPN appealed to the Federal Court for judicial review of other parts of this Tribunal decision, but did not appeal the expected inflation component of the decision. Australian Competition Tribunal, *Application by SA Power Networks [2016] ACompT 11*, October 2016, para. 139.

In May 2016 we published final decisions for the Victorian electricity distributors, ActewAGL Gas Distribution, APTNT, and Australian Gas Networks' SA distribution network. In our decisions for the Victorian electricity distributors, we maintained that we could not change the method for estimating expected inflation due to the binding effect of the PTRM.[41] For gas businesses, while the PTRM was not binding, there needed to be sufficient consultation from the initial proposal on alternative methods of estimating expected inflation so that we could be satisfied that an alternative method resulted in an estimate that was made on a reasonable basis and was the best in the circumstances.[42] In each case, we also included a consideration of the relative merits of different methods for estimating expected inflation that had been put forward by service providers. This consideration was limited to the information available to us at the time and to the level of analysis that we could reasonably undertake in the time available. We found that there were a number of limitations with the breakeven approach that may cause it to produce biased estimates, and considered that overall the RBA forecasts and target band approach would better contribute to the National Gas and Electricity Objectives, particularly where alternatives had not been subjected to appropriate industry-wide consultation.[43]

United Energy and ActewAGL Gas Distribution filed applications for merits review by the Tribunal of the expected inflation decisions of our May 2016 determinations. United Energy withdrew its ground of review relating to expected inflation following the Tribunal's SAPN decision. The Tribunal's decision in ActewAGL's review is currently reserved but due to be delivered on or before 27 October 2017.

In the course of undertaking revenue reset processes and our review of the RFM, we have received further submissions raising issues about our approach for estimating expected inflation. Even in the context of the RFM review, these submissions focused on the expected inflation method set out in the PTRM. These submissions also proposed several other potential mechanisms to adjust allowed revenue to account for differences between estimated expected inflation and actual inflation in previous periods.[44] Such mechanisms would attempt to address the issue of estimating expected inflation by removing the influence of expected inflation and result in a change to the regulatory framework of setting an annual real rate of return, instead of the fixed rate of return over a regulatory period.

The alternative approaches for addressing inflation that have been proposed over the past 12 months are not necessarily consistent with one another.

---

41 AER, *Final decision Jemena distribution determination - Overview*, May 2016, p. 20.

42 NGR, r. 74.

43 For example, for electricity distributors: AER, *Final decision Jemena distribution determination - Attachment 3 - Rate of return*, May 2016, pp. 151–162; and in reference to gas businesses: AER, *Final decision Australian Gas Networks Access Arrangement - Attachment 3 - Rate of return*, May 2016, pp. 149–160.

44 APTPPL, *Roma-Brisbane pipeline access arrangement submission*, September 2016, pp. 207–210; SA Power Networks / CitiPower / Powercor, *Letter re: proposed amendment to the Roll Forward Model*, 13 October 2016, pp. 7–8.

In April 2017, the ACCC and AER published a working paper considering the best estimates of expected inflation (ACCC/AER working paper # 11).[45] The paper ranked and compared four different approaches including:

1. RBA inflation forecasts and target band (our current method)
2. Bond breakeven inflation rate
3. Zero coupon inflation swaps
4. Surveys.

The ACCC/AER working paper concludes that the RBA inflation forecasts and target band method is the best approach to estimating expected inflation. This approach is the most simple, transparent and replicable. The working paper concludes that long-term inflation expectations are anchored within the inflation target band and are relatively stable, and is considered to be relatively congruent with the 10 year market-expected inflation rate.[46]

4.2 Stage one consultation

We conduct an industry-wide review before making changes to our models given the widespread use of the PTRM and RFM, and the requirements set out in the NER for consultation.[47] The Discussion paper, the resulting consultation and submissions was the first step of our review of the treatment of inflation in our determination of revenue and prices for electricity and gas network services.

Consultation on the first stage was extended in response to submissions received on our Discussion paper. Details of the extended consultation step are in Section 4.3.

4.2.1 Discussion paper

The Discussion paper described the issues relevant to whether or not we should investigate changes to our PTRM, RFM, and/or annual pricing mechanisms. The submissions on the paper then fed into our assessment of whether or not amendments to these models and mechanisms would be appropriate and the form of any potential amendments.

The Discussion paper also provided further detail on how the inflation models and mechanisms used by the AER work. It also set out key concepts relevant to the consideration of inflation in the context of regulating revenues/prices of electricity and gas network services.

---

[45] See ACCC/AER Working Paper #11, *Consideration of best estimates of expected inflation: comparing and ranking approaches*, April 2017.

[46] ACCC/AER Working Paper #11, *Consideration of best estimates of expected inflation: comparing and ranking approaches*, April 2017, pp. 94-104.

[47] NER, cll. 6.4.1(c), 6.5.1(b), 6A.5.2(b) and 6A.6.1(c).

The AER provided a set of questions throughout the Discussion paper. These were questions on which we were particularly interested in hearing the views of stakeholders.[48]

4.2.2 Inflation forum

On 14 June 2017, we held a public forum as part of the industry-wide consultation and review of the regulatory treatment of inflation. The forum gave stakeholders the opportunity to seek clarification of inflation-related issues in our previously published Discussion paper and allowed the AER's project team to engage with stakeholders to understand their main concerns. The forum also provided the opportunity for all stakeholders to understand each other's issues, exchange views and concerns, and potential consequences of changing the AER's current approach to the treatment of inflation.[49]

The inflation forum was timed to allow discussion between stakeholders and the AER before stakeholders' submissions were due to be submitted.

4.2.3 Submissions

4.2.3.1 Issue 1

In response to the AER's Discussion paper, we received 16 responses on 'Issue 1'. The majority of submissions from service providers recommended replacing the AER's current approach with the bond breakeven approach (Table 1). Conversely, consumer groups recommended continuing using the RBA inflation target approach. Below is a summary of the submissions.

---

[48] AER, *Regulatory Treatment of Inflation, Discussion Paper*, April 2017, pp. 44–45.

[49] For more information on the discussion, see: https://www.aer.gov.au/system/files/AER%20Public%20Inflation%20Forum%20-%20Summary%20Report%20-%2014%20June%202017_0.docx

Table 1: Recommendations from submissions on 'Issue 1'

Submitter	Bond breakeven	RBA inflation target	Inflation swaps	Survey / Other
ActewAGL	X			
APA				Other
Ausgrid	X			
AusNet Services	X	X*		
CCP		X		
CEPA	X			
ECA		X**		
ENA	X			
Endeavour	X			
Jemena		X*		
MEU		X		
QTC	X			
Spark Infrastructure	X			
SA Power Networks, CitiPower, Powercor and AGN	X			
TransGrid		X		
Uniting Communities		X**		

Source: Discussion paper submissions, AER.

Notes:

X* AusNet and Jemena submit that if RBA approach remains it should be altered to adopt a glide path method. AusNet also suggests that we could use an average of RBA and break even approach.

X** ECA and Uniting Communities agree with the use of the RBA approach using the top of the RBA band.

Other APA proposes changes to PTRM estimate of inflation to overcome an alleged error.

Consumer groups' submissions

There were three submissions from consumer groups: the CCP, the ECA and Uniting Communities. Each recommended continued use of the AER's current approach. ECA and Uniting Church, however, requested that the expected inflation estimate for years three to ten be changed from 2.5 per cent to 3 per cent.

CCP

The CCP's submission is guided by the view that consistency and predictability are the key principles of good regulatory practice. Accordingly the 'bar' for change should be relatively high to ensure that any change is enduring and in the long-term interests of consumers.[50]

The CCP considered that the case for moving away from the AER's current approach has not been made. While actual inflation is currently below long term expectations, there is a lack of evidence to support that this will continue or that inflation expectations in the long term have moved outside the RBA target range.[51] CCP's primary concern with the use of the indexed bond yields is the potential size and volatility of the liquidity premium. For the CCP to be convinced of the change from the AER's current approach to using the bond breakeven inflation rate it would be necessary to show that potential biases in the market are currently low and will be persistently low.[52]

ECA and Uniting Communities

ECA emphasised that the treatment of expected inflation should eliminate regulatory risks to promote economic efficiency and result in current and future consumers paying no more than necessary. ECA supported the objective of seeking outcomes beneficial to both consumer and producer interests, not just a balancing of those interests, as the rationale for economic regulation.[53]

ECA commissioned two expert reports: Woollahra Partners (labelled Attachment A) and Professor John Quiggin (labelled Attachment B).

ECA submitted the appropriate estimate to use is the RBA target band, and that the proposal to base estimates of inflation on market indicators is inappropriate as it introduces unnecessary regulatory risk. ECA proposed that setting estimated inflation at the top of the RBA target band appropriately allocates inflation risk to investors.[54]

Uniting Communities agreed with ECA's perspective that the regulatory rate for inflation should be set at the upper end of the RBA target range as this will reduce inflation risk to consumers.

Service providers' submissions

Service providers' recommendations fit into three broad categories: no change to the AER's current approach, change the current approach to include a glide path, and change to bond breakeven inflation rate approach.

---

50 CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, p. 5.
51 CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, pp. 26–27.
52 CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, p. 20.
53 ECA, *Regulatory treatment of inflation, Response to AER discussion paper*, June 2017, pp. 4-6.
54 ECA, *Regulatory treatment of inflation, Response to AER discussion paper*, June 2017, p. 10.

Service providers' submissions in favour of a bond-breakeven approach

The majority of service providers' submissions recommended changing to a bond breakeven approach. These submissions mainly stated their support for the ENA submission which, in turn, relied on the CEPA submission. Some of the submissions also refer to other external reports used in previous regulatory determinations by Frontier Economics (ActewAGL) and CEG (Spark Infrastructure). A brief summary of the CEPA and CEG reports are below.

In its report, CEPA provided four assessment criteria:

- Congruence with regulatory framework
- Congruence with market expectations of inflation
- Objective and evidence based
- Transparency and replicability.

These criteria exclude the simplicity criterion used in the ACCC/AER working paper.

CEPA submitted the AER's current approach is not the best estimate of expected inflation and does not necessarily reflect the macroeconomic conditions that market based approaches take into account. CEPA preferred a breakeven inflation approach, without adjustment. It note that while the breakeven approach is subject to some distortions from bias and risk premium, evidence suggests these tend to 'average out' over time and on balance overestimate (rather than underestimate) inflation.

The 2016 CEG Report, Best Estimate of Expected Inflation compares the breakeven method with the AER's current approach and attempts to illustrate that the AER's method performed poorly. CEG stated that the breakeven method has advantages over the AER's current method, including:

- it is a direct measure of inflation expectations in the same bond market that the AER uses to set the nominal rate of return on equity
- it already reflects a probability weighted average of all possible inflation outcomes as perceived by bond investors
- it is available as a longer time series.[55]

Service providers' submissions in favour of a glide path approach

A glide path approach was discussed as a possible method in the AusNet Services, Jemena and CEPA submissions. A glide path would use the RBA's forecasts but would involve a linear ('glide') path between the RBA inflation forecasts for the first two years and the mid-point of the RBA's inflation target band of 2.5 per cent.

---

[55] Spark, *Letter re: Submission to the AER's discussion paper on the regulatory treatment of inflation*, 29 June 2017, pp. 8–10.

Service providers' submissions on indifference to 'Issue 1'

Both TransGrid and APA do not wish to change from our current approach for estimating expected inflation. TransGrid noted that over the long run any mismatch between forecast and actual inflation should "equalise out". APA submitted that none of the three methods considered (the RBA inflation target method, the use of data from inflation swaps, and the bond breakeven method) appears to provide a better estimate of expected inflation as compared to the other two methods.

A more in depth coverage of submissions can be found in section 5 and Appendix B.

4.2.3.2 Issue 2

In response to the AER's Discussion paper, we received a number of responses on 'Issue 2'. Below is a summary of the submissions.

Consumer groups' submissions

The CCP

In its submission the CCP considered the issues raised by APA, APGA and ElectraNet,[56] and identified their concerns are largely focused on the potential mismatch between the forecast and actual inflation arising from two potential errors:

- that the assumed inflation is higher or lower than the observable 'true' inflation expectations
- that actual, or outturn, inflation is different from the assumed inflation.[57]

The CCP considered it important that there is an agreed quantitative understanding of the impacts of the errors or risks on consumers and utilities, and undertook modelling to test the impact of these errors.[58] The preliminary findings are that:

> A lower inflation assumption at the start of the period can substantially increase prices and expected profits in real terms. Conversely, higher inflation assumption at the start of the period can substantially reduce prices and expected profits in real terms.
>
> Differences between actual and expected inflation during the period do not affect prices, revenues or profits in real terms.[59]

The CCP submitted that a common understanding of how the models work over the life of the assets of multiple time periods is important, and this should be facilitated through a further stakeholder workshop to systematically work through the models. The

---

[56] CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, pp. 6–10.
[57] CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, p. 11.
[58] CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, pp. 11–12.
[59] CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, p. 11.

workshop should be confined to a small group of network representatives, consumers groups and others wishing to test and measure.[60]

We undertook a technical workshop that was similar to that recommended (see section 4.3.2).

ECA and Uniting Communities

ECA engaged Woollahra Partners to review the AER's modelling framework and assess the delivery of inflation under the current AER approach. Based on this advice, the ECA submitted (in regard to Issue 2) that:[61]

> The conclusion is that in the cases where real WACC is held constant, that is where what is modelled is the variation between estimated expected inflation and actual inflation, is relatively small and virtually symmetrical. Where the analysis considers the impact of estimated expected inflation deviating from the inflation inherent in the estimate of the WACC (i.e. where nominal WACC is held constant) then the variation is greater though again symmetrical for the same sized deviation.

In this aspect, the ECA agreed that the AER's regulatory framework was delivering the initial real rate of return (but not the initial nominal rate of return). This real rate of return was delivered (with small and symmetrical deviation) even where actual inflation differed from expected inflation.

Uniting Communities' submission on 'Issue 2' referred to Ofgem's consideration of similar network business revenue proposals at the same time which allows issues like inflation to be considered at once across all electricity distribution network businesses. Uniting Communities submitted that the AER consider a single inflation guideline to be applied across all regulated network businesses over an agreed period of time. The inflation guideline should be binding over a specified period e.g. three to five years. A binding inflation guideline would be efficient and provide greater stakeholder certainty.[62]

Service providers' submissions

Service providers' concerns in submissions on 'Issue 2' can be split into two broad categories:

(A) The regulatory framework does not achieve its intended target (initial real rate of return).

(B) The regulatory framework should target a different outcome.

---

60 CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, p. 16.

61 ECA, *Regulatory treatment of inflation, Response to AER discussion paper*, June 2017, p. 9.

62 Uniting Communities, *Submission to the AER on regulatory treatment of inflation*, 5 July 2017, pp. 2–3.

The range of initial stakeholder concerns reflected considerable confusion over what was happening in the regulatory models, as well as confusion over the intended target.

Many of the expressed concerns in category A (that the regulatory framework does not achieve its intended initial real rate of return) have been resolved as a result of the extensive engagement process (see section 4.3).

The additional consultation has clarified, but not resolved, many of the expressed concerns in category B (that the regulatory framework should target a different outcome). There are two alternative targets (in addition to the AER's current target) proposed by different stakeholders:

- The framework should target the initial nominal rate of return. This means that revenue received by service providers does not change when actual inflation outcomes are above or below expected inflation. Proponents for this include Ausgrid and APA.[63]
- The framework should target the initial real return on equity, and the initial nominal return on debt. Under this hybrid approach, the revenue relating to debt costs should not vary with inflation outcomes (and so conceptually align with fixed nominal debt issued by the benchmark entity). However, the residual revenue (after debt costs had been paid) would vary with inflation outcomes in order for equity holders to obtain the initial real return on equity. The primary proponent of this position is Spark Infrastructure.

With this background, the major stakeholder concerns can be summarised as follows:

- **NER requires the AER to target the initial nominal rate of return.** Ausgrid submitted that the NER reference to a nominal vanilla rate of return in cl. 6.5.3(d)(2) requires the AER to adopt this nominal rate of return target. This falls under category B above.
- **Mismatch in the regulatory depreciation building block.** APA submitted that the inflation indexation calculation in the PTRM for the return of capital building block does not align with the equivalent calculation in the RFM. This negative building block adjustment (that is, inflation increases the value of the RAB, and so decreases the regulatory depreciation building block) uses expected inflation in the PTRM but actual inflation in the RFM. This falls under category A above.[64]
- **Targeting the initial nominal rate of return is economically preferable.** APA and Ausgrid submitted that delivery of the initial nominal rate of return would align

---

[63] APA and Ausgrid led discussion on this point at the technical workshop on 9 August 2017. See APA, *Regulatory treatment of inflation, APA submission in response to AER consultation*, 29 June 2017, p. 17 and Ausgrid, *Letter in response to the AER's regulatory treatment of inflation discussion paper*, 29 June 2017, pp. 3–4.

[64] At the August technical workshop, the APA representative stated that the regulatory framework 'probably' delivered the initial real WACC. However, subsequent communication from APA (including their RBP and VTS revised proposals) indicates that it still considers this 'mismatch' prevents delivery of the initial real WACC.

with the headline return on capital expected by investors (and potentially the basis on which our rate of return parameters are set). This falls under category B above.

- **In the presence of fixed nominal debt costs, a hybrid target of real equity/nominal debt is preferable.** Spark Infrastructure submitted that providing compensation for efficient costs means recognising the issuance of fixed nominal debt by a service provider. If we target the initial real rate of return, but debt costs are fixed in nominal terms, the equity holders (after paying the fixed interest rate on debt) will not receive the initial real return on equity whenever actual inflation differs from expected inflation. Hence, they propose changing the current framework. This falls under category B above.
- **Changes to the return on debt approach require we move to a hybrid target of real equity/nominal debt.** Building on the previous point, Spark Infrastructure submitted that the critical trigger is the AER's move to an annually updated trailing average portfolio return on debt approach in 2013. This perspective acknowledges the long history of the current inflation approach, but sees the 2013 change as introducing internal inconsistency into our framework. Under the post-2013 approach, we estimate the return on debt by assuming the benchmark entity issues fixed nominal debt each year. This falls under category B above.

An in depth coverage of the key issues arising from these submissions can be found in section 6.

4.3 Extended stage one consultation

The submissions we received in response to the Discussion paper revealed divergent views on the regulatory framework, particularly with regard to 'Issue 2'. In particular, stakeholders disagreed on whether or not:

(a) the current regulatory models achieved their intended real rate of return target

(b) the regulatory models should target a different rate of return outcome.

The divergence in views was apparent at the June 2017 public forum, and several stakeholders requested that the AER facilitate further engagement on these issues.

To explore these different perspectives and clarify the operation of the models, we extended the initial consultation to allow additional bilateral (AER-stakeholder) meetings and then a technical workshop. The small staff-level meetings were intended to build a foundation of shared understanding for the much larger technical workshop.

4.3.1 Small group meetings

AER staff offered to meet stakeholders in one-on-one sessions where it would be possible to look in detail at the models. This allowed:

- stakeholders to ask questions about the AER's models and inflation approach, and together examine the excel spreadsheets
- the AER to reflect its understanding of the stakeholders' written submissions, and then allow stakeholders to correct and/or clarify that understanding

- the AER to introduce its modelling of overall inflation effects, including across multiple regulatory periods.

Ten meetings were held with twelve different stakeholders.[65]

4.3.2 Technical workshop

We issued an open invitation for any stakeholders to present at the technical workshop, with the condition that presenters develop models to illustrate the inflation effects and provide them to all participants in advance of the meeting. We asked all presenters to address three core inflation scenarios in their modelling—where actual inflation outcomes were equal to, above or below expected inflation.

We held the technical workshop on the 9 August 2017 in Sydney with forty participants attending. There were six presentations:

- AER
- Consumer Challenge Panel
- Energy Consumers Australia (part of the Consumer Reference Group)[66]
- Jemena
- APA
- Spark Infrastructure.[67]

In each case, the presenters explained their approach to modelling inflation outcomes.

Broadly speaking, the extended consultation resolved the expressed stakeholder concerns around whether or not the current regulatory models achieved their intended rate of return target. At the end of the technical workshop there was consensus that the current regulatory framework targets the initial real rate of return, and that the models deliver this outcome with only minor variation around the target.[68]

The extended consultation clarified, but did not resolve, the different stakeholder concerns around the appropriate form of target. At the end of the technical workshop there were three distinct stakeholder perspectives—the framework should either:

(c) continue to target the initial real rate of return; or

(d) change to target the initial nominal rate of return; or

(e) change to target initial real return on equity and initial nominal return on debt.

---

65 Meetings were held with Ausgrid, the Consumer Challenge Panel, Endeavour Energy, Energy Consumers Australia (twice), South Australian Power Networks / CitiPower / Powercor / Australian Gas Networks (jointly), Essential Energy, AusNet Services, Spark Infrastructure and Jemena Limited.

66 Woollahra Partners gave this presentation, acting as consultants to ECA.

67 A section of this presentation was given by CEG, acting as consultants to Spark.

68 The only exception to the consensus was APA, who agreed that the models probably delivered the initial real rate of return but wanted to further review the matter.

All materials relating to the technical workshop (including models from all presenters and a summary of outcomes) are available on the AER website.[69]

4.4 Expert advice

Leading up to and during the inflation review, the AER has obtained advice from experts to address the two broad issues with inflation that were raised by stakeholders. We provide a brief summary of their findings below.

4.4.1 ACCC/AER working paper advice

The ACCC and AER published a working paper considering the best estimates of expected inflation (ACCC/AER working paper # 11).[70] The paper ranked and compared four different approaches including:

1. RBA inflation forecasts and target band (our current method)
2. Bond breakeven inflation rate
3. Zero coupon inflation swaps
4. Surveys.

The ACCC/AER working paper #11 ranked the four approaches by five assessment criteria:

- relative congruence with the market-expected inflation rate (whether estimates of a particular approach more closely correspond to the market-expected inflation rate)
- robustness
- transparency
- replicability
- simplicity.

The ACCC/AER working paper concludes that the RBA inflation forecasts and target band method is the best approach to estimating expected inflation for the AER. This approach is the simplest, most transparent and replicable. The working paper concludes that long-term inflation expectations are anchored within the inflation target band and are relatively stable, and the AER's current method is considered to be relatively congruent with the 10 year market-expected inflation rate.[71] Surveys were found to be least favourable, however that was primarily due to there being no public access to long term inflation expectations based on surveys.

---

69 See https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-expected-inflation-2017/initiation.

70 See ACCC/AER Working Paper #11, *Consideration of best estimates of expected inflation: comparing and ranking approaches*, April 2017.

71 ACCC/AER Working Paper #11, *Consideration of best estimates of expected inflation: comparing and ranking approaches*, April 2017, pp. 94-104.

4.4.2 RBA correspondence

On 9 June 2017, the AER sent a letter to the RBA seeking its views on the relative merits of the four different approaches discussed in the ACCC/AER working paper #11.

The RBA responded with a letter on 5 July 2017. The RBA stated:

> To summarise our response, none of these measures is perfect. The AER's current approach, while fairly transparent and simple, would not capture a change in long-term inflation expectations if that were to occur. Reserve Bank analysis suggests that surveys of professional forecasters can produce good estimates of long-term inflation expectations. However, relying on proprietary data from Consensus Economics may be at odds with the AER's stated aim of transparency. As noted in previous correspondence between the Bank and the AER, market-based measures of inflation expectations have several shortcomings that probably make them unviable alternatives to the current method.[72]

The full letter from the RBA was published on the AER website after receipt.[73]

4.4.3 Shaun Vahey's advice

We engaged Professor Shaun Vahey of the University of Warwick to provide advice on the findings in the ACCC/AER working paper, our Discussion paper and the submissions. This advice focused solely on 'Issue 1', the evaluation of alternative methods for estimating expected inflation. This advice was received on 15 September 2017.

Professor Vahey's findings were largely consistent with the ACCC/AER working paper. He found that the working paper correctly identified the current methodology as the most appealing approach to meet the selection criteria. The other methodologies were also considered:

- The swaps method was found to be sensitive to the market turmoil associated with deflationary pressures in recessions.
- The bond breakeven approach was found to lack transparency, simplicity, as well as robustness. Risks of distortions to relative liquidity are also described as 'considerable'.
- Surveys were thought to add additional complexity for no particularly obvious advantages in terms of the selection criteria.

---

[72] RBA, *Letter re: Regulatory treatment of inflation – Inflation expectations,* 5 July 2017.

[73] Available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-expected-inflation-2017/initiation (in the supporting information section).

4.4.4 Sapere Research Group report

We commissioned Sapere Research Group (Sapere) to provide advice on the Discussion paper, written submissions and material presented at the technical workshop. This advice focused primarily on 'Issue 2', the operation of the regulatory framework (PTRM/RFM/annual pricing process) and the delivery of the intended rate of return target. This advice was received on 25 September 2017.

The Sapere report finds that:[74]

- It is an appropriate regulatory objective to target the delivery of the initial real rate of return on capital (plus ex post inflation outcomes). This target will align with the investor's opportunity cost of capital. It will fulfil the NPV=0 principle and support the national gas and electricity objectives.
- The current regulatory models (PTRM, RFM and annual pricing) are consistent with the regulatory objective. There is a small deviation from the target return for most service providers because of the first year pricing effect.
- If the regulatory objectives are to be met, it is necessary to avoid large or persistent errors (bias) in the AER's initial estimate of expected inflation. This sort of error will cause the estimated real rate of return to depart from the 'true' real rate of return.[75] There is no known framework that would avoid this problem and meet the regulatory objectives.
- Equity holders are exposed to inflation risk where they pay debt in fixed nominal terms, but revenue moves in line with inflation—as under the current approach where a real rate of return on capital is targeted. Leverage magnifies this risk. However, this exposure is already included in the allowed rate of return, through an equity beta estimated using observed data for companies subject to the current inflation approach.

To arrive at this conclusion, the Sapere report:

- reviewed the relevant legislative requirements and the economic rationale for inflation compensation
- derived algebraic equations to represent the operation of the AER's PTRM, RFM and annual pricing process
- undertook modelling (in excel spreadsheet form) of inflation interactions across multiple regulatory periods, including all regulatory components.

The Sapere report includes several sections looking in detail at the interactions between debt returns, equity returns and inflation. It derives equations for the exposure

---

[74] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017.

[75] The Sapere report does not assess the merits of the alternative methods for estimating inflation (though this is undertaken in the ACCC/AER working paper and the Vahey report).

of equity holders to changes in inflation under a number of different debt frameworks. Under an approach that targets the real rate of return on capital, if expected inflation is 2 per cent but actual inflation is 1 per cent:[76]

- If debt costs are set in *real* terms, equity holders will receive real returns equal to their initial (targeted) real return. Nominal returns to equity holders will be 1 per cent below the initial nominal return, because inflation was lower than expected by 1 per cent.
- If debt costs are set in *nominal* terms, equity holders will receive real returns 1.5 per cent below their initial (targeted) real return.[77] Nominal returns to equity holders will be 2.5 per cent below the initial nominal return. This occurs because interest payments to debtholders take precedence over the return to equity holders. Revenue decreases in line with the reduction in revenue but there is no reduction in the fixed debt costs.

[76] This example also assumes that the 'true' estimate of expected inflation embedded in the return on debt is equal to 2 per cent (and so equal to the AER's estimate of expected inflation).

[77] This calculation uses the benchmark gearing (60 per cent). Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 20 (paragraph 107).

5 Analysis on methods for estimating expected inflation

5.1 Position and reasoning

The NGR requires forecasts and estimates to be arrived at on a reasonable basis and represent the best possible forecast or estimate possible in the circumstances.[78] We construct the expected inflation estimates in the PTRM and RFM so that they satisfy these NGR provisions in addition to requirements in the NER. As part of this process we used the five criteria in our Discussion paper (congruence, robustness, transparency, replicability and simplicity) to determine the 'best' estimate of expected inflation.

Our preliminary position is to continue using the current approach to estimate inflation expectations (the current estimate of expected inflation is a combination of the available RBA forecasts with the RBA's target band). The current method is preferred due to it being relatively congruent with long term inflation expectations (as compared to other methods considered), robust, simple to employ, transparent and easy to replicate.

We have carefully evaluated several submissions that suggested we should modify the RBA approach by adding a 'glide path' from the RBA's short term forecast to the midpoint of the target band. We consider that the empirical evidence currently before us does not support a glide path. We invite stakeholder submissions to specifically address the rate of reversion to the midpoint in responding to our preliminary position.

We agree with stakeholders' submissions that the RBA method is predicated on the use of the RBA's target band as an anchor for long term inflation expectations. The evidence before us does not indicate long term inflation expectations have de-anchored from the RBA's target band at present. We propose to add one additional monitoring process, which is to regularly review survey evidence on long term inflation expectations. If these deviate substantially from the midpoint of the RBA target band (used in the RBA method) we would seek advice from the RBA.

While surveys are good for the monitoring process, we find that they are inappropriate for use as the primary estimate. Inflation expectation surveys that were considered were either for too short a duration or were restrictively proprietary. Short term surveys are already considered by the RBA and information from them should already be in the first two years' forecasts under the current approach.

Inflation expectation estimates based on swaps were also considered. We find that it is probably the best unadjusted market measure but it is not useful in our regulatory

[78] NGR, r.74(2).

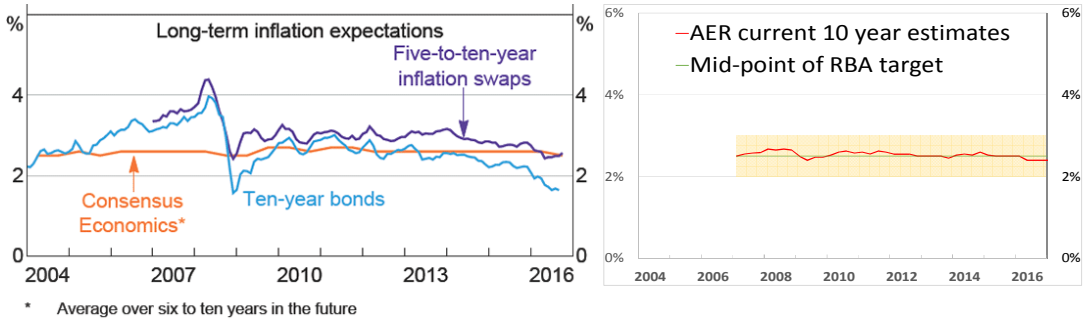
context due to the concerns of the infrequency of market trades. It is also possibly affected by a number of biases.

The bond breakeven approach was preferred by a number of stakeholders in the submission process. However, we find that it is affected by biases that are potentially time varying and is particularly volatile (see Figure 1). This leaves the method not particularly useful when unadjusted. There are some adjusted bond breakeven approaches. While they may provide a more accurate representation of inflation expectations than the unadjusted breakeven approach, they are not transparent or simple. The adjusted estimates are also likely to differ depending on the study parameters chosen and so are unlikely to produce robust estimates across adjustment approaches.

After considering stakeholder submissions, expert reports and other material presented to us as part of this process, we concluded the current method provides the 'best' estimate of expected inflation for use in the regulatory framework. While this is our preliminary position, we encourage further submissions on this issue (particularly on the glide path approach).

The remainder of section 5 considers each of the methods in detail. Responses to submissions on the 'best' estimate issue are also in Appendix B.

Figure 1: Four inflation expectation measures over time



Sources: LHS - RBA, Bulletin - December Quarter 2016 - Measures of Inflation Expectations in Australia, December 2016, 23-32, RHS - AER calculations.

5.2 Current method

The AER's current approach is a 10 year geometric annualised average of the RBA's headline rate forecasts for 1 and 2 years ahead[79] and the midpoint of the RBA's target inflation band of 2 to 3 per cent for years 3 to 10.

[79] Where the RBA forecast headline inflation rates for 1 and 2 years ahead is a range, the midpoint of the range is used.

Discussions with, and submissions from, stakeholders and other parties raised a number of positives and faults with the current approach.

After consideration of the submissions from stakeholders and experts, we found the current approach remains the simplest to apply, most transparent and easily replicable. Estimates from this approach tend towards the mid-point of the RBA's inflation target band, and the ACCC/AER working paper (along with Professor Vahey) found that long-term inflation expectations are anchored to the RBA's target band and relatively stable over time. While the RBA's inflation targeting is perceived to be effective, and inflation expectations are anchored to the target band, this estimation method is likely to be unbiased.[80]

Some submissions stated that the current method is too stable over time. The ACCC/AER working paper #11 found that, overall, the academic literature supports the view that long-term inflation expectations are:[81]

- relatively stable over time
- anchored to the RBA's target band, and
- do not respond significantly to inflation surprises.

Correspondence with the RBA stated that market measures have several shortcomings that probably make them unviable alternatives to the current method, but that surveys of professional forecasters can produce good estimates of long-term inflation expectations.[82] The current method performs more consistently to the Consensus Economics approach than the other methods considered (see Table 2 below).

---

80 ACCC/AER Working Paper # 11, *Consideration of best estimates of expected inflation: comparing and ranking approaches*, April 2017, paragraphs 201-204.

81 See ACCC/AER Working Paper # 11, *Consideration of best estimates of expected inflation: comparing and ranking approaches,* April 2017, paragraph 38. See also: Christian Gillitzer and John Simon (2015), 'Inflation Targeting: A Victim of Its Own Success?', RDP 2015-09, August, *Reserve Bank of Australia Discussion Paper*, pp. 1–27; Richard Finlay and Sebastian Wende (2011), 'Estimating Inflation Expectations with a Limited Number of Inflation-indexed Bonds', *Research Discussion Paper*, Reserve Bank of Australia, RDP 2011-01, March, pp. 1–35; Shawn Chen-Yu Leu and Jeffery Sheen (2006), 'Asymmetric Monetary Policy in Australia', *The Economic Record*, 82, Special Issue, September, pp. S85–S96; Jarkko Jaaskela and Rebecca McKibbin (2010), 'Learning in an Estimated Small Open Economy Model', RDP 2010-02, March, *Reserve Bank of Australia Discussion Paper*, pp. 1–45.

82 The RBA's finding in this regard is corroborated by other central bank and academic studies on survey-based estimates of long term inflation expectations. See pages 90–92 of ACCC/AER working paper.

Table 2: Maximum deviation from the midpoint of RBA target band—comparison of AER method, bond breakeven approach and swaps

Method of estimating 10 year inflation expectations	Maximum deviation from February 2007 to August 2017 (basis points)
Gillitzer and Simon's (2015) long term inflation expectations proxy	20*
AER's current method	17
Bond breakeven approach (unadjusted)	136
Swaps	144

* The sample period employed by Gillitzer and Simon is 1998 to 2013, whereas the AER's current method , bond breakeven and swaps estimates are considered from February 2007 to August 2017. Nonetheless, it is likely that long term inflation expectations have remained relatively stable since 2013. For example, Finlay and Wende extended their 10 year BBIR decomposition analysis to 2016 and find that 10 year inflation expectations appear relatively stable and close to the midpoint. Gillitzer and Simon's proxy for inflation expectations is a weighted average of a forward-looking measure of long term inflation expectations from Consensus Economics, and a backward-looking measure, lagged year-ended inflation. The weighting has trended to unity with the Consensus Economics expectations since inflation targeting began.

The current method, however, does have a potential flaw. If the RBA inflation targeting is (or becomes) perceived to have lost its effectiveness and expectations are not anchored within the target band, then estimates from the RBA inflation target method may not be the best estimates of expected inflation. There is potential, though, to minimise the risk of using the method when inflation expectations have become unanchored. This is discussed in the following section.

5.2.1 Use of Consensus Economics survey as check

The current method's primary potential imperfection, its vulnerability to sustained changes in expectations, can be partially addressed by the AER monitoring the Consensus Economics survey. The AER will monitor the series as a deviation of the series away from the RBA's target band would potentially indicate an unanchoring of inflation expectations.[83] If there is such an indication, at that time the AER would seek the advice of the RBA. Currently the Consensus Economics survey is inappropriate to use by itself (see section 5.4 for more information).

5.3 Modifications to current approach

5.3.1 Glide path

Some submissions by stakeholders proposed using a glide path approach.

A glide path method involves a gradual movement from the RBA's short term inflation forecasts to the midpoint of its target range. It recognises a possible slower reversion

[83] RBA, *Letter re: Regulatory treatment of inflation - Inflation expectations*, 5 July 2017.

to midpoint inflation target, which some stakeholders submit may occur in the current global environment.[84] The Commerce Commission of New Zealand uses an equivalent version using RBNZ forecasts.

A glide path approach was not discussed in the ACCC/AER working paper or the Discussion paper. Below we describe some of the known positives and negatives of the approach at this time. Considering these, we are currently not satisfied that there is enough evidence to change from the current approach to a glide path approach. However, we encourage stakeholders to provide more evidence in submissions to this paper.

Commerce Commission of New Zealand glide path

The Commerce Commission of New Zealand has used a glide path approach to inflation since 2012. Similar to the AER's current approach, the Commerce Commission's approach uses the RBNZ's forecasts and the midpoint (in New Zealand's case 2 per cent). However, the Commerce Commission's approach 'glides' in years 3 and 4 to the midpoint in the fifth year. An illustrative example can be seen in Table 3 below.

Table 3: Illustrative calculation of forecast CPI for regulatory period of five years for the New Zealand Commerce Commission

Regulatory period	Data source or calculation	Forecast change in CPI
Year 1	Reserve Bank forecast	3.0%
Year 2	Reserve Bank forecast	2.5%
Year 3	2.5%-(2.5%-2%)/3	2.33%
Year 4	2.33%-(2.5%-2%)/3	2.17%
Year 5	2.17%-(2.5-2%)/3	2.00%

Source: New Zealand Commerce Commission

Notes: The RBNZ targets an inflation midpoint of 2.0 per cent (distinct from the 2.5 per cent targeted by the RBA).

The Commerce Commission's reasoning for the glide path is time taken for the transmission of monetary policy. The Commerce Commission states:[85]

> Evidence on the time it takes for a monetary policy change to have an effect is not conclusive but a 'rule of thumb' for the length of monetary policy transmission mechanism is between one and two years.

[84] CEPA, *Best Estimate of Inflation Expectations: Assessment of Approaches*, 28 June 2017, p. 31.

[85] Commerce Commission New Zealand, *Specification and Amendment of Input Methodologies as Applicable to Default Price-Quality Paths,* 28 September 2012, p. 14.

In Australia, transmission of monetary policy occurs at a lag but is typically shown to be one to two years.[86] This suggests that, if monetary policy is still effective, a glide would be between 0 years (as we have currently) and 2 years (as the Commerce Commission of New Zealand currently uses). This is because if deviations from the Reserve Bank's target are known at the time of the forecast then the Reserve Bank can implement monetary policy and the effect should occur before the third year (due to the transmission taking one to two years on average).

Other glide length evidence

There are many potential glide path candidates that could be used. It is difficult at this time to differentiate if a particular method is better than the others. Current evidence before us suggests that having no glide path, or a short glide path, would be more appropriate than a long glide path. We look forward to stakeholder submissions on this topic.

The current non-glide path approach is based on the consideration of the potentially rapid reversion of short term inflation expectations to the midpoint of the RBA inflation target band. Tulip and Wallace (2012) found that RBA's second year forecasts of inflation significantly outperform forecasts based on a random walk ($p = 0.03$) but did not significantly outperform forecasts based on the midpoint of the inflation target band.[87] Tulip and Wallace state that this reflects 'rapid reversion of headline inflation to the mean'. This outcome is consistent with the successful targeting of the inflation rate. Further, Tawadros finds that the RBA forecasts produce much lower forecasting errors than the forecasts made by the three other private sources.[88] If the relative accuracy of RBA short term forecasts inform and reflect short term market expectations of inflation, such relatively rapid reversion of short term inflation expectations to the midpoint indicates that a glide path may be unnecessary.

Research suggests that the inflation expectations in the past have been well anchored within the RBA target band.[89] Some approaches are consistent with this. The current approach, Consensus Economics survey and adjusted bond breakeven measures have not deviated from the midpoint of the target by large amounts. Long glide paths can deviate considerably.

In Figure 2, we graph a selection of glide path estimates over the past 10 years. These include:

1. A linear glide path with two transition years (similar to that used by the NZCC)
2. A non-linear glide path with two transition years (exponential decay)

---

86 Reserve Bank of Australia, *The Transmission of Monetary Policy*, p. 2.

87 Peter Tulip and Stephanie Wallace (2012), 'Estimates of Uncertainty around the RBA's Forecasts', *RBA Research Discussion Paper – November 2012*, RDP2012-07, pp. 11-12.

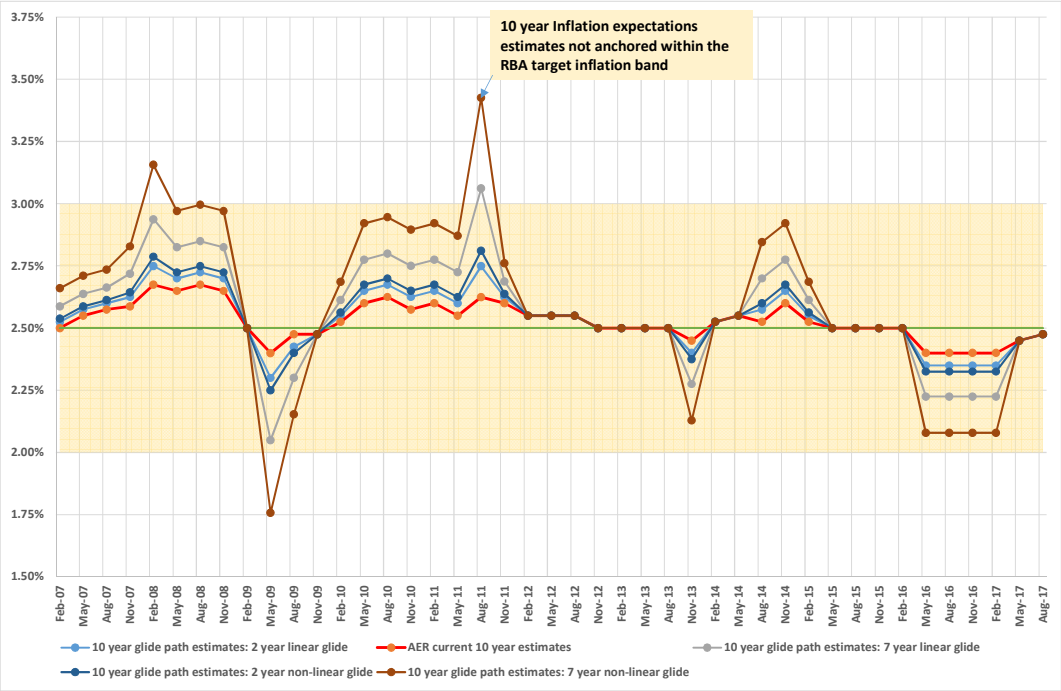
88 George Tawadros (2013), 'The information content of the Reserve Bank of Australia's inflation forecasts', *Applied Economics*, 45, pp. 626–627.

89 ACCC/AER Working Paper # 11, pp. 16–18.

3. A linear glide path with seven transition years (final year is the midpoint)
4. A non-linear glide path with two transition years (exponential decay with the final year the midpoint)
5. AER's current method (no transition years).

The figure shows the glide paths (both linear and non-linear) that include long 'glides' are the most volatile. Of note, high two-year ahead forecasts made in 2011 due to the introduction of the carbon tax would have led to estimates of inflation expectations of between 3 and 3.5 per cent for the next ten years. These were unlikely to be congruent with actual inflation expectations for the next ten years.

Figure 2: Glide path inflation expectations over time



Source: RBA, AER/ACCC

In Table 4 we consider the maximum deviation from the midpoint in the past 10 years of select glide paths. Depending on the glide path chosen the maximum deviation from the midpoint can vary considerably. Long glide paths can at times suggest that the target is no longer anchored to the RBA's target band (outside 2-3 per cent). In contrast, a measure that is almost identical to Consensus Economics – Gillitzer and Simon's long term inflation expectations proxy – deviates by an amount similar to the

current approach.[90] An RBA Bulletin (2016) states that the Consensus Economics 'measure is ideal for assessing anchoring of long-term inflation expectations'.[91]

Table 4: Maximum deviation from the midpoint of RBA target band—comparison of AER method and select glide paths

Method of estimating 10 year inflation expectations	Maximum deviation from February 2007 to August 2017 (basis points)
Gillitzer and Simon's (2015) long term inflation expectations proxy	20*
AER's current method	17
Glide path: 2 year linear glide	25
Glide path: 2 year non-linear glide	31
Glide path: 7 year linear glide	56 (no longer anchored within the target band)
Glide path: 7 year non-linear glide	93 (no longer anchored within the target band)

* The sample period employed by Gillitzer and Simon is 1998 to 2013, whereas the AER's current method estimates and glide path estimates are considered from February 2007 to August 2017. Nonetheless, it is likely that long term inflation expectations have remained relatively stable since 2013. For example, Finlay and Wende extended their 10 year BBIR decomposition analysis to 2016 and find that 10 year inflation expectations appear relatively stable and close to the midpoint. Gillitzer and Simon's proxy for inflation expectations is a weighted average of a forward-looking measure of long term inflation expectations from Consensus Economics, and a backward-looking measure, lagged year-ended inflation. The weighting has trended to unity with the Consensus Economics expectations since inflation targeting began.

5.3.2 Change to the end target point

ECA's submission suggested a change from the 2.5 per cent end point used in the current method to 3 per cent. Below we detail our reasons for why we chose 2.5 per cent and consider the arguments for changing to 3 per cent.

The 2.5 per cent midpoint

The AER decided to estimate expected inflation using the RBA forecasts and target band approach, rather than the breakeven approach, in its 31 January 2008 final decision for AusNet Services' transmission determination. The midpoint was chosen from the target band for years 3 to 10 after consultation with the RBA, Australian Treasury and retail banks.

In its letter to the ACCC, the RBA advised that:

> Given inflation expectations have been firmly anchored by the Bank's inflation-target regime for some time, a rough estimate of a real risk free rate would be

[90] Used as Consensus Economics is proprietary. For evidence of near unity movement with consensus, see Christian Gillitzer and John Simon, *Inflation Targeting: A Victim of Its Own Success?*, September 2015, p. 9.

[91] RBA, *Bulletin - December Quarter 2016 - Measures of Inflation Expectations in Australia*, December 2016, 23-32.

> the nominal government bond less the centre of the inflation target band (ie the nominal yield less 2 ½ per cent).[92]

Similar advice was also received from the Australian Treasury:

> We suggest that [when] working with nominal yields and, where a real return is required, making an inflation adjustment based on the mid point of the RBA's 2 to 3 per cent range, is entirely reasonable. Since the independence of the Reserve Bank Board in conducting monetary policy was formalised in March 1996, annual inflation has averaged 2.5 per cent.
>
> …
>
> We therefore recommend that the ACCC use the mid point of the RBA's target band for inflation (i.e. 2.5% per annum) as the best estimate of inflation.[93]

The AER noted most of the retail banks referenced in AusNet Services' proposal did not forecast inflation beyond a 2-3 year period either. Most of these banks also suggested 2.5 per cent be used for longer term inflation forecasts, on the basis that it is the midpoint of the RBA's target range. Some also note that it was the long term average.

In the absence of a reliable market based estimate, and acknowledging the difficulty of forecasting inflation beyond the short term, the AER considered 2.5 per cent to be a reasonable estimate of inflation beyond the RBA's forecast period.

Inflation, since inflation targeting began in Australia, has averaged around 2.5 per cent to 2017 and 2.3 per cent over the past decade.[94]

More recent studies find that long term expectations of inflation are anchored within the RBA's inflation target band and near the midpoint. [95]

Proposed change to 3 per cent

The report by Professor Quiggin that accompanied ECA's submission suggests setting estimated inflation at the top of the RBA's target band appropriately allocates inflation risk to investors. The purpose is to protect consumers from 'upside' inflationary risk by setting the regulatory estimated rate at the upper end of the range.

Our view is that this would be setting a direct transfer from the service providers to consumers but would not necessarily lower risk. This is because the change would be equivalent to an expected 40 basis point drop in annual return compared to the existing approach. However, if inflation was different from what was expected then prices would

---

92 RBA, *Letter to ACCC*, 9 August 2007, p.3.

93 Australian Treasury, *The Treasury bond yield as a proxy for the CAPM risk-free rate*, Letter to ACCC, 7 August 2007, p.5.

94 ABS, 6401.0 - Consumer Price Index Australia, June 2017.

95 Jarkko Jaaskela and Rebecca McKibbin (2010), 'Learning in an Estimated Small Open Economy Model', RDP 2010-02, March, *Reserve Bank of Australia Discussion Paper*, pp. 1–45. and ACCC/AER Working Paper # 11, pp. 16–18.

change in the same manner as the current estimate (including when inflation is above 3 per cent). So while it does reduce the chance that actual inflation is above the estimate, it does not necessarily reduce price fluctuation risk for consumers.

Relevantly, the NER states that the PTRM for electricity distribution and transmission must specify: 'a methodology that the AER determines is likely to result in the best estimates of expected inflation.'[96] The NGR states that an estimate must be arrived at on a reasonable basis and must represent the best forecast or estimate possible in the circumstances.[97] It is doubtful that a change in the current estimation technique in an attempt to shift risk from consumers to service providers would also provide the best estimate of expected inflation. Transfers of risk are better considered as part of any change to the regulatory framework.

5.4 Surveys

Inflation expectations obtained from surveys of professional forecasters, market economists and other groups is another method for estimating market expectations of inflation. There are two types available, those publicly available and those that are not. Neither is our preferred method for the reasons detailed below.

Surveys of inflation expectations that are publicly available are limited in availability. Those that the AER has been able to observe include expectations two years into the future. These surveys are already considered by the RBA and have no particularly obvious advantages in terms of the AER's criteria.[98] Tulip and Wallace, and Tawadros found that these surveys do not provide a better estimate than the RBA forecasts.[99]

Surveys of longer inflation expectations are often proprietary and not publicly available. They, however, are often congruent with actual long term inflation expectations. The RBA provided some detail on these methods in its letter to the AER:[100]

> The RBA monitors three surveys of long-term inflation expectations: those of union officials, local market economists, and the respondents to Consensus Economics' survey. The survey of union officials and the survey of market economists measure expectations of average annual inflation over the next five to ten years, while the survey from Consensus Economics captures expectations of average inflation for between six to ten years. Long-term surveys of expectations are a good way to estimate long-term inflation expectations since they should not be influenced by temporary deviations or financial market developments, and because the respondents are well-informed. They should also react to any unanchoring of expectations. Internal work has found that the Consensus Economics survey is the measure of long-term expectations that best abstracts from near-term influences on inflation.

---

96 NER, cll. 6.4.2(b)(1) and 6A.5.3(b)(1).

97 NGR, r. 74.

98 Shaun P. Vahey, *Report to the AER on Estimating Expected Inflation*, 15 September 2017, p. 12.

99 Peter Tulip and Stephanie Wallace (2012), 'Estimates of Uncertainty around the RBA's Forecasts', *RBA Research Discussion Paper – November 2012*, RDP2012-07, p. 16. and George Tawadros (2013), 'The information content of the Reserve Bank of Australia's inflation forecasts', *Applied Economics*, 45, pp. 626–627.

100 RBA, *Letter re: Regulatory treatment of inflation – Inflation expectations*, 5 July 2017.

The main drawback of the Consensus Economics survey is its frequency; long-term expectations are only surveyed twice a year (in April and October). Furthermore, the information in this survey is proprietary, which may restrict replicability.

We note that from 2014, the Consensus Economics survey has been issued quarterly (useful for our purposes). This is the same availability as the RBA forecasts published in the Statement of monetary policy.

The Consensus Economics forecast is proprietary and therefore does not satisfy the transparency and replicability criteria. Survey companies sell the inflation estimates derived from their surveys. If we used a proprietary survey estimate in our regulatory process it may be possible to reverse engineer the value which would undermine the business case of the survey company.

As mentioned in section 5.2.1 we now have access to the survey results and will be monitoring it.

5.5 Swaps

The swaps method has a number of positive attributes. Estimates of expected inflation using swaps are simple to calculate, can give daily estimates and the biases are arguably smaller than bond breakeven approach.

Although there are these positive attributes, we do not prefer the inflation swaps method over the current method. The estimates produced using the inflation swaps methods are likely to incorporate biases and distortions (due to hedging costs, liquidity premium and other premiums) and these biases and distortions are likely time-varying.[101] There also remains uncertainty as to the size of the biases. The ACCC/AER working paper provided a breakdown on these biases as set out in Table 5 on the following page.

The volatility of the estimates is also undesirable. Evidence before us suggests that long term inflation expectations are relatively stable and are anchored within the RBA target band.[102] The zero coupon inflation swap prices are volatile. This suggests that the method does not produce congruent estimates of inflation expectations.

Focusing on the use of the swaps method in the regulatory framework, we have concerns with the ability of stakeholders to move the market in short averaging periods. Such ability is a concern due to the impact of expected inflation on revenue outcomes for service providers.

The swaps method did not receive much support in submissions to the Discussion paper. The RBA's letter also advises that this method is probably an unviable alternative to the current method.

---

[101] ACCC/AER Working Paper # 11, pp. 75–76.

[102] Jaaskela and McKibbin (2010), 'Learning in an Estimated Small Open Economy Model', RDP 2010-02, March, *Reserve Bank of Australia Discussion Paper*, pp. 1–45. and ACCC/AER Working Paper # 11, pp. 16–18.

Table 5 Issues with swap-implied inflation rates

Bias	Explanation
Hedging costs	Likely to result in potential overestimates of expected inflation. If there is greater demand for the fixed leg than the floating leg dealers may hedge their short exposure in the swap market by taking offsetting exposures in other markets, such as bond markets. In taking these positions dealers are likely to incur hedging costs. Hedging costs include all costs associated with opening, maintaining and closing positions in the market. The zero coupon inflation swap rate may be affected by the hedging costs incurred by swap dealers. Swap dealers may pass on these hedging costs in the form of higher inflation swap rate quotes. In this case, hedging costs may drive a wedge between the inflation swap rate and the market-expected inflation rate. The ACCC/AER working paper #11 found that academic literature suggests that hedging costs may be minor, but there are not many studies to support drawing robust conclusions. As the demand for the fixed and floating leg will change under different market conditions this bias is likely to be time-varying.
Inflation risk premium	Likely to result in potential overestimates of expected inflation. There may be a number of arbitrage and transaction costs associated with hedging the short exposure in the inflation swap market. Hedging may also be imperfect because there may be mismatches in the timing, size and maturity of the cash flows. Hedgers seldom create a perfect hedge because the marginal cost of hedging rises sharply as the risk minimising hedge ratio is approached. The hedger will select a hedge that is less, perhaps substantially less, than the risk-minimising hedge ratio.[103] As a result, swap dealers short in inflation swaps may still require an inflation risk premium to compensate them for inflation uncertainty that persists due to imperfect hedges, and this premium may be included in the published inflation swap rate. This potential bias is likely to be time-varying when inflation expectations are more uncertain.
Inflation indexation lag	Inflation rate swaps are also subject to indexation lag, which may influence the inflation swap rate such that the raw inflation swap rate may depart from the expected inflation rate. The floating leg of the zero coupon swaps is explicitly linked to the reference CPI date. The lag on the Australian zero coupon inflation swap is moderate. Bloomberg and Zine-eddine (2014) identify the lag as 3 months. Because the swap inflation rates are not adjusted for indexation lag, the swap contract is referenced to inflation for a period that starts before the date on which the contract is priced and ends before the contract matures. Therefore, the estimated forward inflation curve from inflation swaps will not entirely capture forward inflation rates, but also include some historical inflation determined by the extent of the indexation lag. This bias is potentially small due to the short lag on indexed CGS and is not likely to be time-varying.
Counterparty default risk	The risk associated with an inflation swap is that the counterparty will fail to fulfil its obligations outlined in the swap agreement. This default risk is known as counterparty risk and as such, default risk premia may be included in inflation swap rates. While the presence of this risk premia is a relatively well-known, the effect of counterparty default risk on zero coupon inflation swap rates may not be significant. This premia could result in overestimates of expected inflation and is not likely to be time-varying.
Liquidity premia	Likely to result in potential overestimates of expected inflation. Zero coupon inflation swap rates may also contain liquidity premia, which may drive a wedge between the raw inflation swap rate and expected inflation rate. A-priori liquidity premia may be near zero since swaps can be created as required and there is no supply limitation. Observations of Australian data suggest that this liquidity premia may be negligible.[104] If the inflation swap method includes a liquidity premium it is likely to produce overestimates of the expected inflation rate. Furthermore, the liquidity premium is likely to be greater during periods of uncertainty when investors' appreciation of liquidity risk may have changed.

Source: ACCC/AER Working Paper # 11, pp. 75–76.

[103] Charles Howard and Louis D'Antonio (1994), *'The Cost of Hedging and the Optimal Hedge Ratio'*, The Journal of Futures Markets, 14(2), pp. 237-238.

[104] See ACCC/AER Working Paper #11, *Consideration of best estimates of expected inflation: comparing and ranking approaches,* April 2017, pp. 81–85.

5.6 Bond breakeven approaches

5.6.1 Overview of bond breakeven approaches

The bond breakeven approach was recommended in 9 of the 16 submissions received on the Discussion paper.[105] The method is also used by some regulators internationally in both adjusted and unadjusted forms. For example, Ofwat uses the bond breakeven approach but adjusts the estimate by 0.3 percentage points.

The bond breakeven inflation rate (BBIR) method, however, is not our preferred approach for the following reasons:

- There is evidence of significant and time-varying premiums and biases in BBIRs for the US and UK markets (more mature and liquid than the Australian market) – as well as for the Australian market.
- BBIR estimates may vary considerably depending on the chosen yield curve models (and there is no consensus in the literature on which model should be used).
- There is evidence that long term inflation expectations are relatively stable and are anchored within the RBA inflation target band. Adjustments can be made to mitigate this.
- If adjustments are made for the above issues the methodology becomes complex and opaque.

5.6.2 Calculation

The BBIR is calculated from the Fisher equation. The Fisher equation provides that:

$$(1 + interest\ rate_{nominal}) = (1 + interest\ rate_{real})(1 + expected\ inflation)$$

Therefore:

$$expected\ inflation = \frac{1+interest\ rate_{nominal}}{1+interest\ rate_{real}} - 1$$

The yield to maturity (as a proxy for the interest rate) on the risk free asset (nominal and indexed CGS) is typically used to calculate breakeven inflation rates via the Fisher equation.

5.6.3 Bond breakeven without adjustment

Submissions that recommended the bond breakeven approach preferred using the method without making adjustments for biases. Research suggests the bond

[105] Predominantly regulated entities, their owners and their consultants.

breakeven approach has considerable issues if left unadjusted, which were covered in the ACCC/AER working paper. See Table 6 below for more information.

The conclusions of other experts we consulted were consistent with this finding. The RBA detailed that much of the variation in the long term bond breakeven rate is due to changes in the inflation risk premium rather than changes in inflation expectations.[106] Professor Shaun Vahey's paper discussed our previous use of the bond breakeven approach before 2008. The approach was halted because of distorted breakeven inflation estimates due to illiquidity. He describes the risks of further distortions of relative liquidity as considerable.[107]

Many of the supporting submissions of the breakeven approach relied on the report by CEPA. CEPA noted that the breakeven approach is subject to some distortions from bias and risk premium, but evidence suggests these tend to 'average out' over time and on balance overestimate (rather than underestimate) inflation. This is inconsistent with the RBA's advice which stated:[108]

> The inflation risk premium biases the long-term bond breakeven rate upward, while the liquidity premium biases it down; there is no guarantee that these biases will offset one another. Furthermore, these premiums are unobservable and probably vary over time, which complicates the interpretation of changes in the long-term bond breakeven rate. Movements in the breakeven rate could arise from changes to long-term inflation expectations, the liquidity premium, or the inflation risk premium. Previous work undertaken by the RBA has found that, at long horizons, much of the variation in the long-term bond breakeven rate is due to changes in the inflation risk premium rather than changes in expectations.

The RBA's reasoning is informed by Finlay and Wende (2011).[109] These were updated in 2016 with similar findings.[110]

CEPA also stated that the bond breakeven approach on balance overestimates (rather than underestimates) inflation. To do so it relied on a RBA Bulletin article referred to in its report.[111] The article only used swaps to calculate market-implied measures of expected inflation and so is not applicable to the bond breakeven approach.[112]

The bond breakeven approach was not supported by consumer groups. The CCP considered each of the four options and agreed with the AER's use of the five criteria. In its report the CCP stated:[113]

---

106 RBA, *Letter re: Regulatory treatment of inflation – Inflation expectations*, 5 July 2017.

107 Shaun P. Vahey (2017), *Report to the AER on Estimating Expected Inflation*, 15 September 2017, pp. 16–17.

108 RBA, *Letter re: Regulatory treatment of inflation – Inflation expectations*, 5 July 2017, p. 2.

109 Richard Finlay and Sebastian Wende (2011), 'Estimating Inflation Expectations with a Limited Number of Inflation-indexed Bonds', *Research Discussion Paper,* Reserve Bank of Australia, RDP 2011-01, March, pp. 1-35

110 RBA, Bulletin - December Quarter 2016 - *Measures of Inflation Expectations in Australia*, December 2016, 23-32.

111 CEPA, *Best Estimate of Inflation Expectations: Assessment of Approaches*, 28 June 2017, p. 24, 30-31.

112 RBA Bulletin March 2017, *Inflation Expectations in Advanced Economies*, March 2017.

113 CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, p. 26.

In the case of the proposed move to the bond break even approach to measuring inflation expectations, the CCP's preliminary view is that there is insufficient evidence supporting a shift from the current AER approach.

We base this on our philosophical approach to the importance of the key principles of consistency and predictability in best practice regulatory decision-making. This is important to consumers as well as investors. While some flexibility to adapt to exceptional circumstances is recognised as being necessary the adoption of a consistent, an enduring methodology or approach to decision-making is essential if there is to be consistency and predictability.

Consumers require strong confidence that the benefits of change are present and enduring ie provide a better estimate of inflation expectations over multiple decision cycles in different conditions, not just in the current conditions. We are concerned that a change back to the bond break even approach, after it was abandoned in 2008, will create a risk of flip-flopping of approaches to suit specific interests.

ECA and Uniting Communities were also against using the bond breakeven approach.[114]

Below, Table 6 (taken from the ACCC/AER working paper) summarises the key issues with bond breakeven estimates.

Table 6 Issues with bond breakeven estimates

Issue	Explanation
Fitting a yield curve	The approximate matching of 10 year maturities of nominal and indexed CGS is necessary for the calculation of the 10 year breakeven inflation rate. However, a match of such maturities is unlikely to occur given the relatively few tenors of outstanding indexed CGS. Therefore, calculations of breakeven estimates may require yield curve models to interpolate estimates of yields obtained from indexed and nominal CGS with different tenors. The consequence of using yield curve models is that the breakeven estimates are unlikely to reflect mark-to-market expectations of inflation, and the estimates are likely to vary depending on the yield curve models chosen. Deacon and Derry (1994) and Deacon et al. (2004) find that breakeven estimates may vary considerably depending on the yield curve models employed.
Liquidity premia	Indexed CGS are likely to be substantially less liquid than nominal CGS. This implies that liquidity premia included in the yields on indexed CGS may be greater than the liquidity premia included in the yields on nominal CGS. The difference between liquidity premia, or the differential liquidity premia, is likely to drive a wedge between the bond breakeven inflation estimates and inflation expectations. The differential liquidity premia are likely to be greater during periods of uncertainty when investors' appreciation of liquidity risk may have changed. In such a situation, the yield spread between nominal bonds and inflation indexed bonds is likely to narrow – a narrowing that is caused by greater uncertainty, growing differential liquidity premia, and not necessarily a fall in inflation expectations.
Inflation risk premia	The inflation risk premia arise because holders of nominal bonds are exposed to inflation risk,

[114] ECA, *Regulatory treatment of inflation, Response to AER discussion paper*, June 2017, p. 8, 26; Uniting Communities, *Submission to the AER on regulatory treatment of inflation*, 5 July 2017, p. 4.

	where there is a probability that the actual inflation rate will not match the expected inflation rate. As a result, nominal bondholders may demand compensation for bearing this risk. Inflation risk premia may be positive or negative, depending on whether there are concerns about inflation or deflation.
Convexity bias	Bond prices are a convex function of their respective yields. Therefore, if yields are volatile, giving effect to gains being larger than the losses, bond prices may rise. The rise in the bond prices push down their forward yields, below their expected future yields. The difference between forward yields and expected future yields on a bond is the 'convexity effect'. The size of the convexity effect is likely to be different for nominal and indexed bonds. The difference in the magnitude of the convexity effect for nominal and indexed bonds may result in the bond break-even inflation estimates departing from market expectations of inflation by the amount of a 'convexity bias' (other things unchanged). Convexity bias is sensitive to the relative volatility of forward yields on nominal and indexed bonds. Therefore, the scale of convexity bias estimates may change if relative forward yield volatilities change over time.
Inflation indexation lag	A perfectly indexed CGS would pay a real coupon amount that is adjusted by the increase in the CPI between the issue date and the time of payment. However, there are unavoidable lags between the actual movements in the CPI and adjustments of indexed bond cash flows. Indexation lag may result in the forward yields on indexed CGS being calculated on the basis of both historical inflation rates and expected future short term inflation rates. The effect of indexation lag on indexed CGS yields may be significant during periods of significantly above and below-trend inflation.
Inflation risk premia in indexed bond yields: indexation lag premia	As a result of indexation lag, the real return on indexed bonds may be exposed to some inflation risk. There is research which finds that inflation risk premia may be embedded in indexed bond yields to compensate investors for such risk. This is known as indexation lag risk premia. Risa (2001) finds that the yields on UK 10 year indexed bonds included an indexation lag risk premium of approximately 3.3 basis points. However, Risa considers that this premium is not economically relevant in size. D'Amico et al. (2016) find an indexation lag premium on the yields on 10 year TIPS varies between –5 and 3 basis points.
Inflation risk premia in indexed bond yields: post-tax variability of indexed bond cash flows	Tax regimes in existence tend to cause post-tax real returns to remain uncertain even if pre-tax real yields are known. Since tax is levied on the nominal yield, not the real yield, the tax system reintroduces inflation risk for indexed bonds. Post-tax real yields may become uncertain and variable if inflation is uncertain. If the demand for bonds is a function of their expected post-tax returns, pre-tax indexed bond yields may include inflation risk premia to compensate investors for the potential uncertainty of post-tax real returns. The existence of inflation risk premia in indexed bond yields may result in bond break-even inflation estimates departing from market expectations of inflation.
Mismatched pattern of cash flows	Christensen et al. (2004) argue that even if nominal and indexed bonds have the same maturity, differences in the pattern of coupon payments (resulting in differences of duration and convexity of each bond) may expose each bond to different discount factors. In real terms, the coupon payments on indexed bonds are fixed, while the coupon payments on nominal bonds decline in real terms over their maturity. Since cash flows that arrive later in time are discounted more heavily, the price of the indexed bond will be lower and therefore the BBIR may produce downwardly biased estimates of expected inflation. Christensen et al. note that the size of this bias will not be constant through time since it is a function of the coupon and maturity of nominal and indexed bonds and the term structure of interest rates. They find that observed volatility of bond breakeven estimates may be due to mismatched cash flows and not to changes in inflation expectations.
Sensitivity to short term inflation expectations when calculated from coupon-paying bonds	When bond breakeven estimates are calculated from the yields on coupon-paying bonds, the estimates may become more sensitive to changes in short term inflation expectations compared to an approach that is calculated from yields on zero coupon bonds. As a result, if the term structure of inflation expectations is not flat, relatively volatile short term inflation expectations may change the bond break-even estimates, even if the long term market expectations of inflation are unchanged.
Changes to the demand for and	There may be changes to the demand for and supply of nominal and indexed CGS that are unrelated to changes in inflation expectations. As a result, relative yields and bond break-even

supply of indexed and nominal CGS that are unrelated to changes to inflation expectations	inflation estimates may change even if the term structure of inflation expectations is unchanged. For example, changes to the relative supply of nominal and indexed CGS, changes to investor risk aversion, slow moving capital and capital availability may result in a movement of the relative yields that may be unrelated to changes in inflation expectations.
The effect of the deflation floor on the yields of indexed CGS	Indexed CGS have a 'deflation floor' – coupon interest payments will not be based on a capital value less than the face value and payment of the principal cannot fall below the face value. If deflation becomes a concern, the deflation protection of indexed CGS becomes valuable, pushing up indexed CGS prices and reducing indexed CGS yields. During such episodes, the effect of the deflation floor on indexed CGS may influence bond breakeven estimates. For the US, D'Amico et al. (2016) identify the effect of the deflation floor as a potential driver of bond breakeven estimates. They find that the deflation floor affects the yields on 10 year TIPS by about 5 basis points during normal times but widening to -20 basis points during the recent crisis.
Personal price indices and the substitution effect	In their estimates of the bond breakeven inflation rate for the US, Christensen and Gillan (2012) find that the inflation risk premium in the estimates remained negative even after maximally correcting for the liquidity premium. Christensen and Gillan argue that this may be due to TIPS yields being higher than they otherwise would be for two reasons. Firstly, the CPI may overstate true inflation outcomes because the substitution effects have not been considered. Secondly, the personal price index of investors may be different to the CPI and therefore TIPS are only a partial hedge for inflation risk. Consequently, investors may demand a risk premium for the remaining exposure to an imperfect inflation hedge. The influence of the substitution effect and personal price indices on indexed bond yields may result in bond breakeven inflation estimates departing from market expectations of inflation.

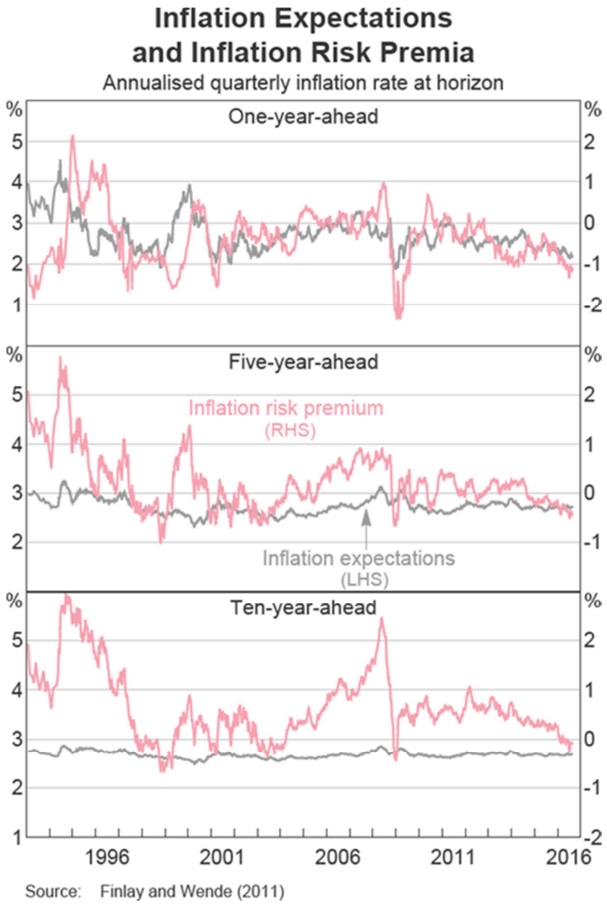
Source: ACCC/AER Working Paper # 11, *Consideration of best estimates of expected inflation: comparing and ranking approaches*, April 2017, pp. 33–36.

5.6.4 Bond breakeven with adjustments

Adjusted bond breakeven approaches have been used by regulators in the past internationally and have been created in Australia. Finlay and Wende decomposed the bond breakeven approach into several components in 2011. These were updated by the RBA in 2016 and set out in Figure 3:[115]

[115] RBA Bulletin - December Quarter 2016, *Measures of Inflation Expectations in Australia*, December 2016.

Figure 3: Inflation expectations from adjusted BBIR



Source: RBA

Figure 3 shows the resulting estimate is considerably more stable than the unadjusted breakeven approach. The inflation risk premia vary considerably more than inflation expectations at the ten-year-ahead range suggesting variation in the unadjusted method is mostly attributable to bias. The stability of the ten-year-ahead forecast is similar to our current approach and the resulting estimate is higher than under the AER's current method.

Using an adjusted approach would produce estimates more congruent with inflation expectations than using the bond breakeven approach unadjusted. It would not, however, achieve the objectives of a simple or transparent method. Perhaps more importantly, the decomposition estimates are likely to differ depending on the study parameters chosen – the bond breakeven method is unlikely to produce robust estimates across decomposition approaches.

Ofwat's adjustment is simpler than that used by Finlay and Wende. However, just choosing a single value like Ofwat does, would not be appropriate in an Australian context. This because the inflation risk premium is considerably more volatile than inflation expectations and can change by more than 2 percentage points in a single year.

6 Analysis of the treatment of inflation in the regulatory framework

6.1 Position and reasoning

Our current approach targets the delivery of the initial real rate of return (derived from the initial nominal rate of return and expected inflation) plus actual inflation outcomes over the regulatory period. Targeting the real rate of return means that revenues received by the service provider move in the same direction as inflation. If actual inflation outcomes are below expected inflation, service providers recover less than expected; but if actual inflation outcomes are above expected inflation, service providers recover more than expected.

We have consistently applied this approach (targeting the initial real rate of return) in all our previous electricity and gas decisions (including relevant decisions by the ACCC prior to the formation of the AER). We consider that there is a strong economic rationale behind an approach that targets the initial real rate of return, and this approach is consistent with the NER and the NGR.

Under the current implementation, delivery of the initial real rate of return is not exact. That is, when actual inflation outcomes are above or below expected inflation, the obtained real rate of return will differ slightly from the targeted real rate of return. However, deviations around this target appear to be minor and symmetrical. Further, one of the key deviation sources—the first year pricing effect—acts to offset potential errors in the AER's estimate of expected inflation.

Targeting the initial real rate of return appears compatible with our post-2013 method for calculating the return on debt (a trailing average debt portfolio, annually updated). The change in debt approach does not appear to have increased the inflation exposure of equity holders. The current approach in our treatment of inflation aligns with our method for estimating the rate of return—in particular, the method for estimating equity beta. Hence, we are satisfied that service providers receive the correct overall compensation package.

6.2 Delivery of initial real rate of return under the current approach

We consider that the different inflation treatments should be assessed by estimating the overall revenue impact of differences between expected and actual inflation. This means considering the complex interactions between:

- different regulatory processes—that is, the inflation effects throughout the PTRM, annual pricing adjustments and RFM
- multiple regulatory periods—that is, where lagged series are used and over-compensation in one period may be offset by under-compensation in the next

- the allowed rate of return and direct inflation adjustments—that is, compensation for inflation can be provided via an ex ante risk premium or an ex post adjustment to cashflows.

6.2.1 Delivery of initial real rate of return

We consider that the current regulatory framework acts to deliver the intended target, the initial real rate of return plus ex post inflation outcomes. Understanding the overall inflation approach requires that we consider:

- the operation of the PTRM, annual pricing process and RFM
- changes to within-period cashflows as well as the closing asset base (which represents claims on future cashflows).

We set out the primary inflation-related calculations in section 3.3.4 above.

Initially, stakeholders expressed divergent views on whether the current regulatory framework delivered this intended target. However, following engagement and consultation, stakeholders at our technical workshop reached consensus that the current regulatory framework delivers the initial real rate of return. Following its review of our regulatory framework, the Sapere report also reached this finding:[116]

> The application of the RFM and the PTRM achieves the expected result that the net present value of the investment is zero and the NSP maintains the real value of its capital investment.

The interactions between the different inflation elements are complex and so it may be helpful to consider an illustrative example. In this example, our estimate of expected inflation is 2 per cent. This means that in the PTRM, at the commencement of the regulatory period:

- In the return on capital building block (calculated as nominal rate of return x indexed asset base) there is 2 per cent inflation increase in revenue above the real rate of return.
- In the return of capital building block there will be a 2 per cent decrease in revenue reflecting the negative adjustment for indexation on the opening asset base.
- In the projected roll forward there will be a 2 per cent increase in future revenue (via the value of the closing RAB) reflecting indexation on the opening asset base.

The total *ex ante* inflation compensation will therefore be 2 per cent, equal to the initial estimate of expected inflation. The inflation deduction in the return of capital building block means that compensation for inflation only occurs once. Using the estimate of expected inflation, the initial nominal rate of return and initial real rate of return will be consistent.

---

[116] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 8 (paragraph 46).

If we then assume that actual inflation is 1 per cent, below the initial estimate, then the following inflation effects occur:

- The CPI–X annual pricing process applies 1 per cent actual inflation at the aggregate smoothed revenue level. This therefore equally affects the return on capital and return of capital building blocks. At the highest level, this replaces the 2 per cent expected inflation both for the return on capital building block (1 per cent increase) and the return of capital building block (1 per cent decrease).[117]
- The RFM applies 1 per cent actual inflation when rolling forward the asset base. This will be the basis for building block calculations in the subsequent regulatory period, and therefore reflected in future cashflows.

The total ex post inflation compensation will therefore be 1 per cent, equal to the actual inflation outcome. The offsetting inflation adjustments in the return on capital and return of capital building blocks are equal. The inflation deduction in the return of capital building block prevents double compensation (once through cashflows in the return on capital building block, once through the change in asset values in the asset base).

These ex ante and ex post inflation outcomes can also be interpreted as inflation compensation added to the initial real rate of return. If, for example, the initial nominal rate of return was 7 per cent, the initial real rate of return is therefore 5 per cent (7 per cent minus 2 per cent).[118] Ex ante we expected nominal outcomes of 7 per cent, but the ex post nominal outcome would be 6 per cent (5 per cent initial real rate of return plus 1 per cent inflation compensation). Although total nominal revenue decreases, the initial real rate of return is preserved.

6.2.2 Deviations from initial real rate of return

Delivery of the intended real rate of return target is not exact. There are a number of causes, but the general outcome is that these deviations are minor and symmetrical. These deviations arise because of practical limitations on when inflation outcomes are known.

We discuss the primary effects below.

First year pricing effect

Our standard approach for annual pricing adjustments is as follows:

- first year revenue is set in nominal terms, which means expected inflation from the PTRM is applied

---

[117] More technically, the CPI-X pricing adjustment multiplies each of the component building blocks by (1+actual inflation) / (1+expected inflation). Note that this multiplier will be applied to both the return on capital and return of capital building blocks, so the negative inflation adjustment in the return of capital building block will still exactly offset the positive inflation included in the return on capital building block.

[118] This is a simplified example for illustrative purposes; the precise calculation would use the Fisher equation.

- for all subsequent years in the regulatory period, revenue is calculated by using a (one-year lagged) actual inflation series to adjust the previous year's revenue.

The use of expected inflation in the first year, instead of (lagged) actual inflation, will result in an inflation deviation from the intended real rate of return.[119] This effect was noted in our initial Discussion paper,[120] demonstrated in several models presented at the technical workshop,[121] and identified in the Sapere report:[122]

> The effect of keeping the first year SMAR at the value set at time 0 is to lock into the outcome for the first year the expected inflation rather than actual inflation. This means that for most NSPs, there is a difference between the expected real revenue and the actual real revenue. If expected inflation for the first year is greater (less) than actual inflation, the NSP receives a higher (lower) return than expected. This effect persists through the regulatory period because each year's revenue is a function of the previous year and so ultimately all are a function of the first year.

This first year pricing effect appears well understood, and has been present in the regulatory framework for more than fifteen years. We do not consider that the first year pricing effect requires any changes to the regulatory framework because it is:

- relatively small
- symmetrical, which means the net effect will reduce across multiple regulatory periods (provided the estimate of expected inflation is unbiased)
- acting to offset errors in the real rate of return (though always of smaller magnitude)
- brings with it some implementation characteristics.

We explain each of these in turn.

The Sapere report quantifies the first year pricing effect on revenue received:[123]

$$(Revenue\ received) = \left(\frac{1 + expected\ inflation}{1 + actual\ inflation}\right) x (target\ revenue)$$

Hence, where expected inflation is greater than actual inflation, the service provider over-recovers relative to the revenue allowance that would be consistent with the initial real rate of return. The equation shows that the first year pricing effect is relatively small, given observed inflation outcomes post the adoption of the RBA's inflation target

---

119 The effect of using lagged inflation, instead of unlagged inflation, is discussed in the next section.

120 AER, *Regulatory treatment of inflation, Discussion paper*, April 2017, p. 39.

121 See the models and presentations from the AER, CCP and ECA available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-expected-inflation-2017/initiation.

122 Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 12 (paragraph 77).

123 We have rearranged the error formula presented by Sapere—their 'allowed revenue' for year 1 would be the left hand side of this equation . See Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 12 (paragraph 78).

band. It is also symmetrical, which means that it acts to reduce revenue in the same manner (and to the same magnitude) that it increases revenue.

This deviation only applies to revenue received within the regulatory period. Actual inflation will be used throughout the RFM and so the deviation will not apply to revenue received in later periods. In net present value terms, revenue received in the next regulatory period will comprise approximately 15 per cent of total revenue received.[124] This means 85 per cent of overall revenue will not be affected by actual inflation deviating from expected inflation in the first year of a period.

The first year pricing effect will reoccur across subsequent regulatory periods. If our estimate of expected inflation is an unbiased estimate of actual inflation outcomes, there will be equal probability of revenue increases or revenue decreases. So the net effect across multiple periods will be even smaller.

There is an important offsetting interaction between the first year pricing effect and the effect of inflation on the real rate of return:

- If the AER's estimate of expected inflation is above the 'true' estimate of expected inflation embedded in the nominal rate of return, the real rate of return targeted by the regulatory framework will be too low. As a result revenues for the service provider will be too low.
- If the AER's estimate of expected inflation is above the actual inflation outcome, then first year revenue will be too high (it will be escalated by expected inflation, which is higher than actual inflation) and revenues for the service provider will be too high.

So, to the extent that actual inflation outcomes are likely to be correlated with the 'true' estimate of expected inflation, these two effects will move in opposite directions. However, the predominant effect will always be the effect of inflation on the real rate of return.[125]

There are also implementation advantages to the standard annual pricing approach. We release our final decision just before the commencement of the regulatory period, and the standard approach means nominal revenue from that decision can be directly applied to calculate price impacts for customers.

None of the submissions we received proposed to remove the first year pricing effect.

The APA VTS pricing adjustment

The standard approach is applied to most, but not all, service providers. The key exception is APA VTS, which has the following modification:

---

[124] This is an indicative calculation for assets in use within the period (not future capex). It is sensitive to changes in WACC, remaining asset life and the size of opex (relative to other building blocks).

[125] This is true for any regulatory period longer than two years. In a two year regulatory period, the two effects will be approximately equal.

- first year revenue is set in nominal terms, which means expected inflation from the PTRM is applied—but only as a placeholder
- for all subsequent years in the access arrangement period:
    - the real value of the previous year's nominal revenue is calculated using actual inflation for the previous year
    - the real value of the current year's nominal revenue is calculated using an updated actual inflation figure that is not yet final (since the current year is not yet complete)
    - revenue for the upcoming year is calculated with regard to the real value of all prior years within the access arrangement period, with a placeholder inflation forecast for the upcoming year (which will be corrected, in turn, in later years).

While it requires a two year delay, the net effect is that actual (un-lagged) inflation is applied to revenue each year within the access arrangement period. Two years of true-up calculations are required, so there is additional uncertainty for consumers over the price path and potentially more short-term volatility. There is also no offsetting effect with the determination of the real rate of return, which might be one reason why this approach is not more widely adopted.[126] Nonetheless, the APA VTS annual pricing approach appears to allow closer targeting the initial real rate of return, albeit with some implementation tradeoffs.

Inflation lags

In several places the regulatory framework uses actual inflation lagged by one year instead of (unlagged) actual inflation. There are two prominent examples:[127]

- In the CPI–X annual pricing process, where lagged actual inflation is used by almost all service providers in years 2 to 5 of a regulatory period.
- In the RFM, where lagged actual inflation is used by most service providers to convert new capex from nominal terms to real terms and vice versa; and to convert real straight-line depreciation to nominal terms.

This occurs primarily for practical reasons, because the relevant actual inflation outcome is not known in time.[128]

---

[126] There would also be a specific changeover issue regarding the one-year gap when switching from a lagged actual series to an unlagged actual inflation series. The inflation outcome in this year would determine which of the service provider or consumers received a windfall gain, and which a windfall loss.

[127] Note that even 'unlagged' inflation is lagged to allow for measurement delay; this is six months for most service providers. This implementation delay is excluded when describing 'one year lagged' actual inflation; the actual delay is eighteen months for most service providers.

[128] Our 2016 decision on amendments to the distribution RFM included considerable analysis on the impact of lags in the RFM. See AER, *Final decision, Amendment, Electricity distribution network service providers, Roll forward model (version 2)*, 15 December 2016.

We consider that there is no material inflation impact from these lags.[129] Generally, where a one-year lagged series is used the upper bound for the revenue impact is the time value of a one year delay. However, any effect is substantially reduced because of offsetting movements in subsequent years, and the inflation impact of these lags diminishes as a longer time period is considered.

Use of a ten year geometric mean

A joint submission from SA Power Networks, CitiPower, Powercor and Australian Gas Networks identified another potential inflation-driven difference in revenue (beyond the intended delivery of a real rate of return).[130] They submitted that estimating inflation using a 10 year geometric average resulted in under or over recovery across a five year regulatory period, with a worked example (the 'SAPN example') to illustrate this effect.

We do not agree that the example should be interpreted this way. We consider that the SAPN example shows the nominal rate of return and expected inflation need to be estimated in consistent terms. As set out in our rate of return guideline, we estimate the nominal rate of return in constant annual terms over a ten year horizon.[131] Using the 10 year geometric average to estimate expected inflation is therefore necessary to align with the nominal rate of return and prevent inflation-related under or over recovery. The Sapere report also supports this conclusion.[132]

The key points of the SAPN example were:

- Both expected and actual inflation were 2.00 per cent in years one and two, then 2.50 per cent from years three to ten. The nominal WACC was fixed at 6.15 per cent in all years.
- The AER's current approach estimated expected inflation as the geometric average over ten years (2.39 per cent).[133] This ten year average was higher than expected inflation in years one and two (individually), but lower than expected inflation in years three to ten. By construction, the higher and lower years would net off.
- However the 2.39 per cent estimate of expected inflation is only used for years one to five. In year six, a new regulatory period begins and so a new estimate of

---

129 The Sapere report also concludes that the lags have little inflation impact; but largely relies on analysis conducted by the AER in the 2016 RFM review (see previous footnote). Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, pp. 23–24.

130 SA Power Networks, CitPower, Powercor, and Australian Gas Networks, *Letter re: Review of the regulatory treatment of inflation*, 29 June 2017, pp. 9–10.

131 AER, *Better regulation, Explanatory statement, Rate of return guideline*, December 2013, pp. 48–49, 74–79, 135–147. In the simplified example below, we calculate the nominal rate of return using a geometric average. As described in the guideline, the process for determining the nominal rate of return is more complicated than this and does not use a geometric average calculation in this manner. However, the key point is that our nominal WACC is estimated in constant annual terms over the 10 year horizon, and our estimate of expected inflation aligns with this.

132 Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 22 (paragraph 127).

133 The submitted example uses 2.39 per cent; we calculate the geometric mean as 2.40% per cent.

expected inflation is determined. Hence, the AER's estimate of expected inflation is too high across the first five years, on average.

Where the AER's estimate of expected inflation is above the 'true' estimate of expected inflation for a year, the real WACC delivered by the AER's regulatory framework will be below the 'true' real WACC.[134] We set out the example (as submitted) in Table 7.

Table 7 Demonstration of ten year geometric mean effect in the SAPN example

Year	1	2	3	4	5	6	7	8	9	10
Nominal WACC	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%
Expected Inflation (year-by-year)	2.0%	2.0%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
'True' real WACC	4.1%	4.1%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
Expected inflation (geometric mean)	2.4% (calculated from years 1 to 10)					2.5% (calculated from years 6 to 15)				
Delivered real WACC in years 1 to 5	3.7%	3.7%	3.7%	3.7%	3.7%					
Difference in real WACCs	–0.4%	–0.4%	+0.1%	+0.1%	+0.1%					
Cumulative difference in real WACCs	–0.5%									

Source: SA Power Networks, CitPower, Powercor, and Australian Gas Networks, *Letter re: Review of the regulatory treatment of inflation*, 29 June 2017, pp. 9–10.

Notes: The AER has recalculated the geometric mean and dependent calculations.
All conversions between real and nominal use the Fisher equation.

This table shows that there is some over-recovery in years three to five, but this is not enough to offset the under recovery in the first two years. The net effect is under recovery of around 0.5 per cent across the first regulatory period. SA Power Networks, CitiPower, Powercor and Australian Gas Networks submitted that the main cause of this error was our decision to use a ten year geometric average for a five year regulatory period.

We consider that this example demonstrates not that the ten year geometric average causes inflation variation in realised returns, but instead the importance of aligning the estimation basis for inflation and the return on debt/equity—that is, both are estimated in constant annual terms. This can be illustrated by varying the SAPN example to

[134] The submitted example focused on the delivery of the initial nominal WACC, which is not the intended target of the AER's current regulatory framework. However, because actual inflation equals expected inflation (on an individual year basis) throughout the example, we can recast it in terms of the initial real WACC and still demonstrate the same point made by SA Power Networks/CitiPower/Powercor/Australian Gas Networks.

recognise that the nominal rate of return they present (6.15 per cent) has itself been derived as an average across the ten year period.[135] We hold constant the real rate of return at 3.66 per cent, which means the nominal rate of return would be 5.74 per cent in years one and two and 6.25 per cent in years three to ten. We can then calculate the average nominal WACC as 6.15 per cent, equal to the figure in the original example.[136]

Under the AER's approach, the real rate of return will reflect the nominal WACC less expected inflation—both estimated in constant annual terms. The alignment of the estimation periods means the real rate of return will be correctly targeted, in every year of the first regulatory period. Table 8 shows this effect.

Table 8 Demonstration of alignment between nominal WACC and expected inflation in altered SAPN example

Year	1	2	3	4	5	6	7	8	9	10
Nominal WACC (year-by-year)	5.7%	5.7%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%
Expected Inflation (year-by-year)	2.0%	2.0%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
'True' real WACC (year-by-year)	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
Nominal WACC (geometric mean)	6.2% (calculated from years 1 to 10)					6.3% (calculated from years 6 to 15)				
Expected inflation (geometric mean)	2.4% (calculated from years 1 to 10)					2.5% (calculated from years 6 to 15)				
Delivered real WACC in years 1 to 5	3.7%	3.7%	3.7%	3.7%	3.7%					
Difference in real WACCs	0.0%	0.0%	0.0%	0.0%	0.0%					
Cumulative difference in real WACCs	0.0%									

Source: AER calculations.

Notes: All conversions between real and nominal use the Fisher equation.

This table shows no under or over recovery as a result of the use of the 10 year geometric average when calculating expected inflation. The real rate of return is correctly calculated because the both the nominal rate of return and estimate of

[135] The SAPN example fixed the nominal rate of return at 6.15 per cent. This meant the real rate of return varied from years one and two (4.07 per cent) to years three to ten (3.56 per cent).

[136] This has been calculated as the geometric mean from years one to ten.

expected inflation are estimated in consistent terms. We therefore consider there is no material inflation impact from this interaction.[137]

Tax interactions

The APA submission noted that there are may be inflation-driven differences in revenue (beyond the intended delivery of a real rate of return) related to our treatment of tax. This inflation effect arises because tax payments are modelled on unsmoothed building blocks, rather than smoothed, and tax will be assessed in strictly nominal terms.[138]

We agree that there is a possible second-order inflation interaction arising from this tax treatment, but consider that it is unlikely to be material.[139]

Other proposed deviations

Several submissions described 'errors' or 'inconsistencies' in the regulatory models that prevented the delivery of the targeted rate of return outcomes, but which we do not agree should be considered deviations.

In some cases, the root cause is a disagreement over the appropriate target for the regulatory framework. Stakeholders identified as 'errors' aspects of the regulatory framework that we consider are intended features, because these features act to deliver the initial real rate of return (and not, for example, the initial nominal rate of return).[140]

The Sapere report provides an accessible discussion of one such example, taken from a report by Frontier Economics for the ENA.[141] In this example, the initial nominal WACC was 6 per cent, and expected inflation was 2.5 per cent. If actual inflation was 1 per cent, Frontier calculated that the current regulatory framework would provide compensation of 4.5 per cent, a 1.5 per cent shortfall relative to the initial nominal target. We do not consider that this is an error; it is the intended operation of a framework that targets the initial real rate of return. Ex ante, the real WACC is 3.5 per

---

137 We discuss below in section 6.3.3 the inflation effect of the change to a trailing debt portfolio, which is an effect distinct from those discussed in this section.

138 APA, *Regulatory treatment of inflation, APA submission in response to AER consultation*, 29 June 2017, p. 2 (footnote 1).

139 The APA submission makes a broader point about whether the tax building block should be calculated on smoothed or unsmoothed revenue (rather than just the inflation effect arising from this tax treatment) but this is outside the scope of this review.

140 See, for example, Ausgrid, *Letter in response to the AER's regulatory treatment of inflation discussion paper*, 29 June 2017, pp. 3–4; APA, *Regulatory treatment of inflation, APA submission in response to AER consultation*, 29 June 2017, pp. 4–8; ActewAGL, *Letter re: Regulatory treatment of inflation*, 28 June 2017, pp. 3–4.

141 Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, pp. 9–10, 13; Frontier Economics, *Comment on the treatment of inflation in the AER's PTRM and the RFM*, 2016 (section 3.2.1).

cent (6 per cent minus 2.5 per cent), and obtained ex post real WACC is also 3.5 per cent (4.5 per cent minus 1 per cent).[142]

These issues are therefore subordinate to the discussion in section 6.3 below on the appropriate target outcome. We agree that, if the current target approach was to change, several of these calculations within the PTRM/RFM would need to change. However, we consider that targeting the initial real rate of return is the appropriate regulatory objective.

APA identified a 'mismatch' which it considered causes under or over-compensation when actual inflation differs from expected inflation.[143] It appears that APA considered that this effect would prevent the delivery of the initial real rate of return.[144] The mismatch is located in the return of capital building block, where the negative indexation adjustment on the asset base in the PTRM uses expected inflation; but the equivalent calculation in the RFM uses actual inflation.

We consider that the APA 'mismatch' arises from a narrow perspective that looks at just one inflation effect in isolation. In other words, APA's comparison does not consider all the relevant inflation interrelationships across the PTRM, RFM and annual pricing processes (under the 'CPI–X' mechanism). The inflation relationship between the return on capital and return of capital is particularly important, since the inflation adjustment included in the regulatory depreciation building block occurs as a direct offset to the inflation component included in the return on capital building block. We discussed the APA 'mismatch' in detail in our draft decision for the APA VTS access arrangement proposal.[145]

6.3 Should the target be the initial real rate of return?

We consider that the appropriate target for the regulatory framework is the initial real rate of return. This means that the revenue recovered by service providers will move in line with inflation. If actual inflation is above expected inflation, service providers will recover more than expected; and vice versa.

There are two alternative targets proposed by different stakeholders:

- **The framework should target the initial nominal rate of return.** This means that revenue received by service providers does not change when actual inflation outcomes are above or below expected inflation. Proponents for this include Ausgrid and APA.

---

142 This is a simplified example for illustrative purposes; the precise calculation would use the Fisher equation.

143 APA, *Regulatory treatment of inflation, APA submission in response to AER consultation*, 29 June 2017, pp. 4–8;.

144 APA also considers that the regulatory target should be the initial nominal WACC; the identified mechanism would also appear to prevent the delivery of this target; APA, *Regulatory treatment of inflation, APA submission in response to AER consultation*, 29 June 2017, p. 17.

145 AER, *Draft decision, APA VTS Australia, Gas access arrangement 2018 to 2022*, July 2017, Attachment 2—Capital base, pp. 2-19 to 2-31.

- **The framework should target the initial real return on equity, and the initial nominal return on debt.** Under this hybrid approach, the revenue relating to debt costs should not vary with inflation outcomes (and so conceptually align with fixed nominal debt issued by the benchmark entity). However, the residual revenue (after debt costs had been paid) would vary with inflation outcomes in order for equity holders to obtain the initial real return on equity. The primary proponent of this position is Spark Infrastructure.

This section discusses the arguments for and against each approach.

6.3.1 Targeting the initial real rate of return

Economic rationale

We set the allowed rate of return so that service providers can 'attract the necessary funds from capital markets for these investments and service the debt they incur in borrowing the funds'.[146] This is reflected in the 'efficient financing costs' language of the NER and NGR. The underlying objective for the service provider is to achieve a real return consistent with the opportunity cost of capital. Since the revenue recovered by the service provider will be in nominal dollars, they also expect to be compensated for inflation. Ex ante, the initial nominal rate of return reflects the joint assessment of expected real returns and inflation. However, receiving the inflation compensation is not an end to itself; it matters only because it determines whether or not the underlying initial real rate of return is received. The current regulatory framework therefore focuses on this outcome.

Equivalently, the focus on real outcomes can be explained in terms of the inflation treatment of the capital investment (asset base). Investors expect to maintain the real value of the asset base, which means compensation for actual inflation. This is particularly important with long lived assets such as those in the electricity and gas sectors. A framework that targets the initial real rate of return plus actual inflation outcomes will naturally incorporate the indexation of the asset base using actual inflation. This also aligns with the implementation of real straight-line depreciation, spreading the depreciation cost equally across customers over the life of the assets (inter-generational equity).

The Sapere report agrees with this approach:[147]

> As specific, long-life, assets are a significant fraction of total costs of NSPs, the long-term credibility of the regulatory rules are important in convincing investors they will be fairly compensated for the efficient costs they incur in the provision of services. Future decisions are influenced by past outcomes. The long-term

[146] AEMC, *Rule determination: Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services*, 2012, page iii.

[147] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 3 (paragraph 21).

> interest of consumers requires both an *ex ante* expectation of real returns, and that these returns are able to be achieved *ex post*.

With this background, the current approach for the regulatory treatment of inflation can be described as achieving a real policy outcome (delivery of the initial real rate of return, adjusted for ex post inflation outcomes) but within a nominal framework.[148] The same real policy objective could be obtained without specifying that we start with a nominal rate of return, but the advantage of the current approach is that there is explicit consideration of inflation effects. Any real calculation will require conversion to/from nominal terms, and it aids regulatory transparency and consistency to publicly address these matters.

Consistent with past regulatory treatment

The current treatment of inflation in the regulatory models has long standing regulatory precedent. It has been applied in all AER decisions across gas and electricity sectors. It was also used in relevant ACCC energy sector decisions prior to the creation of the AER. We can trace the framework back to the ACCC's 1999 *Draft Statement of Principles for the Regulation of Transmission Revenues* (DRP). The DRP stated:[149]

> The key elements of the Commission's framework are:
>
> - a revenue cap based on forecasts of the cost of service;
> - CPI–X adjustment of the revenue cap and inflation adjustment of the regulatory asset base on an annual basis. This feature is designed to minimise any inflation risk to the business;
> - the return on assets determined on a post-tax nominal basis with estimated tax relevant to the regulatory period treated explicitly as a component of the cost of service;…

In combination, these components will deliver a real outcome (the initial real rate of return) but with explicit regard to inflation effects—that is, expressed in nominal terms.

These elements were preserved when we moved from the National Electricity Code to the NER, and the rules were explicitly drafted to codify existing practice in these areas. For instance, the AEMC stated in its 2006 decision on the 6A transmission revenue and pricing rules:[150]

> The Rule Proposal has been substantially based on the current approach to transmission regulation set out in the Statement of Regulatory Principles (SRP). The Commission recognises the considerable work and consultation

---

[148] Further, indexation on the asset base is related to another policy objective, which is the delivery of real straight line depreciation.

[149] ACCC, *Draft Statement of Principles for the Regulation of Transmission Revenues*, May 1999, p. 16.

[150] AEMC, *Review of the electricity transmission revenue and pricing rules, Transmission revenue: Rule proposal report, Draft national electricity amendment (Economic regulation of transmission services) Rule 2006*, February 2006. pp. 11, 58–59.

> undertaken by the ACCC in developing the SRP and the widespread support in submissions for continuing that general approach to regulation.
>
> …
>
> As part of the roll-forward of the RAB, the Draft Rule requires the AER to adjust the RAB to reflect outturn inflation. However, under the post-tax nominal framework, TNSPs are compensated for inflation via a nominal return on capital. In order to ensure that the TNSPs are not over-compensated for inflation, the impact of the indexation of the RAB needs to be removed in calculating the building block revenue requirement. This is allowed for in the Rule Proposal and reflects current AER practice. The Commission notes that currently the AER combines depreciation and indexation of the RAB into what it terms 'economic depreciation'.

The 1999 DRP described the advantages of this approach as follows:[151]

> The primary advantages of this framework are that:
>
> - it incorporates the best features of the real and the nominal approaches i.e. the minimisation of inflation risk of a real framework with the direct application of nominal rate of return benchmarks;
> - the nominal post-tax framework eliminates the need to consider the conversion problem (i.e. from a nominal post-tax rate of return to a real pre-tax rate of return);
> - it provides for a rate of return, post-tax nominal, that is more familiar to financial markets, and is therefore comparable with other everyday financial benchmarks;…

We consider that the reference to 'the minimisation of inflation risk' refers to two (related) effects:

- the revenue recovered by the service provider will move in line with inflation, so the inflation risk that is minimised will be the risk that there is an inflation-driven difference between revenue and costs
- the return to investors (in aggregate) will move in line with inflation, so that the inflation risk that is minimised will be the risk that there is an inflation-driven departure from their required real rate of return.

Since the service provider recovers revenue from consumers, this statement also implies that consumers are assigned the inflation risk. Consumers have certainty around the real cost of energy, but not the nominal cost.

Consistent with our rate of return approach

We consider that targeting the initial real rate of return is consistent with fulfilling the allowed rate of return objective and the provision of an opportunity for service providers

[151] ACCC, *Draft Statement of Principles for the Regulation of Transmission Revenues*, May 1999, p. 16.

to recover their efficient financing costs. Our inflation treatment is part of a package that provides appropriate compensation overall.

This consideration begins with estimating the initial nominal rate of return and expected inflation in consistent terms—constant annual figures over a ten year horizon. The data that informs our estimate of the nominal rate of return relates to service providers' returns observed over past years where the current inflation treatment was applied. Hence, there are strong conceptual grounds to consider that the effects of inflation on revenues are already included in the observed data. These effects would include the inflation deviations (first year pricing effects, lags) discussed in section 6.3.1 above, and the debt effects discussed in section 6.3.3 below.

In particular, our equity beta estimates are informed by ASX data for listed regulated service providers over a period where the current inflation treatment (targeting the initial real rate of return) applied. The Sapere report describes the alignment of our rate of return approach in these terms:[152]

> **Comparator firms for equity beta and inflation risk**
>
> In estimating the allowed return, the AER estimates a cost of equity to reflect the riskiness of the *benchmark efficient entity* relative to the market. If the comparator firms from which the asset beta is calculated are also exposed to a similar form of inflation risk, the equity beta estimate may include the extent to which inflation risk is more or less costly for the benchmark efficient entity relative to the market. The implication would be that equity holders in entities regulated by the AER are compensated for the effects of inflation risk inherent in the method used by the AER.

The Sapere report reviews the regulatory framework applying to comparator firms over the time period for estimation of equity beta.[153] It finds that this data will reflect the current inflation treatment.

The current approach targets the overall rate of return—the aggregate return across both debt and equity investors—rather than the return to equity holders directly. The equity holders will receive the benefit or the detriment of many financing decisions, including what gearing level to target; whether to issue fixed or floating debt; whether to issue debt in Australia or overseas; and so on. The ability to outperform (or underperform) the benchmark is an important feature of our incentive-based regime. This extends to the inflation implications of financing decisions which may also result in over or under recovery relative to the benchmark. Below in section 6.3.3 we discuss debt effects on equity holder returns in more detail.

---

[152] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 27 (paragraph 148).

[153] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, pp. 27–31.

Avoiding risk due to a methodology change

Given the long regulatory precedent for the current approach, and the alignment between available rate of return data and the current approach, any change to an alternative target involves risk. There are practical problems in any such change, including the risk of windfall gains (losses) for service providers—and therefore windfall losses (gains) for consumers.

It is not clear how we would alter our method for estimating the rate of return if we were to change to target an initial nominal return or a real return on equity. Some of the currently available data would not be directly relevant (since it embodies the current inflation treatment). We would need to set the nominal rate of return without this data or make a judgement on the appropriate conceptual adjustment that would align the data with the chosen approach. This situation would continue for an extended period of time, until sufficient time had elapsed under the new approach (perhaps five years or more).

We asked for submissions on this issue in our Discussion paper, and it was also discussed at our technical workshop.[154] There were a range of responses:[155]

- Several service providers who advocated a change to the current approach considered that, if our approach did change, there would be no other consequential changes to the determination of the rate of return.[156] We include with this group the joint submission from SA Power Networks, CitiPower, Powercor and AGN, which stated that although there might need to be consequential changes, it would be important that these were not made on the basis of conjecture or speculation. Instead, changes should be empirically derived at a later time, once relevant data became available under the new approach.[157]
- Several stakeholders considered that, if our approach did change, there would need to be consequential changes to the determination of the rate of return.[158] This includes the ECA submission, which stated (in the expert report it commissioned

---

[154] AER, *Regulatory treatment of inflation, Discussion paper*, April 2017, pp. 42–43. The discussion at our technical workshop reflected diverse views on the potential for consequential changes to other parts, in line with the range of written submissions

[155] Several stakeholders did not address the matter, including several who advocated for maintaining the current approach (targeting the real rate of return) and so the issue of consequential changes to the rate of return did not strictly arise.

[156] See for example, APA, *Regulatory treatment of inflation, APA submission in response to AER consultation*, 29 June 2017, p. 18. Spark, *Letter re: Submission to the AER's discussion paper on the regulatory treatment of inflation*, 29 June 2017, pp. 3, 13.

[157] SA Power Networks, CitPower, Powercor and Australian Gas Networks, *Letter re: Review of the regulatory treatment of inflation*, 29 June 2017, p. 12.

[158] See, for example, CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, pp. 27–30; MEU, *Letter re: Regulatory treatment of inflation discussion paper*, 29 June 2017, p. 2. Note that the MEU proposal to 'true up' for actual inflation instead of expected inflation would appear to target the nominal rate of return.

from Professor Quiggin) that its proposed inflation changes were designed to lower the regulated rate of return.[159]

The CCP submission included this summary statement on the need for a high bar to be set on any change from our existing approach:[160]

> While some flexibility is important for exceptional circumstances, good regulatory practice is built on consistency and predictability. Both investors and consumers place a high value on these system attributes. Given this, the CCP comes with a philosophical starting point that there must be a very good reason for change – the "bar" for change should be set relatively high to ensure that any change is enduring and unambiguously in the long-term interests of consumers.

We consider that a departure from targeting the real rate of return would be a fundamental change to the regulatory framework. Accordingly, if we were to implement such a change in approach, there would need to be extensive consideration of interrelationships with other regulatory elements and significant stakeholder consultation.

6.3.2 Targeting the initial nominal rate of return

There are two distinct arguments advanced for targeting the nominal rate of return:

- Ausgrid submitted that the NER reference to a nominal vanilla WACC in clause 6.5.3(d)(2) requires the AER to target that form. This is a strict legal interpretation argument.
- APA (and Ausgrid) submitted that targeting the initial nominal rate of return is economically preferable, in that it would align with the headline return on capital expected by investors.

Legal basis for targeting the initial nominal rate of return

We have reviewed the legal basis for our current approach in response to the submission by Ausgrid that the NER requires us to target the initial nominal rate of return.[161] We consider that our current approach (targeting the initial real rate of return) is consistent with the NER and NGR. Further, it appears that targeting a nominal rate of return as proposed by Ausgrid is not consistent with the NER.

Ausgrid referred to clause 6.5.2(d)(2) of the NER, which states that the rate of return must be 'determined on a nominal vanilla basis'. We set an initial nominal rate of return

---

159 ECA, *Regulatory treatment of inflation, Response to AER discussion paper*, June 2017, pp. 39–40.

160 CCP, *Response to AER discussion paper, Regulatory treatment of inflation*, 29 June 2017, p. 4.

161 This position was discussed at the Technical Workshop on 9 August 2017—the workshop summary is available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-expected-inflation-2017/initiation. See also Ausgrid, *Letter in response to the AER's regulatory treatment of inflation discussion paper*, 29 June 2017, pp. 3–4.

and then apply it to the asset base to calculate the return on capital building block.[162] Several other clauses go directly to the inflation treatment required in other elements of regulatory framework, which then determines the inflation compensation received by the service provider *ex post*.

Clause 6.5.1(e) of the NER states:

> (e) The roll forward model must set out the method for determining the roll forward of the regulatory asset base for distribution systems:
>
> …
>
> under which
>
> (3) the roll forward of the regulatory asset base from the immediately preceding regulatory control period to the beginning of the first regulatory year of a subsequent regulatory control period entails the value of the first mentioned regulatory asset base being adjusted for actual inflation, consistently with the method used for the indexation of the control mechanism (or control mechanisms) for standard control services during the preceding regulatory control period.

This clause requires the use of actual inflation in the roll forward of the asset base. This use of actual inflation is then linked to the control mechanism, which will be of the 'CPI–X' form where we substitute (lagged) actual inflation outcomes in place of expected inflation.

Combined, the NER sets out:

- the starting form for estimating the initial nominal rate of return
- how we apply that rate to calculate the return on capital building block
- the subsequent actual inflation adjustment in the asset base roll forward, consistent with the indexation of the control mechanisms.[163]

There are equivalent transmission clauses.[164] For these reasons, we consider that the NER does not require us to target the initial nominal rate of return outcome. Our approach of targeting the initial real rate of return is consistent with the NER.

Similarly, we consider that our approach of targeting the initial real rate of return is consistent with the NGR. Also, we consider that one consistent approach should be adopted under both the NER and NGR. This preserves regulatory consistency—including consistency with past uniform treatment of gas and electricity service providers—and avoids any investment distortions arising from different treatment between the two sectors.

---

[162] NER, cl. 6.5.2(d)(1).

[163] NER cll. 6.5.1(e), S6.2.3(c)(4) and 6.4.3(b)(1).

[164] NER cll. 6A.5.4(b)(1)(ii), 6A.6.1(e)(3), 6A.6.2(d)(2), and S6A.2.4(c)(4).

Economic rationale for targeting the initial nominal rate of return

Apart from the legal argument advanced above, the core reason advanced by stakeholders appears to be that investors expect to achieve the headline nominal rate of return, regardless of inflation outcomes.

We do not consider that this correctly characterises the investor perspective. Investors are concerned with underlying real returns, and this is the basis for the determination of efficient financing costs.[165] We agree that investors must make an assessment of expected inflation, and hence nominal returns, because they will receive nominal cashflows in future years. However, the real return basis drives the opportunity cost of capital and is therefore the appropriate target for the regulatory framework. We expand on these reasons in section 6.3.1 above on the economic rationale for targeting the initial real rate of return.

6.3.3 Targeting the initial real return on equity

We agree with stakeholder submissions that, under an approach that targets the initial real rate of return, inflation effects can cause equity holders to receive more than (or less than) the initial real return on equity. This effect can be substantial; but it is symmetrical and reflects the allocation of the benefit (or detriment) of financing decisions to equity holders. We consider that service providers receive an appropriate overall compensation package under the current framework. Hence, we do not consider that it would be appropriate to change the target to be the real return on equity.

We also do not agree that when we changed our approach to determining a return on debt from the 'on-the-day' method to the 'trailing average portfolio' method we created an imbalance that introduced net additional risk for equity investors. The key scenario occurs where the firm issues debt fixed in nominal terms and actual inflation differs from expected. In this case, debt costs may depart from the return on debt included in the target real rate of return. The magnitude and direction of any such departure is unclear. Depending on the circumstances, there could be an increase or decrease in the overall inflation exposure. However, the key point is that if the service provider chooses to issue fixed nominal debt it has taken a position that exposes its equity holders to movements in inflation. That primary inflation exposure occurs under both the old approach to debt and the new approach and, particularly in current circumstances, it is not clear that the change in debt approach materially impacts the overall level of exposure. Our consultant's report explores this issue in detail including setting out algebraic derivations.

Even if there was increased inflation exposure, this would need to be weighed against the non-inflation benefits of our new approach to debt. We moved to the debt portfolio

---

[165] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, pp. 2–5.

because it better aligned the regulatory debt allowance with incurred debt costs, and so reduced both interest rate risk and refinancing risk. At present, inflation expectations appear to be unchanging through time and broadly consistent with realised inflation. In these circumstances any additional inflation risk arising from the change in the debt approach is likely to be small and symmetrical. We expect that in current circumstances, equity investors are less exposed to risk in total than before the change to the debt approach.

We structure our reasoning around four key questions:

- Why does inflation cause equity returns to vary?
- Is this an intended effect?
- What happens if debt costs are fixed in nominal terms?
- What is the overall effect of 2013 changes to debt approach?

Why does inflation cause equity returns to vary?

The current approach targets the initial real rate of return, but this is not the same as targeting the initial real return on equity. Debt holders take precedence; so equity holders received the residual after interest payments to debt holders are made. If the service provider incurs debt costs in line with the initial real return on debt, then equity holders will receive the initial real return on equity. However, if debt costs incurred by the service provider do not equal the initial real return on debt, then equity holders will not receive the initial real return on equity.

There are two inflation-related reasons why debt costs might differ from the regulated debt allowance, assuming the firm issues nominal debt:

1. If actual inflation differs from expected inflation.
2. If the regulatory estimate of expected inflation does not align with the 'true' expected inflation embedded in the nominal rate of return. This includes effects arising from changes in the 'true' expected inflation when there are annual updates to the trailing average portfolio debt.

Illustrative example

The first effect is the simplest to illustrate. Suppose the AER estimates the initial nominal rate of return at 7 per cent, with expected inflation of 2 per cent. The nominal rate of return was calculated from a 5 per cent initial nominal return on debt, 10 per cent initial nominal return on equity, and 60 per cent gearing.[166] We can then derive the implied real rate of return of 5 per cent, comprising real return on debt of 3 per cent and real return on equity of 8 per cent.

[166] Since (0.6 x 5.0 per cent) + (0.4 x 10.0 per cent) = 7.0 per cent.

The AER's current approach targets the initial real rate of return, and so will deliver this 5 per cent real return plus ex post inflation outcomes. If the actual inflation outcome was 1 per cent, the total nominal return to the service provider will be 6 per cent. This would be consistent with paying debt holders a nominal return of 4 per cent (equivalent to the initial real return on debt of 3 per cent, given actual inflation of 1 per cent) and equity holders 9 per cent (again, equivalent to the initial real return on equity of 8 per cent, given actual inflation of 1 per cent).[167]

However, if debt payments were fixed in nominal terms, debt holders receive the initial 5 per cent nominal return. This means, of the 6 per cent total return, there is a smaller proportion left for equity holders. They will receive just 7.5 per cent nominal return, which is 2.5 per cent below the initial nominal return on equity.[168] In real terms, the equity holders receive 6.5 per cent real return, which is 1.5 per cent below the initial real return on equity.

The second effect is similar, but slightly more complicated. In this case, the regulator misestimates expected inflation and the implied real return on debt and equity provided does not match the 'true' real return. The total nominal return will vary in line with actual inflation on top of the regulated real return, but this will not equal the incurred nominal debt costs. Since debt takes precedence, equity holders will not receive the initial return on equity (in both nominal and real terms).

So, under an approach that targets the initial real rate of return, debt related inflation effects can cause equity holders to not receive the real return on equity.

Is this an intended effect?

Several submissions from service providers characterise this as either an error or an unintended side effect of the decision to target the initial real rate of return.[169] These stakeholders submitted that the most important outcome is the delivery of the initial real return on equity, and so propose that we change the inflation objective accordingly. If the benchmark firm issues nominal debt, this would entail a hybrid inflation target: targeting the real return on equity (on the equity portion of the asset base) combined with targeting the nominal return on debt (on the debt portion of the asset base).

We consider that this effect was not an error or side effect; rather, it was well understood prior to the adoption of the current approach more than fifteen years ago.[170] It reflects a deliberate regulatory decision on the appropriate level to assess returns for the benchmark entity—that is, at the service provider level (not the equity

---

[167] Since (0.6 x 4.0 per cent) + (0.4 x 9.0 per cent) = 6.0 per cent.

[168] Since (0.6 x 5.0 per cent) + (0.4 x 7,5 per cent) = 6.0 per cent.

[169] See, for example, Spark, *Letter re: Submission to the AER's discussion paper on the regulatory treatment of inflation*, 29 June 2017, pp. 1–6; ActewAGL, *Letter re: Regulatory treatment of inflation*, 28 June 2017, pp. 3–4; Ausgrid, *Letter in response to the AER's regulatory treatment of inflation discussion paper*, 29 June 2017, pp. 2–4.

[170] The 1999 DRP refers to the minimisation of inflation risk at the business level, not at the equity holder level.

investor level). Targeting the overall rate of return means that financing decisions remain the concern of the service provider, who bears the benefit or detriment of all such decisions (on the appropriate gearing level, whether to issue fixed or floating debt, whether to issue domestically or overseas, and so on). It appropriately assigns any risk arising from these financing decisions to the service provider, rather than consumers.

Although this financing risk is assigned to the service provider, and so inflation can alter returns to equity holders, this does not change the allocation of overall inflation risk. Consumers still bear this inflation risk, as the charges they pay move in line with inflation outcomes, and so insulate the business from changes in actual inflation. When inflation causes the real return to equity holders to drop below the initial target, the real return to debt holders rises above the initial target—this is a consequence of the decision to issue nominal debt.

We also consider that, given the long period over which the current approach has been applied, this effect will already be included in the historical share market data used when we estimate the rate of return. There are therefore grounds to conclude that the total compensation package we provide will be appropriate. In particular, our equity beta estimates are informed by ASX data for listed regulated service providers over this period. The symmetrical effect would have increased equity returns for some periods (for instance, when actual inflation exceeded expectations) and decreased equity returns in others (when actual inflation did not reach expectations). It is an open question whether this would have increased or decreased covariance with overall market return (that is, the observed equity beta). However, whichever direction it moved the equity beta (if at all), the effect is already priced into our allowed rate of return.

Spark Infrastructure made a related but slightly different submission, which points to the 2013 changes to our return on debt approach as the catalyst for its proposed change in our inflation treatment. Spark submitted that we introduced an internal inconsistency when we moved to an annually updated trailing average portfolio return on debt in 2013. We estimate this return on debt by assuming the benchmark entity issues fixed nominal debt each year. Spark submitted that the efficient financing costs incurred by the benchmark entity will include debt fixed in nominal terms. A hybrid target (real equity, nominal debt) is therefore the required approach. The particular implementation favoured by Spark is to adjust revenues (and asset values) using a hybrid inflation approach that is based on 60 per cent expected inflation and 40 per cent actual inflation. These percentages align with the benchmark gearing (60 per cent debt, 40 per cent equity).

While Spark is correct that (one part of) our benchmark uses fixed nominal debt costs, this does not bind a service provider to issue debt of this type. Under incentive regulation, the service provider is able to depart from the benchmark as it sees fit, issuing (for example) floating debt, and bearing the benefit or detriment that arises. Nonetheless, the key inflation effect occurs when debt is issued in fixed nominal terms.

What happens if debt costs are fixed in nominal terms?

Stakeholders are correct that if we target the real rate of return, but debt costs are fixed in nominal terms, the residual payments to equity holders may not equal the initial real return on equity.[171] There is an inflation-related change in equity holders' returns if debt costs are fixed in nominal terms, and:

- actual inflation differs from the AER's estimate of expected inflation, or
- the 'true' estimate of expected inflation (embedded in the initial nominal rate of return) differs from the AER's estimate of expected inflation.

The first cause arises under both approaches—the on-the-day approach and trailing average portfolio approach. The second cause arises under the on-the-day approach where the AER misestimates expected inflation (for instance, because it adopted a method which resulted in a biased estimate of expected inflation). Additionally, under the trailing average portfolio approach, it can arise because the debt portfolio reflects inflation expectations from different years—and these years change when annual debt updates occur. The AER's estimate always reflects expected inflation at the commencement of the regulatory period.

We deal with the two causes in turn.

If actual inflation is below expected inflation, and debt costs are fixed in nominal terms, then the actual return to equity holders will be below the initial real return.

The Sapere report includes an algebraic derivation of the impact of inflation on residual returns to equity holders after fixed nominal debt costs are paid.[172] If actual inflation is 1 per cent below expected inflation, real returns to equity holders will be 1.5 per cent below the target real return (2.5 per cent below the initial nominal return). This is a substantial inflation effect.

Nonetheless, we consider that service providers are receiving an appropriate inflation compensation package:

- The effect is symmetrical—so is equally likely to increase or decrease return to equity holders, assuming an unbiased estimate of expected inflation.
- The effect is not new—it has always been present in the regulatory framework (more than fifteen years). This also means that observed data used to set the rate of return (and in particular the equity beta) already includes this inflation effect.
- Targeting the overall rate of return (rather than the return on equity) means the service provider bears the benefit/detriment of its financing decisions (on gearing, issuance of fixed/floating debt, overseas or Australian debt, etc) and this is appropriate under an incentive regime.

---

[171] The exception is where actual inflation exactly equals expected inflation for the entire regulatory period.

[172] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 20 (para 119).

Most importantly, this primary inflation effect occurs under both the on-the-day approach and the post-2013 trailing debt portfolio approach (including or excluding annual debt updates). Relative to the on-the-day approach, the 2013 debt changes may result in a different estimate for the initial nominal return on debt. However, regardless of how the nominal return on debt is set, the effect will depend only on the difference between the AER's estimate of expected inflation and actual inflation outcomes. Neither of these figures is affected by the change from on-the-day debt estimation to a trailing debt portfolio.

We now turn to the second cause. Stakeholders are also correct that if we target the real rate of return, but the estimate of expected inflation does not match the 'true' expected inflation embedded in the nominal rate of return, the residual payments to equity holders may not equal the initial real return on equity. The regulated return varies with ex post inflation on top of the regulator's estimated real rate of return (not the 'true' real rate of return), and so will not align with debt costs fixed in nominal terms.

However, unlike the first cause, this second cause is altered by the 2013 debt changes. The intuitive explanation is that changing to use a historical debt portfolio (instead of the on-the-day approach) will alter the expected inflation embedded in the nominal return on debt. The debt portfolio includes (with 10 per cent weight each year) the inflation expectation from each of the last nine years and the current year.[173] When the debt portfolio is annually updated during the regulatory period, the expected inflation embedded in the portfolio changes as the oldest debt drops out of the portfolio and the new debt (with new expected inflation) enters. There is a timing difference between the inflation embedded in these debt portfolios and the AER's estimate of expected inflation, which is fixed at the commencement of the period.[174] We noted this timing difference in our April 2017 Discussion paper.[175]

The Sapere report includes algebraic derivations of the impact of inflation on residual returns to equity holders of embedded inflation in debt:

- under the on-the-day approach[176]
- under a trailing average portfolio approach, both when:
    - the historical average portfolio is used to calculate debt costs at the commencement of the regulatory period[177]
    - the portfolio is annually updated within a regulatory period.[178]

---

[173] Each inflation expectation is over a ten-year horizon (consistent with the ten year tenor of benchmark debt), but is expressed is constant annual terms (consistent with the way the debt figure is expressed).

[174] More specifically, the AER estimates expected inflation over the ten years from the commencement of the regulatory period, consistent with the ten year term of debt and equity. This estimate is expressed in constant annual terms, consistent with the way the return on debt and return on equity are expressed.

[175] AER, *Regulatory treatment of inflation, Discussion paper*, April 2017, p. 41.

[176] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 17 (paragraph 99).

[177] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 18 (paragraph 108).

The equations are complex and, as with the first cause, the effect may be substantial.[179] The second and third embedded inflation pathways on this list were absent prior to 2013, where the on-the-day approach applied. However, the three pathways may not act in the same direction. The net effect of the three inflation pathways may be larger than the on-the-day effect in isolation; or they may act to net off against each other and so the overall effect will be smaller. It is not possible to say *a priori* whether the net effect on equity holders will be larger or smaller. If the estimate of expected inflation is unbiased, each effect will still be symmetrical, so equally likely to result in increased or decreased returns for equity holders.

What is the overall effect of 2013 changes to debt approach?

The key driver of our 2013 changes was to align our benchmark debt figure with observed debt practice—that is, the management of refinancing risk by issuing staggered debt. Using a trailing average debt portfolio means that our initial estimate of the nominal return on debt will better align with the efficient financing costs of the benchmark service provider. Better alignment between the regulated debt allowance and incurred debt costs will make it more likely that equity holders receive the intended return on equity. This link was recognised by the AEMC when it made the legislative changes to allow the return on debt to be set using an annually updated trailing average portfolio:[180]

> The second factor requires the regulator (and NSPs when making their proposals) to have regard to any potential benefit to consumers that could flow from reduced financing risks that may result from different return on debt methodologies. The intention is to require consideration of the potential impact on the return on equity that may result from a return on debt methodology that reduces the overall volatility of cash flows to equity holders. As modelling results provided by SFG show, in certain cases the cash flow volatility to equity holders can be reduced by better matching the debt component of the regulated return with borrowing costs.

This effect is separate to the inflation effects discussed in detail in this section—but the inflation effects need to be considered in this context. Even if there was increased overall inflation exposure, this would need to be weighed against the non-inflation benefits of our new approach to debt.

---

178 Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 19 (paragraph 114).

179 Considering only the on-the-day approach, the divergence between the AER estimate of expected inflation and 'true' embedded inflation has an effect equivalent in size to the divergence between the AER estimate of expected inflation and actual inflation. If the 'true' expected inflation is 1 per cent below the AER's estimate of expected inflation, real returns to equity holders will be 1.5 per cent below the target real return (2.5 per cent below the initial nominal return).

180 Australian Energy Market Commission, *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. 65.

We moved to the trailing average debt portfolio because it better aligned the regulatory debt allowance with incurred debt costs, and so reduced both interest rate risk and refinancing risk.[181] Our *a priori* expectation was (and remains) that these risks were larger in magnitude than the inflation risk which in current circumstances is likely to be small and symmetric.[182] Submissions from most stakeholders (in the 2013 Better Regulation guideline development process) focused on the ability of a trailing average portfolio to ameliorate these risks, above any discussion of potential inflation risk.[183] It is difficult to quantify the overall effect of the 2013 changes, and we have not attempted this task. The Sapere report, consistent with the scope assigned, only attempts algebraic derivations of the direct inflation–related effects.[184] Nonetheless, we expect that in current circumstances, equity investors are less exposed to risk in total than before the change to the debt approach.

Based on the inflation analysis in the previous section, we consider that the 2013 changes to debt approach have not caused any material inconsistency in our inflation treatment. It is true that the trailing average portfolio is estimated using debt costs for fixed nominal debt—but the previous approach also set the 'on-the-day' debt cost using fixed nominal debt. The primary inflation effect, that return to equity holders varies when actual inflation differs from the AER's estimate of expected inflation, exists under either approach. When the service provider chooses to issue fixed nominal debt it has taken a position that exposes its equity holders to movements in inflation.

It appears that the move to use a trailing average cost of debt has introduced additional complexity into the calculation of inflation exposure arising from inflation embedded in the debt portfolio. However, it is not clear that the 2013 changes to debt approach have caused any net increase or decrease in the inflation exposure of equity holders arising from this cause.

When we moved to the trailing average portfolio approach, we accepted that the staggered issuance of fixed nominal debt was a reasonable approach for the benchmark. Under an incentive regime, service providers are entitled to depart from the benchmark and retain any benefit or detriment they obtain in doing so. If a service provider was also following this debt strategy while under the previous on-the-day approach, then our move to the trailing average portfolio approach would appear to have reduced the overall exposure of its equity holders—considering both inflation and non-inflation effects.

---

[181] AER, *Better regulation, Explanatory statement, Rate of return guideline*, December 2013, pp. 104–105.

[182] AER, *Better regulation, Explanatory statement, Draft rate of return guideline*, August 2013, p. 166.

[183] Some stakeholders (primarily Jemena) advocated for the adoption of a 'hybrid' debt portfolio which combined a trailing average debt risk premium with an on-the-day risk free rate. While not explicitly about inflation risk, elements of these submissions are relevant to the discussion of inflation effects on the return to equity holders.

[184] Sapere, *Efficient allocation and compensation for inflation risk, Report prepared for the Australian Energy Regulator*, 25 September 2017, p. 15 (paragraph 89).

A Rule requirements

A.1 National Electricity Rules (NER)

The following provisions from Chapter 6 (electricity distribution) of the NER are mirrored in Chapter 6A (electricity transmission).

Clause 6.3.1(c) provides that a building block proposal must be prepared in accordance with the PTRM. The PTRM is the model prepared and published by us in accordance with clause 6.4.1(a) of the NER.

Clause 6.4.2(b)(1) provides that the PTRM must establish a "method" that we determine "is likely to result in the best estimates of expected inflation".

Clause 6.4.3(a)(1) specifies that one of the building blocks used to calculate the annual revenue requirement is an amount for indexation of the RAB and refers to clause 6.4.3(b)(1). Clause 6.4.3(b)(1) provides that this RAB indexation building block is to be a negative amount equal to the increase in the RAB value due to inflation indexation. Clause 6.4.3(b)(1) states:

> *(1) for indexation of the regulatory asset base:*
>
> *(i) the regulatory asset base is calculated in accordance with clause 6.5.1 and schedule 6.2; and*
>
> *(ii) the building block comprises a negative adjustment equal to the amount referred to in clause S6.2.3(c)(4) for that year*

Clause 6.5.1 provides that the value of the RAB is to be adjusted via the RFM. Clause S6.2.3(c)(4) provides that the RAB is to be indexed for inflation and states:

> *(c) Method of adjustment of value of regulatory asset base*
>
> *The value of the regulatory asset base for a distribution system as at the beginning of the second or a subsequent year (the later year) in a regulatory control period must be calculated by adjusting the value (the previous value) of the regulatory asset base for that distribution system as at the beginning of the immediately preceding regulatory year (the previous year) in that regulatory control period as follows:*
>
> *…*
>
> *(4) The previous value of the regulatory asset base must be increased by an amount necessary to maintain the real value of the regulatory asset base as at the beginning of the later year by adjusting that value for inflation.*

The purpose of the RFM is to adjust the value of the RAB from one regulatory control period to the next. Clause 6.5.1(e)(3) requires that the RFM set out the method for determining the roll forward of the RAB for distribution systems under which:

> *(3) the roll forward of the regulatory asset base from the immediately preceding regulatory control period to the beginning of the first regulatory year of a subsequent regulatory control period entails the value of the first mentioned regulatory asset base being adjusted for actual inflation, consistently with the method used for the indexation of the control mechanism (or control mechanisms) for standard control services during the preceding regulatory control period.*

The deduction from the annual revenue requirement is needed to avoid "double counting" of expected inflation. Under the NER, a nominal rate of return is used in combination with an inflation-adjusted RAB. Without any adjustment, service providers a compensated twice for the effects of inflation – once through the rate of return and again through indexation of the RAB.

Clause 6.5.2(a) provides that the RAB (which is indexed to inflation) is to be applied to the rate of return to determine the return on capital building block. Clause 6.5.2(d)(2) provides that this rate of return is to be a nominal rate of return.

Clause 6.5.2(e)(3) provides that 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". An estimate of expected inflation may be considered to be a "financial parameter".

Clause 6.4.1(c) requires the PTRM to be "in force" at all times. As noted by the Australian Competition Tribunal in the application for merits review by SA Power Networks, this means that the PTRM:[185]

> *is not merely that the PTRM be available for use. Secondly, the PTRM cannot be amended at a whim. It can only be amended under the distribution consultation procedures. There would be little point in the rule makers establishing such a significant "gatekeeping" requirement if the PTRM were little more than a tool in which to submit a proposal.*

Clause 6.4.1(b) provides that the AER may, from time to time, and in accordance with the distribution consultation procedures, amend or replace the PTRM. The distribution consultation procedure is the procedure set out in Part G of Chapter 6 of the NER (s6.16) and provides for a consultation and decision making process.

Clause 6.5.1(b) requires us in accordance with the distribution consultation procedures, develop and publish a model (the 'roll forward model' or 'RFM') for the roll forward of the RAB. Clause 6.5.1(c) provides that we may amend or replace the RFM from time to time in accordance with the distribution consultation procedures.

The distribution consultation procedures provide that:

---

[185] Australian Competition Tribunal, *Application by SA Power Networks* [2016] ACompT 11, para 603.

- Before making a decision on a guideline, methodology, model, scheme, test or amendment; the AER must publish a proposed guideline, methodology, model, scheme, test or amendment along with an explanatory statement.
- The explanatory statement must set out the applicable legislative requirements and our reasons for our proposal.
- The AER must invite written submissions on its proposal and allow for no less than 30 business days for the making of submissions.
- Within 80 business days of publishing a proposed guideline, methodology, model, scheme, test, amendment, or invitation for submissions; the AER must make its final decision and reasons. The AER may extend the timeline but only if "the consultation involves issues of unusual complexity or difficulty" or "the extension of time has become necessary because of circumstances beyond the AER's control".
- In making its final decision, the AER must have regard to submissions and include a summary of each issue raised and the AER's response.
- The AER may publish issues, consultation, and discussion papers and may hold conferences and information sessions.

A.2 National Gas Rules (NGR)

The NGR are somewhat less prescriptive than the NER.

The NGR do not require gas business to use the AER's PTRM and RFM, though the businesses are not prohibited from using it either. The NGR do not expressly state that the AER is to determine an estimate of expected inflation. However, it is clear from Rules 73 and 89 that an estimate of inflation is a required component of an access arrangement proposal.

Rule 73 provides that financial information provided by a gas network operator must be provided with some recognized basis for dealing with the effects of inflation.
Rule 89(1)(d) provides that the depreciation schedule should be designed so that an asset is depreciated only once (i.e. that the amount by which the asset is depreciated over its economic life does not exceed the value of the asset at the time of its inclusion in the capital base (adjusted, if the accounting method approved by the AER permits, for inflation)).

There is no specific requirement in the NGR for the capital base to be indexed for inflation (as there is in the NER). Rule 89, however, by allowing for depreciation to be adjusted and in combination with a mandated nominal rate of return (see next paragraph), seems to allow for an accounting method that maintains the real value of the asset base by indexing it to inflation. In practice, most gas businesses propose using the PTRM and RFM. Hence businesses generally propose the basis for dealing with the effects of inflation (pursuant to rule 73) and the accounting method for adjusting depreciation for inflation (pursuant to rule 89) as set out in our PTRM.

The rate of return provisions of the NGR largely mirror those in the NER. Rule 87(4)(b) provides that the rate of return is to be estimated on a nominal basis. Rule 87(5)(c)

provides that 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”. An estimate of expected inflation may be considered to be a “financial parameter”.

Rule 74 provides that a forecast or estimate must be arrived at on a reasonable basis and must represent the best forecast or estimate possible in the circumstances.

B Submissions on best estimate of inflation

This appendix includes a more detailed response by the AER to the submissions to 'Issue 1' in the Discussion paper.

Responses to each submission can be found in the following sections:

Table B-1: Submissions and placement of response

Submission	Section	Reason for section placement	Links
ActewAGL	CEPA	Submission relies on CEPA's submission	Link
APA	APA	Own submission	Link
Ausgrid	CEPA	Submission relies on CEPA's submission	Link
AusNet Services	CEPA	Submission relies on CEPA's submission	Link
CCP	CCP	Own submission	Link
CEPA	CEPA	Own submission	Link
ECA	ECA	Own submission	Link
ENA	CEPA	ENA commissioned and relies on CEPA's submission	Link
Endeavour Energy	CEPA	Submission relies on CEPA's submission	Link
Jemena	CEPA	Argues for glide path. Covered in response to CEPA	Link
MEU	ECA	Submission relies on ECAs submission	Link
QTC	QTC	Own submission	Link
Spark Infrastructure	Spark Infrastructure	Own submission	Link
SAPN, CitiPower, Powercor and AGN	CEPA	Submission relies on CEPA's submission	Link
TransGrid	TransGrid	Own submission	Link
Uniting Communities	ECA	Submission relies on ECA's submission	Link

Source: Discussion paper submissions, AER

Consideration of CEPA's submission

Bond breakeven approach

Discussion on CEPA's submission which stated that the biases in the bond breakeven approach average out or cause an overestimate is in section 5.6.3. Below we consider CEPA's preference for BBIR.

CEPA states that there are plausible explanations for why breakeven inflation estimates reflect expectations better than the current approach:

> This includes: the central banks reduced ability to affect inflation through monetary policy; global forces bringing about a 'lower for longer' scenario as the macroeconomic conditions have fundamentally changed; and the broadening of the RBA's remit which places greater weight on financial stability and may mean the RBA targets the lower part of its band.'[186]

CEPA did not refer to studies or evidence to support these claims or to support the conjecture that there are plausible explanations in support of the BBIR. In contrast, a number of studies find that long term inflation expectations may be anchored within the inflation target band, including: Leu and Sheen (2006), Finlay and Wende (2011), Gillitzer and Simon (2015) and Mallick (2015).[187] There are also studies by Kuttner and Robinson (2010) and Paradiso and Rao (2012) which find that since the introduction of inflation targeting, the Phillips Curve has flattened. A flattened Phillips Curve is consistent with an anchoring of inflation expectations to the RBA inflation target band. Mallick finds that while the Phillips Curve is flatter, it remains downward sloping over the business cycle. This result indicates that the effectiveness of the RBA's monetary policy in stabilising the business cycle 'has not diminished'.[188]

Tulip and Wallace find that RBA first year forecasts of CPI inflation significantly outperform CPI inflation forecasts based on a random walk (p = 0.00) and the midpoint of the inflation target band (p = 0.04). RBA second year forecasts of CPI inflation significantly outperform forecasts based on a random walk (p = 0.03) but did not significantly outperform forecasts based on the midpoint of the inflation target band.[189] The latter result suggests that there is a relatively rapid reversion of CPI inflation to the mean and such an outcome is consistent with the successful targeting of the inflation rate.

Surveys

In its report CEPA discussed the findings in the ACCC/AER working paper in relation to surveys and there appears to be some misunderstanding. Some potential disadvantages of survey-based estimates were noted in the working paper. However, it was also noted that many studies consider survey-based estimates to be reasonable if not superior proxies for expected inflation.[190] If 10 year survey-based estimates are

---

186 CEPA, *Best Estimate of Inflation Expectations: Assessment of Approaches,* 28 June 2017, p. 31.

187 In Moore (2016), Finlay and Wende extend their decomposition analysis of the BBIR to 2016: long term inflation expectations remain stable and near the midpoint of the inflation target band. Angus Moore (2016), 'Measures of Inflation Expectations in Australia, *Reserve Bank of Australia Bulletin*, December Quarter, p. 27.

188 Debdulal Mallick (2015), 'A Spectral Representation of the Phillips Curve in Australia', Faculty of Business and Law, School Working Paper, Economic Series, SWP 2015/7, p. 25.

189 Peter Tulip and Stephanie Wallace (2012), 'Estimates of Uncertainty around the RBA's Forecasts', *RBA Research Discussion Paper – November 2012*, RDP2012-07, p. 11.

190 Vide: Ian Christensen, Frederic Dion and Christopher Reid, 'Real Return Bonds, Inflation Expectations, and the Break-Even Inflation Rate', *Bank of Canada Working Paper 2004-43*, November 2004, pp. 1–36. Refet Gurkaynak, Brian Sack and Jonathan Wright (2010), 'The TIPS Yield Curve and Inflation Compensation', *American Economic Journal: Macroeconomics*, 2(1), pp. 70–92; Sharon Kozicki and P.A. Tinsley (2012), 'Effective Use of Survey Information in Estimating the Evolution of Expected Inflation', *Journal of Money Credit and Banking*, 44(1), pp. 145–169; Carolin Pflueger and Luis Viceira (2015), 'Return Predictability in the Treasury Market: Real Rates,

available for analysis it is possible that this method may rank above other methods with respect to the criteria of assessment. However, since only 2 year survey-based estimates were available for the comparative assessment, this method was ranked last.

Glide path

A glide path approach was discussed as a possible method in the AusNet Services, Jemena and CEPA submissions. The choice of model specification and length of glide is likely to be subjective. Submissions on the model specification and length of glide may also result in widely divergent estimates of expected inflation which is likely to considerably reduce the robustness of this 'modified' AER method. The variability of estimates may also significantly reduce the transparency, replicability and simplicity of the AER's method.

There is also the consideration of the potentially rapid reversion of short term inflation expectations to the midpoint of the RBA inflation target band. Tulip and Wallace found that RBA's second year forecasts of CPI inflation significantly outperform forecasts based on a random walk ($p = 0.03$) but did not significantly outperform forecasts based on the midpoint of the inflation target band.[191] The finding suggests that there is a relatively rapid reversion of CPI inflation to the midpoint and such an outcome is consistent with the successful targeting of the inflation rate. Further, Tawadros finds that the RBA forecasts produce much lower forecasting errors than the forecasts made by the three other private sources.[192] If the relative accuracy of the RBA short term forecasts inform and reflect short term market expectations of inflation, such rapid reversion of short term inflation expectations to the midpoint indicates that a glide path may be unnecessary.

In its support of the glide path, CEPA observes that there has been a historical persistence of the 10 year average inflation rate above the midpoint. Therefore, a glide path may better represent the persistence of outturn inflation above or below the midpoint. If CEPA's claim of historical persistence is supported by a model of persistence, and this model has forecast inflation outcomes more accurately than other

---

Inflation, and Liquidity', Working Paper, pp. 1–34; Stefania D'Amico, Don Kim and Min Wei (2016), 'Tips from TIPS: The informational content of Treasury Inflation-Protected Security prices', Finance and Economics Discussion Series, Divisions of Research and Statistics and Monetary Affairs, Federal Reserve Board, 2014-24, p. 1–69; Christian Gillitzer and John Simon (2015), 'Inflation Targeting: A Victim of Its Own Success?', RDP 2015-09, August, *Reserve Bank of Australia Discussion Paper*, pp. 1–37; Finlay, R, Wende, S., 'Estimating Inflation Expectations with a Limited Number of Inflation-indexed Bonds', *Research Discussion Paper: Reserve Bank of Australia*, RDP 2011-01, March 2011, pp. 1–35; Zhuoshi Liu, Elisabeth Vangelista, Iryna Kaminski and Jon Relleen (2015), 'The informational content of market-based measures of inflation expectations derived from government bonds and inflation swaps in the United Kingdom', *Staff Working Paper No. 551, Bank of England*, pp. 1–36; Banco Central do Brasil (2014), 'Breaking the Break-even Inflation Rate', *Inflation Report*, December, pp. 18–21.

191 Peter Tulip and Stephanie Wallace (2012), 'Estimates of Uncertainty around the RBA's Forecasts', *RBA Research Discussion Paper – November 2012*, RDP2012-07, p. 11.

192 George Tawadros (2013), 'The information content of the Reserve Bank of Australia's inflation forecasts', *Applied Economics*, 45, pp. 626–627.

methods, further consideration may be given to a glide path. This is because such a model may be likely to inform and reflect long term inflation expectations.

However, in the absence of such a model and evidence of its relative forecast accuracy, observations of outturn inflation do not properly inform the inquiry into best estimates of expected inflation. Historical and current studies of inflation expectations in Australia are the focus. And the findings of Gillitzer and Simon suggest that as a result of the success and credibility of the RBA's inflation targeting, long-term inflation expectations are firmly anchored at target inflation rates. The anchoring effect is estimated: since 1998 long term inflation expectations have never deviated from the midpoint of the RBA's inflation target band by more than 0.2 percentage points.[193]

Criteria

CEPA has stated that the criteria used in the ACCC/AER working paper could be improved:

> 'the focus is perhaps weighted too heavily towards good regulatory practice (transparency, replicability and elements of robustness)'.
>
> 'We have not included the criterion of simplicity. While we consider that this is a pragmatic [sic], including it may lower the ranking of a preferable methodology because it may be relatively more complex'.[194]

At page 12 of the working paper relative congruence and robustness are considered to rank above all other criteria. However, the rankings are not considered to be absolute, there are always trade-offs. Therefore, at the margin, if a particular method is so complex that it is opaque and cannot be reproduced, the uncertainty and controversy over its estimates may result in other methods being ranked as best estimates, even if the other methods are considered to be marginally less congruent and robust.

Consideration of ECA's submission

The Quiggin report that accompanied ECA's submission suggests setting estimated inflation at the top of the RBA's target band appropriately allocates inflation risk to investors. The purpose is to protect consumers from 'upside' inflationary risk by setting the regulatory estimated rate at the upper end of the range.

Our view is that this would be setting a direct transfer from the service providers to consumers but would not necessarily lower risk. This is because the change would be equivalent to an expected 40 basis point drop in annual return compared to the existing approach. However, if inflation was different from what was expected then prices would change in the same manner as the current estimate (including when inflation is above

---

[193] Christian Gillitzer and John Simon (2015), 'Inflation Targeting: A Victim of Its Own Success?', RDP 2015-09, August, *Reserve Bank of Australia Discussion Paper*, p. 9.

[194] CEPA, *Best Estimate of Inflation Expectations: Assessment of Approaches,* 28 June 2017, p. 6.

3 per cent). So while it does reduce the chance that actual inflation is above the estimate, it does not necessarily reduce price fluctuation risk for consumers.

Relevantly, the NER states that the PTRM for electricity distribution and transmission must specify: 'a methodology that the AER determines is likely to result in the best estimates of expected inflation.'[195] The NGR states that an estimate must be arrived at on a reasonable basis and must represent the best forecast or estimate possible in the circumstances.[196] It is doubtful that a change in the current estimation technique in an attempt to shift risk from consumers to service providers would also provide the best estimate of expected inflation. Transfers of risk are better considered as part of any change to the regulatory framework.

Consideration of APA's submission

APA states that none of the RBA inflation target method, the use of data from inflation swaps, and the bond breakeven method appears to provide a better estimate of expected inflation than either of the other two methods and that instead changes should be made to the PTRM. This point is discussed in section 6.

Consideration of CCP's submission

The CCP states that its preliminary analysis suggests that there is not a strong enough case to change from the AER's current approach. We agree with this preliminary assessment.

The CCP also states that the AER should further consider swaps based methods in terms of biases and risk based premia. The AER has consulted the RBA on the issue, where it advised:[197]

> Furthermore, the market for inflation swaps is not particularly active or representative of broader market views. In the first half of 2016, there were on average just six transactions a week at the ten-year tenor. Individual transactions can therefore move the market price significantly and the daily rates are often based on quotes rather than actual transacted prices. The swap market is also dominated by a few participants, so it may not be representative of broader inflation expectations.

Such low liquidity could become an issue if the service providers can move the market during averaging periods.

Consideration of QTC's submission

The Queensland Treasury Corporation (QTC) outlines a number of concerns with the findings and/or analysis in the Discussion paper and the ACCC/AER working paper.

---

195 NER, cll. 6.4.2(b)(1) and 6A.5.3(b)(1).

196 NGR, r. 74.

197 RBA, *Letter re: Regulatory treatment of inflation – Inflation expectations*, 5 July 2017, p. 2.

However, many of these concerns are actually addressed in the working paper and the references cited. Other concerns appear to relate to dismissing of term structure models of interest rates to calculating the BBIR/inflation swaps. Term structure models are the technically correct approaches to calculating expected inflation implied from the BBIR and inflation swaps.

Consideration of Spark Infrastructure's submission

In choosing the best estimate of expected inflation, Spark Infrastructure recommends using the bond breakeven approach. In reaching this conclusion Spark Infrastructure refers to findings by a CEG report: Best estimate of expected inflation (August 2016). The AER's considerations of this report are documented at length in our April 2017 final decisions for AusNet Services, Powerlink and TasNetworks.[198]

Consideration of TransGrid's submission

TransGrid believes that the current approach of using the inflation forecast based on the Statement of monetary policy from the Reserve Bank to forecast inflation should continue to be applied going forward. As mentioned above the AER agrees with this view.

[198] AER, *Final Decision AusNet Services Transmission determination 2017-2019: Attachment 3 – Rate of Return,* April 2017. AER, *Final Decision Powerlink Transmission determination 2017-2019: Attachment 3 – Rate of Return*, April 2017. AER, *Final Decision TasNetworks Distribution determination 2017-2019: Attachment 3 – Rate of Return*, April 2017