29th June 2017

Consumer Challenge Panel

CCP PTRM Sub-Panel
c/o CCP Secretariat, AER

AER Board
Australian Energy Regulator

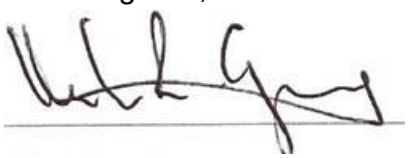
By email: warwick.anderson@aer.gov.au
RateOfReturn@aer.gov.au

Dear Warwick,

Re: Regulatory Treatment of Inflation

Please find attached our submission in relation to the above AER consultation process.

Kind Regards,



Mark Grenning
Sub-panel Chairperson

Consumer
Challenge
Panel

Submission to the Australian Energy Regulator (AER)

Consumer Challenge Panel PTRM

Response to AER Discussion Paper "Regulatory Treatment of Inflation"

Sub-Panel

Mark Grenning

Eric Groom

Bev Hughson

29 June 2017

The Regulatory Treatment of Inflation

1. Executive Summary

The Australian Energy Regulator (AER) has appointed a specially constituted Consumer Challenge Panel (CCP) sub-panel to provide a consumer perspective on the AER's review of the regulatory treatment of inflation. Specifically:

(i) Does the current AER approach (which uses a 10 year average of the RBA forecast for the first two years then the mid-point of the RBA inflation band for the next 8 years) results in the best measure of expected inflation?
(ii) Is inflation appropriately compensated for in the post tax revenue (PTRM), roll forward (RFM) and pricing models?

in the context of the National Electricity and Gas Objectives relating to the long-term interests of consumers.

This sub-panel's role is to participates in workshops and public forums, liaise with the AER established Consumer Reference Group and provide this submission. The sub-panel will continue to provide this consumer perspective and analysis of network submissions until the final decision, anticipated in November 2017.

Consideration of this matter has arisen from comments by various networks over the last two years around the AER's using an average of Reserve Bank of Australia (RBA) forecasts to determine expected inflation. The actual concerns of the networks and their proposed solutions vary and this has made it difficult to prepare this submission. We spend some time in this submission seeking to understand the networks' position and we look forward to their submissions in this process to provide much needed clarity.

From our review of the networks submissions we understand that the networks consider that:

- The use of the RBA based measure of expected inflation results in a measure that is above the actual inflation
- The operation of the PTRM/RFM model means that using the AER approach results in the networks failing to earn their allowable real WACC when the actual inflation rate is below the expected rate
- Substitution of an alternative market based bond break even approach, which was used until 2007 when the current method was adopted, would, perhaps if combined with other changes, restore the networks' allowable real WACC.

We are also cognisant that APA has proposed an approach of annually updating the expected CPI with actual CPI within the PTRM on the basis that this would largely eliminate CPI risk. A number of other networks have cited this as an option to explore further.

The CCP's approach at this stage is to seek an understanding of how the issues impact on the long-term interests of consumers. This requires further information from both the AER and the networks. Our initial thoughts are:

(i) 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

(ii) Our initial modelling suggests that the PTRM/RFM models, when considered over the full asset life, and not just one 5 year revenue period, do not result in the utilities (or consumers) being adversely affected if actual inflation is different from the assumed inflation.

This is a different outcome to qualitative modelling results presented by the APGA at the Forum on 14th June. Other networks have made similar claims in their regulatory proposals. So we look forward to their submissions to this process providing more quantitative analysis of their modelling.

(iii) Given this divergence, it is recommended that the AER convene a special forum of stakeholders to examine modelling outcomes in detail to ensure a common understanding of the methodology and outputs of the PTRM/RFM models in this matter

(iv) If further modelling shows there is a significant impact on network WACC (and we need to come to a landing on how significant it needs to be to justify a change) when actual inflation is either above or below expected inflation, then further analysis of the competing expected inflation measures, in addition to that already provided by the AER and ACCC, is required

- From the AER, further consideration of the Australian market evidence on the size of the biases/risk premia in the swaps method of measuring expected inflation, given this measure was their second preference after the RBA approach and before the bond breakeven approach, and
- From the networks, further explanation of why they prefer the bond breakeven method over the swaps method – given both are market based measures – and why their preferred method is a sustainable measure of expected inflation ie why parties will not return to the same issue in a few years' time because the chosen method no longer meets networks' requirements.

(v) Given our approach to ensuring good regulatory practice, our preliminary analysis of the different measures of expected inflation suggest that there is not a strong enough case to change from the current AER approach

(vi) Some stakeholders are suggesting more fundamental changes to the regulatory framework eg a move to targeting a nominal WACC with networks taking the inflation risk, or a move to targeting a return that is nominal debt + real equity. We suggest resolving the issues around expected inflation first before venturing down this pathway that would involve a fundamental re-consideration of much of the current regulatory framework.

2. Our philosophical starting point

Good regulatory practice is based on the key principles of consistency and predictability[1]. While there needs to be provision for change in exceptional circumstances, consumers and long term investors value consistency and predictability. So our philosophical starting point is that there must be a very good reason to change. The "bar" for change should be set relatively high:

- To ensure the transactions costs of change do not swamp the proposed benefits of the change to consumers, and
- So that if adverse impacts appear down the track that were not anticipated at the time of the change, the costs of these impacts do not swamp the benefits of the change in measurement.

We need to have confidence that the proposed new approach is enduring eg it provides a better estimate of inflation expectations over multiple revenue reset periods and not just in the current market conditions. The PTRM model is at the core of the network regulatory structure and change is only made very advisedly. As the ACT noted in the SA Power Networks decision:

> "595 One immediate observation to make is that the rule makers sought to expressly include a PTRM in the NER, specified the matters it should contain and how the PTRM should be amended. Having gone to those lengths, there is a strong suggestion that the rule makers intended the PTRM to occupy a particular place in the scheme of regulation in the NER.
>
> 603 The drafting of r 6.4 also lends support to this view. First, cl 6.4.1(c) requires the PTRM to be "in force" at all times. It 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. Finally, *the PTRM must establish a "method" that the AER determines is likely to result in the best estimates of expected inflation (cl 6.4.2(b)(1)). The requirement to establish a "method" is a far stronger and significant direction than simply to establish a tool by which to submit a proposal*."[2] [emphasis added]

The current AER method came about in 2008 from network concerns that the bond beak-even method was biased because of lack of liquidity for indexed bonds and hence overestimated inflation expectations. Now the networks are arguing that the previous biases in the bond break-even method have disappeared given their current liquidity and hence this means it is a better estimate of expected inflation – because it will be closer than the RBA method - to actual inflation in the last couple of years.

Inevitably over time different measures will raise concerns in particular stakeholder's minds. So will this debate repeat itself every 5-7 years depending on what approach a particular stakeholder may benefit from? Would we be having this debate now if the actual inflation was higher than the expected rate and consumers, on the basis of the current network arguments, would be paying more than they should and networks earning higher that their allowable WACC?

[1] See for example Utility Regulators Forum, Best Practice Utility Regulation, 1999 (available from ACCC website), B Tenenbaum et al, Handbook for Evaluating Infrastructure Regulatory Systems, World Bank, 2006.
[2] Australian Competition Tribunal, Application by SA Power Networks [2016] ACompT11, 28 October 2016.

We see merit in having a consistent approach over time – not something that changes every 5 or so years due to a change that may have a relatively short-term impact or be to the benefit of one party.

Consumers require a high level of understanding about the nature of the problem and the proposed solution and its risks before feeling comfortable to support a change. We need to be sure that the change is not the result of some relatively short-term events that could go the other way in a few years' time. This approach is consistent with the ACT approach quoted above.

3. What are the networks arguing?

Since initially being raised as an issue by SAPN in June 2015, 10 of the 13 regulatory proposals have proposed a change in the AER's approach to estimating expected inflation.[3] However the lack of consensus on what the key issues are and how to resolve them was acknowledged by the Energy Networks Association in their presentation to the AER Public Forum on 14th June.

So, at the risk of over simplification, this majority of businesses appear to be making the following propositions:

3.1 Inflation is not properly compensated for in the PTRM/RFM models

This section draws on a review of APA revenue proposal for the Roma to Brisbane Pipeline 2017-22, and APGA's presentation to the AER's Inflation Forum on 14 June 2017.

The PTRM uses "forecast inflation"[4] to adjust the return on capital allowance (depreciation) for the upcoming regulatory period. By contrast, the RFM uses actual inflation to determine the return on capital and this value is captured in the starting RAB for the subsequent regulatory period. If the actual inflation in the RFM for a given period is different from the forecast inflation used in the PTRM then the return on capital built into the revenue forecast and price path will be different from the return on capital built into the RFM:

- If actual inflation < forecast inflation in the PTRM, then depreciation in RFM will be higher than depreciation in the PTRM – reducing future returns to the business; and
- If actual inflation > forecast inflation in the PTRM, then depreciation in the RFM will be less than depreciation in the PTRM – increasing future returns to the business.

APA considers that the price control mechanism will not adjust correctly for these outcomes. If actual inflation is lower than forecast inflation, the price control mechanism operates to lower the revenue earned by the service provider. APA concludes that this result is inconsistent with correcting the lower returns associated with the PTRM-RFM in the presence of lower actual inflation than forecast.

APA then notes that the reverse scenario applies if actual inflation is greater than forecast inflation. In this instance, the CPI-X price control formula serves to increase revenue allowance where the impact on depreciation would suggest revenues should be lowered.

[3] AER "Regulatory treatment of Inflation - Discussion Paper" April 2017 p.14.
[4] APGA uses "forecast inflation" rather than the standard term "expected inflation".

APA also suggests that these errors will not be corrected in the 'long-run' because under the price-control mechanism, cash flows will be different from one regulatory period to another, resulting in a return on equity over the life of the asset that is different from the allowed return on equity.

APA provides a one regulatory period example in their RBP proposal to demonstrates their position. This is shown below in Table 1[5]. Where actual inflation is lower than forecast inflation – as has been the case in the last two years and the networks expect this to continue for some years – then depreciation in the RFM will be higher than depreciation in the PTRM with the result that actual WACC they earn is lower than the allowed WACC. Table 1 shows that regulatory depreciation calculated on the basis of expected inflation of 2.55%, reduces revenue by $52.82m, while only $42.79m was added to the capital base through out-turn indexation in the RFM resulting in a loss of $10.3m over the five year period.

Table 1: Inflation compensation in the PTRM and RFM models

$million, nominal	2012-13	2013-14	2014-15	2015-16	2016-17	Total
AER forecast inflation rate	2.55%	2.55%	2.55%	2.55%	2.55%	
Indexation reflected in Regulatory Depreciation[102]	10.65	10.64	10.60	10.51	10.42	**52.82**
Out turn inflation rate	2.50%	2.93%	1.33%	1.31%	2.00%[103]	
Indexation reflected in Roll Forward Model	10.44	12.27	5.66	5.72	8.70	**42.79**
Difference	**-0.21**	**1.63**	**-4.94**	**-4.79**	**-1.72**	**-10.03**

APA conducted a similar analysis of the impact of inflation forecast versus out turn inflation for APA Victorian gas transmission system (VTS). APA claimed that as a result of the use of forecast inflation in the PTRM, and actual inflation for the same period in the RFM, it was: "precluded from recovering some $23.9 million of investment in the VTS".[6]

By contrast, where actual inflation is higher than the expected inflation - not something the networks consider likely for some years – then depreciation in the RFM will be less than depreciation in the PTRM and actual WACC the networks earn is higher than the WACC allowed under the AER's regulatory decision which disadvantages consumers.

So the networks argue that consumers have a common interest with networks to get the best method of expected/forecast inflation.

[5] APA, Roma to Brisbane Pipeline Access Arrangement Submission, Table 10.4, p.204

[6] See APGA, "Regulatory treatment of inflation", Presentation to the AER's Public Forum on 14 June 2017.

3.2 <u>This problem can be addressed in a number of ways</u>

A variety of solutions have been proposed by the networks.

(i) APA proposal

APA's main focus is a proposal to annually update expected inflation with annual inflation in the PTRM. This is administratively simple and replicates the annual updating of the return on debt. It makes the initial estimation of inflation less of a matter for concern for the network and aligns the PTRM outputs and approach with the RFM, which 'corrects' the value of the regulatory asset base for actual inflation.

APA also considers an approach to correct the differences between forecast inflation in the PTRM and actual inflation in the RFM when establishing opening RAB in the PTRM for the next regulatory period.

Finally, it suggests determining a better forecast of expected inflation to reduce the extent of any positive or negative impact, though it notes that this will not solve all the problems inherent in the current regulatory framework. Suggested alternative forecast approaches are:

- Adopt a 10 year geometric average based on:

    (a) the low point of the RBA inflation forecast range for the first two years (as set out in the relevant RBA's Statement of Monetary Policy) and
    (b) the mid-point of the RBA's target range for the next 8 years, or

- Include different estimation of inflation for each year in the PTRM, with the first 1 (or 2 years if available) based on the RBA's forecasts and the remaining years based on the mid-point of the RBA's target range.

In effect, this latter approach operates as a forecast for each individual year over the five years and is, therefore not a simple geometric average of 10 years as per the AER approach.

(ii) Use the bond break even approach to measuring expected inflation

A number of networks argue that the AER's RBA data based methodology (the average of the first two years plus the plus the mid-point of the inflation target band for the next 8 years) does not take sufficient account of recent trends in actual inflation. They argue that a return to the bond break even approach, used until 2007 when it was replaced by the current approach, would enable networks to recover their efficient costs.

ElectraNet in its 2019-2024 revenue submission draws on research by Consensus Economists Group (CEG) published for a number of NSPs over the period 2015 to 2017 to argue:[7]

[7] ElectraNet, *Transmission Network Revenue Proposal*, Attachment 3, p. 22. Note, we refer to ElectraNet as it is the most recent proposal before the AER and relies on a number of more recent reports by CEG. However, a significant number of other networks have raised the same argument beginning with SA Power Network's revised regulatory proposal in 2015.

> "Our concern is that the AER's current approach to estimating inflation, relying on RBA short-term inflation forecasts and long term inflation targets, does not produce an estimate of expected inflation which is consistent with inflation expectations in the market."

While ElectraNet concedes that under "normal market conditions", the mid-point of the RBA target range may be a reasonable proxy of longer-term inflation expectations in the market at large, it argues that current conditions are "not normal" and that Australia (and other major economies) is "arguably in a low inflation trap". As evidence for this claim, ElectraNet refers to a range of arguments eg the limitations of the RBA's monetary policy levers to lift inflation above current levels, the current low 1.5% cash rate, recent low inflation of ~1.5% and commentary from the RBA Governor that Australia faces a "protracted" period of "persistent" low inflation.[8]

ElectraNet's arguments for a change in methodology to the break-even approach are:

- As a matter of theory, it is more appropriate to assess market expectations for inflation based on market data, specifically the difference between yields on 10-year nominal Commonwealth Government securities (CGS) and yields on 10-year indexed CGS
- As a matter of practice, the AER should adopt an approach that places greater emphasis on current market conditions and recognises that at this point in time, current conditions are not 'normal'. The suggestion is that mid to long term inflation expectations are no longer 'anchored' to the RBA target range given the current limitations on the RBA's monetary levers
- The AER's approach to estimating expected inflation would result in "illogical" results - periods where the implied real risk free rate for a 10-year CGS bond was less than zero. Moreover, the AER's estimate of inflation expectations is "unrealistically stable" and has not responded to dramatically changing inflation environment, leading to the current overestimation of expected inflation

ElectraNet claims that that the break-even approach provides an estimate that is consistent with market expectations for inflation, most particularly those implicit in the nominal WACC[9] and states:[10]

> "…the nominal WACC is derived using corporate bond yields for debt and government bond yields for equity. It is logical that the same market data should be used to derive inflation expectations."

They reject the AER's analysis of factors, particularly the liquidity premium, that may mean that the observed difference between nominal and indexed CGS may not be solely due to inflation expectations. They argue that while the size of the market for indexed CGS is small relative to the market for nominal CGS, it is nevertheless a growing market since 2009 and there is little evidence to support a claim that there is a liquidity premium bias.

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[8] Ibid, p.p. 25-26.

[9] Note, this is a different argument than assessing whether the estimate of expected inflation is consistent with actual inflation. Rather it concerns whether the estimate of expected inflation is consistent with the inflation expectations of investors in bonds. As the AER stated in the *Explanatory Statement, Proposed amendments to the electricity distribution roll forward model*, 31 August 2016: "…the forecast inflation and the nominal WACC are jointly estimated on consistent terms…For example, if forecast inflation is overestimated, but this overestimate of inflation is already included in the nominal rate of return, the real WACC will still be correct".

[10] ElectraNet, *Transmission Network Revenue Proposal*, Attachment 3, p. 25.

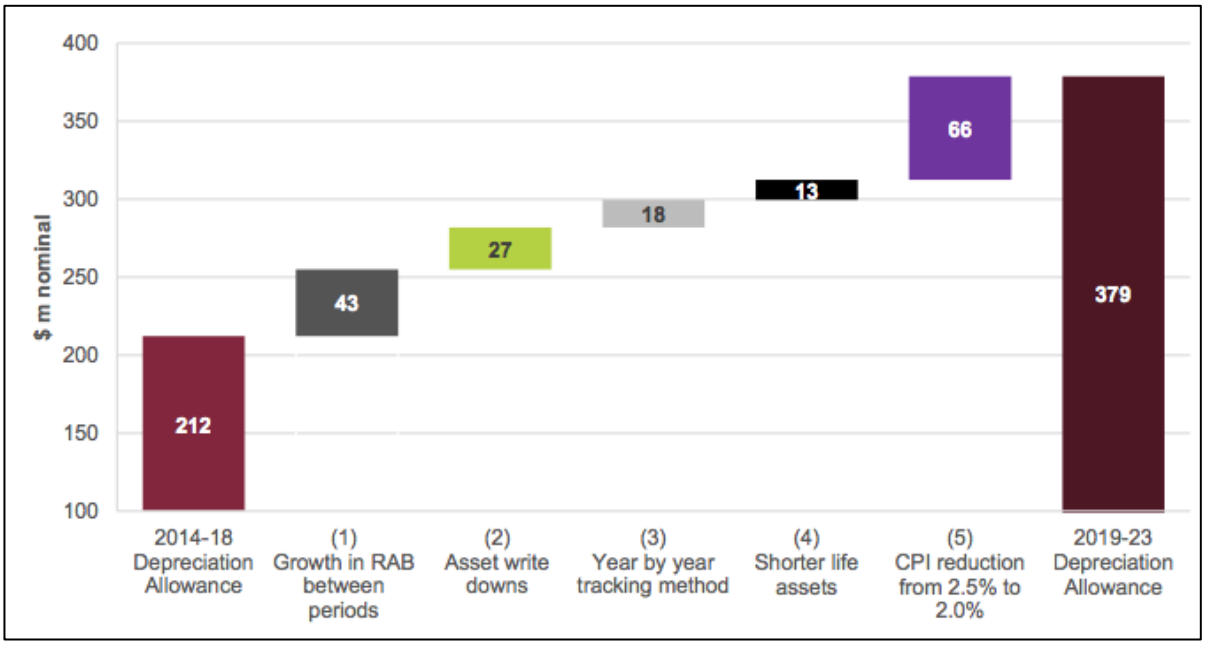
Finally, ElectraNet states that the alternative market measure of inflation expectations, the inflation swaps market, will:

> "…tend to be biased upwards to account for risk premiums and capital costs for the banks providing these products". [11]

which contributes to inflation swap estimates remain above break-even estimates, with ElectraNet concluding that they are therefore "not the appropriate basis on which to estimate forecast inflation".[12]

Using the bond break even approach in its 2019-2024 revenue proposal ElectraNet has an expected inflation rate of 1.97% compared with 2.5% using the AER's approach. Figure 1 shows that using a 1.97% rate increases the depreciation allowance by ~$66m over the five year period.[13]

Figure 1: ElectraNet movements in regulatory depreciation ($m nominal)



4. Is there the problem the networks claim?

Before we start to address the issue of which is the best measure of expected inflation (or the best method to fix the problem the networks have advanced), we need to be sure that a problem exists

[11] Ibid, p. 33.
[12] Ibid.
[13] ElectraNet, *Transmission Network Regulatory Proposal 2019*, Attachment 5, Figure 5.1, p. 9.

with the PTRM/RFM. This is best done by considering the impact of the expected inflation assumption over multiple regulatory periods, not just one.

As noted above the AER assumption on inflation serves two purposes:

- as a proxy for inflation expectations for the next 10 years, to convert the observed nominal vanilla WACC to a real vanilla WACC
- as a forecast of inflation, to convert real cost and revenue forecasts to nominal cost and revenue forecasts and vice versa for the regulatory period.

This gives rise to two potential errors:

- that the assumed inflation is higher or lower than the unobservable 'true' inflation expectations
- that actual, or outturn, inflation is different from the assumed inflation.

The networks expressed concerns have largely focused on the second issue – the potential mismatch between the forecast and actual inflation.

The CCP considers that it is important that there is an agreed understanding of the quantitative impacts of the errors, or risks, on consumers and utilities. This can provide a basis for agreeing if there is a problem to be addressed, and, if so, the effectiveness of options for addressing the problem. To assist in this process, we have used the AER's models to test the impact of these errors. Our 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

The implication from these results is that the key issue is not whether the assumed inflation is a good predictor of inflation but whether it is a good proxy for actual inflation expectations. We do not expect that these results will be automatically accepted by all stakeholders. The results flow from a complex interaction between the PTRM, the RFM, and the price indexation formula. Sometimes the results are counterintuitive if one only looks at one or two of these components rather than all three working together. However, the modelling should be a matter of objective numerical analysis that can be agreed by stakeholders and we have recommended a process that we believe can achieve this. This does not mean all parties will agree on the preferred approach, but we should be able to agree on the quantitative implications of the alternatives.

4.1 Scenarios modelled

We modelled a Base Case and the three scenarios designed to test for the effect of:

(i) A lower or higher WACC (with actual inflation equal to the assumed inflation)
(ii) A variation between the assumed and actual inflation
(iii) A lower or higher WACC and a variation between the assumed and actual inflation

The modelling was undertaken using the linked PTRM and RFM models at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/roll-forward-model-distribution-december-2016-amendment/initiation.

The results for 'Approach. B' in the model, which reflects the AER's current approach, were analysed and we focused on the impacts on real MAR (which given demand does not vary is the same as the impact on prices) and the Net Present Value of the cash flows over multiple regulatory periods.

The model used is for a hypothetical network and projects outcomes over 10 regulatory periods (i.e. 50 years). There is a substantial investment prior to the commencement of the first regulatory period and annual capex for years 1-10. For simplicity, there is no opex. This is a stylised example but we do not consider that a more sophisticated example would yield significantly different results.

Table 2 below sets out the key assumptions in the Base Case and each scenario. All other assumptions are the same as in the original models.

Table 2: Modelling assumptions

	Base Case	1	2	3
Years 1-5				
Nominal WACC	7.62	7.62	7.62	7.62
Inflation Expectations	2.5	2.0	2.5	2.0
Real WACC	5.0	5.51	5.0	5.51
Actual Inflation	2.5	2.0	2.0	2.5
Years 6+				
Nominal WACC	7.62	7.62	7.62	7.62
Inflation Expectations	2.5	2.0	2.5	2.0
Real WACC	5.0	5.51	5.0	5.51
Actual Inflation	2.5	2.0	2.0	2.5

Red= assumption/parameter that varies from base case.

(i) Impact of lower assumed inflation expectations

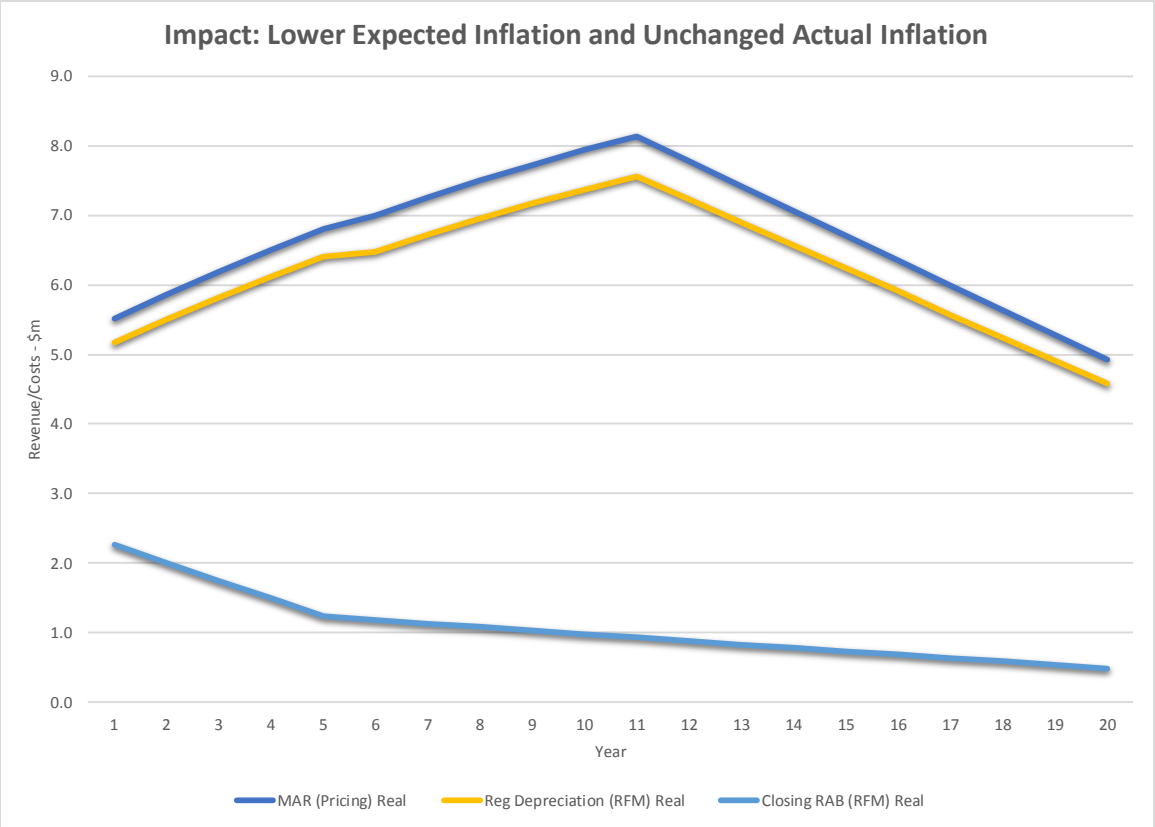
What were the impacts?

We modelled the impact of the impact of assuming a lower expected inflation rate (2% rather than 2.5%) on the revenues and prices. As can be seen from Figure 2 and the detailed tables in Attachment A, the result was a higher real maximum allowed revenue (MAR) and hence prices over successive regulatory periods. In terms of the modelling, this shows up through a higher allowed depreciation. The cash flow for the utility is also higher, due to the higher MAR and depreciation (a non-cash expense). The Net Present Value of the cash flows is marginally lower ($-$8.89m or under

1% of cash flows) but at a higher real discount rate (the real rate of return which is the nominal rate less the expected inflation rate.

The annual increase in the MAR is significant – in the first regulatory period it averages $7.1m pa, or around 5.3% of the average MAR in the example modelled.

Figure 2: Impact of lower assumed inflation expectations



Where the impacts consistent with expectations?

The results are consistent with expectations as the PTRM and RFM models are designed to yield prices and revenues that that are consistent with the achievement of the real rate of return. The real return is the nominal rate of return less expected inflation (using the Fisher equation). Hence the lower assumed inflation increases the real rate of return which drives prices and revenues.

The higher return shows up through a higher depreciation because of the approach used to reconcile the requirements to set the WACC in nominal terms and apply this to an indexed asset base. If no adjustments were made this would result in the utility being compensated twice for inflation – once in WACC and again through the indexation of the RAB. To avoid this depreciation allowed is reduced by the expected increase in the RAB due to indexation. A lower inflation assumption results in a smaller expected increase in the RAB and hence a smaller deduction from the depreciation allowance.

The small reduction in the net present value of the revenue stream appears to reflect the slight mismatch in the first year of each regulatory period when prices are set in nominal terms based on expected inflation and not subsequently adjusted for actual inflation in the model used. Aside from

this the NPV of the cash flows remains broadly constant despite the increase in annual cash flows. This is because the cash flows are discounted at a high real rate of return. Zero NPV of expected costs and revenues is an important objective of the PTRM/RFM.

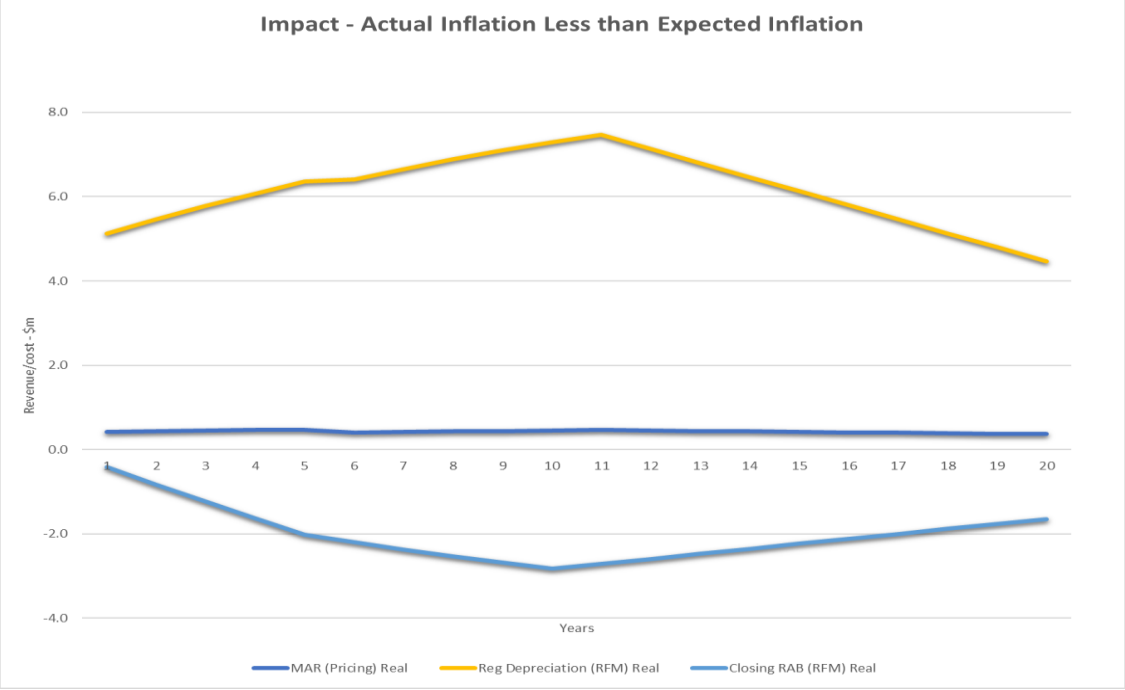
Are the impacts consistent with other modelling and examples?

The results are consistent with modelling undertaken as part of the price proposals submitted by networks. For example, in its latest transmission pricing proposal Electranet used an expected inflation of 1.97%, which was 0.5% below the assumed inflation using the AER's methodology. This resulted in an increase in average revenues of 4.74% (around $77m) which showed up primarily through a higher deprecation allowance.

(ii) Impact of actual inflation below expected inflation

We modelled the impact of the impact of assuming a lower actual (outturn) inflation rate (2% rather than 2.5%) on the revenues and prices. As can be seen from Figure 3 and the detailed tables in Attachment A, the result maximum allowed revenue (MAR) was virtually unchanged in real terms. In terms of the modelling, this shows up through a higher allowed depreciation and a lower RAB. The cash flow for the utility is also virtually unchanged in real terms, although the Net Present Value of the cash flows is marginally higher ($-$8.34m or under 1% of cash flows). This demonstrates that the utility continues to achieve the determined real rate of return despite the lower actual inflation rate.

Figure 3: impact of actual inflation below expected inflation



The results in nominal terms are somewhat different. The lower inflation rate means that prices go up by less than expected during the regulatory period, so the nominal MAR and cash flows are less than in the base case (and modelled at the start of each regulatory period.

Where the impacts consistent with expectations?

The results are consistent with expectations as the PTRM and RFM models are designed to yield prices and revenues that that are consistent with the achievement of the real rate of return. Hence it is expected that the real MAR and real cash flows would not change significantly compared to the base case, consistent with the achievement of the same real rate of return.

At the start of the regulatory period the MAR is determined so as to recover the expected costs at he assumed rate of inflation. In this scenario inflation is less than expected during the regulatory period this means that the actual price increase is less than expected at the start of the period. However, the outcome in real terms is the same as originally projected. In effect the lower actual inflation rate is applied across all costs – opex, depreciation, and the return on asset base so the outcome is the same as if the actual inflation outcome had been used as the assumed inflation.

The RFM rolls-forward the RAB using actual inflation and this is used for the establishing the MAR for the next regulatory period. Thus prices in that period reflect the actual inflation in the previous period. The slightly positive NPV of costs and revenues that occurs reflects a potential mismatch in the model in the first year of each regulatory period. Prices in that first year are set in are set in nominal terms based on expected inflation and not subsequently adjusted for actual inflation in the model used.

Are the impacts consistent with other modelling and examples?

As noted earlier, networks have raised concerns that:

- at the start of the period deduction from depreciation = RAB indexation; but
- at the end of the period the RAB is indexed for actual inflation but no adjustment is made to the depreciation deduction

Hence, networks have argued they may be disadvantaged if actual inflation is less than assumed.

However, this ignores the effect of indexing prices for actual inflation.

- All components of forecast revenues reflect assumed inflation at start of period
- During the period total revenue, **and hence all components,** are adjusted for actual inflation, including depreciation

This suggests that there does not appear to be inconsistency in practice. The modelling results presented above and in Attachment A support this conclusion.

(iii) Impact of lower inflation expectations matched by lower actual inflation

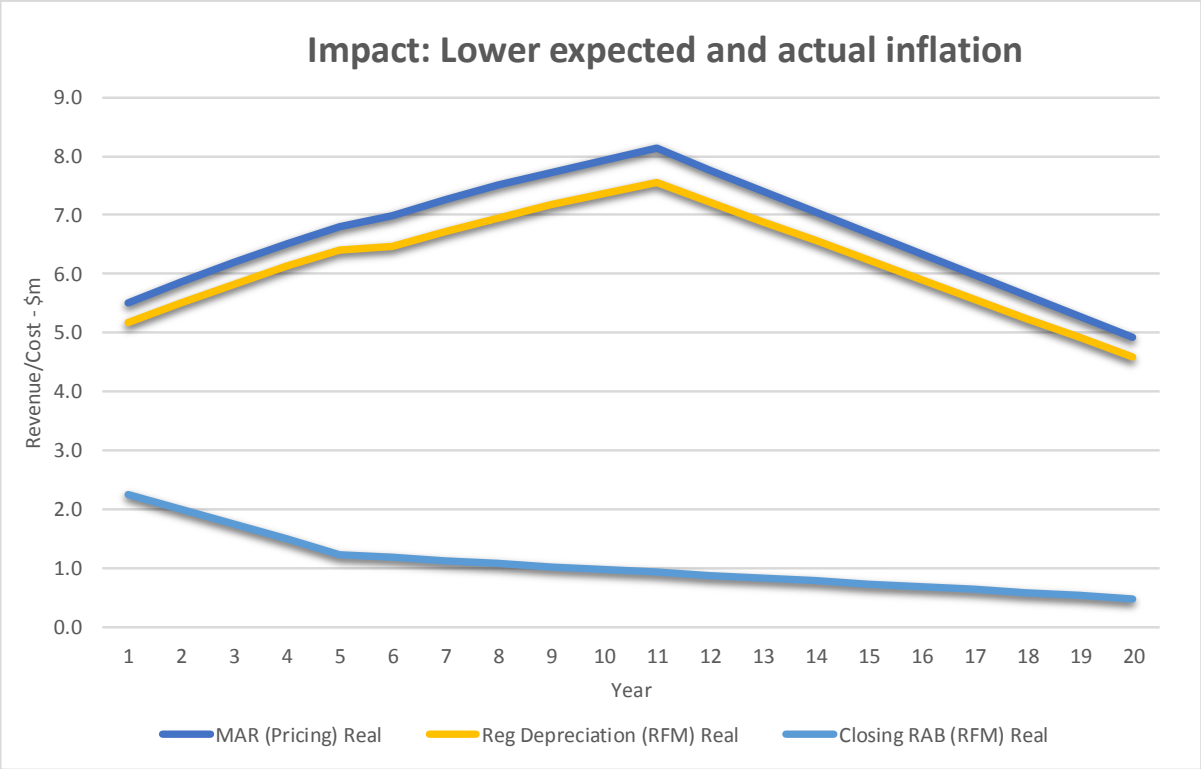
This scenario combines the two previous examples. Compared to the base case it assumes that inflation expectations are lower (2% compared to 2.5%) and these expectations are matched by lower actual inflation.

The outcomes under this scenario are however the same as those under scenario 1. The first year effects in each regulatory period that slightly affected outcomes in scenario 2 were also picked up in scenario 1. Hence there is no additional effect in scenario 3 beyond those captured in Scenario 1

where a lower inflation expectations were assumed but actual inflation was above expected inflation.

The difference between scenarios 1 and 3 is that the gap between assumed and actual inflation in scenario 1 has been removed in scenario 3. But the outcomes are the same. This reinforces the previous result from Scenario 2 that a difference between forecast and actual inflation does not have significant impacts on the real outcomes for the NSP or consumers.

Figure 4: Impact of lower inflation expectations matched by lower actual inflation



4.2 *Agreeing on the modelling of outcomes*

The AER should facilitate a further stakeholder workshop to systematically work its way through the PTRM/RFM/tariff indexation models to seek a common understanding of how they work over the life of assets over multiple time periods. We need to get to common ground on whether there is indeed the problem the networks claim and how significant that problem is – both for networks and consumers – before we can agree on the solutions.

This workshop need not be large. Indeed because of its technical and hands-on nature it would be best kept a small group of representatives of networks, consumer groups, and other interested stakeholders, such as the AEMC. The primary objective of the workshop is to agree on the modelling of the effects of a specified set of scenarios on networks and customers. Prior to the workshop participants could submit a set of scenarios that they would wish to test and measures (eg impacts on real or nominal revenues and prices) for assessing impacts. The AER would consolidate these into a single set of scenarios to be modelled interactively on the day. The results of the workshop would be published and circulated to all stakeholders participating in the review.

4.3 Adjustment for lags

The AER's discussion paper notes the various treatment of lags that are available and potential opportunities to reduce the lags. However, we consider that before going to this step it needs to be demonstrated that the effects of these lags are quantitatively significant and may persist over multiple regulatory period.

5. Some preliminary thoughts on the best measure of expected inflation

5.1 Introduction

Before discussing the different measures of expected inflation, we make the following comments:

- We agree that CPI is the best measure based on the AER proposed criteria. There are numerous difficulties with possible alternative measures eg PPI or GDP deflator given they are not usually forecast and/or are only available after a longer lag than is CPI.
- There seems to be broad agreement between the AER and the networks to retaining 10 years given it corresponds to the term of the CGS yields (equity) and BBB+ bond yield (debt) in the overall WACC. We see no reason to change this.
- We agree with the ACCC/AER proposed five criteria[14] - relative congruence, robustness, transparency and replicability, simplicity - for assessing measures of expected inflation.

5.2 Preliminary comments on the various measures of expected inflation

At the outset it is important to be clear about the AER's task - to develop a reliable estimate of expected average inflation over a 10 year period. It is not to determine expectations of inflation given current/near term market conditions, but the current market view of average inflation over a 10 year period – a very different task. The ACCC/AER Working Paper[15] cites strong evidence supporting the principal underlining the current AER approach - inflation expectations are relatively stable and anchored to the mid-point of the RBA inflation target range. As expected, short-term expectations are considerably more volatile.

Given these well-supported principles, the networks claim that that there has been a long-term shift in the economy and/or that inflation is now disconnected from the RBA target range requires more substantial evidence than presented in the various papers provided.

It is certainly not a claim that is supported by either the RBA's comments, by Treasury or by established forecasters such as revealed in, for instance, the Consensus Economics data as reported in the RBA charts in Figure 6 below. If it was the case that a fundamental 'disconnection' of inflation from the RBA target range, there would very visible and active steps taken by the RBA in accordance with its charter and the Statement on the Conduct of Monetary Policy, to retain stability in the

[14] ACCC/AER Working Paper Series "Best estimates of expected inflation: a comparative assessment of four methods" Working Paper 11 April 2017 p.10-12

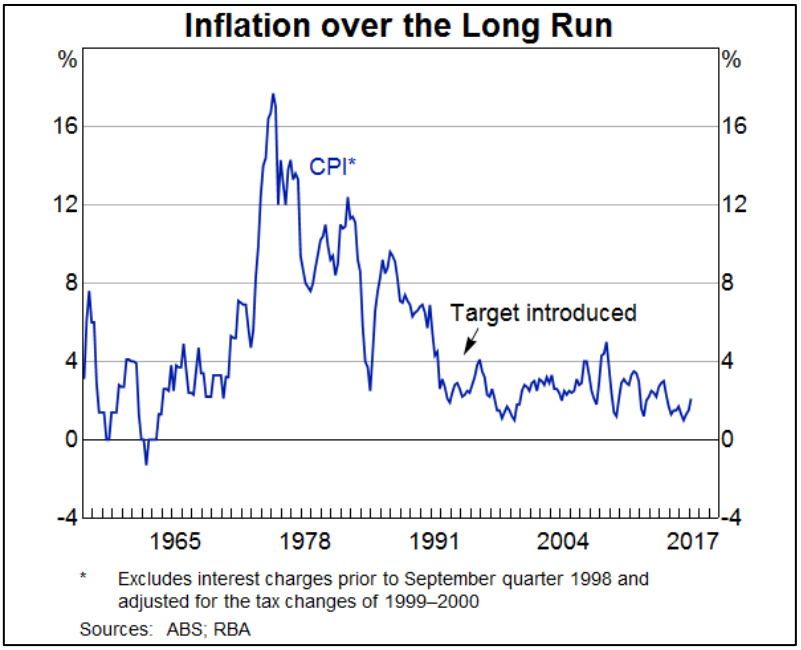
[15] H Mathysen "Best estimates of expected inflation: a comparative assessment of four methods" Working paper No 11 April 2017

economy and confidence in the RBA's approach to monetary policy. Neither the minutes of the RBA meetings or commentary by the Treasurer indicate a shift in views. [16]

The RBA describes its target range as "flexible medium-term inflation targeting framework" with the understanding that at times the actual inflation will drift to either side of the target range and that this is not a cause for 'panic' or automatic drastic lever pulling. Indeed, this flexibility and tolerance to cyclical deviations from the target range is a key strength of the RBA's inflation mandate.

Figure 5[17] illustrates the effectiveness of the RBA policy since the target was introduced. It also illustrates that there is little basis for claiming unique circumstances that warrant significant changes in approach as suggested by the proponents of change to a break-even approach. Certainly, when inflation temporarily exceeded the upper end of the range (over 3%), this was not taken to indicate a step change in inflationary pressures.

Figure 5: Inflation over the long run (before and after the RBA target was introduced)



Notably, most of the CEG reports relied on by the networks refer to actual and expected inflation trends up June quarter 2016, when actual inflation was at, or close to, its lowest point.[18] In its May 2017 Statement of Monetary Policy, the RBA concluded that both the bond and swap measures of inflation expectations remain at higher levels than a year ago, and that long-term survey-based measures of inflation expectations (e.g. Consensus Economics) are around 2.5%.[19] The RBA's own

[16] The most recent Statement on the Conduct of Monetary Policy (dated 24 October 2013) between the Treasurer and the RBA Governor confirms the Bank's continuing commitment to keeping consumer price inflation between 2 and 3%, on average, over the cycle. See for instance: http://www.rba.gov.au/about-rba/corporate-plan.html

[17] RBA, Inflation Target. https://www.rba.gov.au/monetary-policy/inflation-target.html, Chart 1

[18] CEG provided an update of its earlier reports to ElectraNet in March 2017, using data up to December 2016. The updated charts support the RBA's observation of an increase in the break-even measures of expected inflation based on indexed 10-year CGS. See CEG, *Update to inflation report, empirical results*, March 2017. Figure 1, p. 2, illustrates the turn around in break-even estimates based on 10-year indexed CGS.

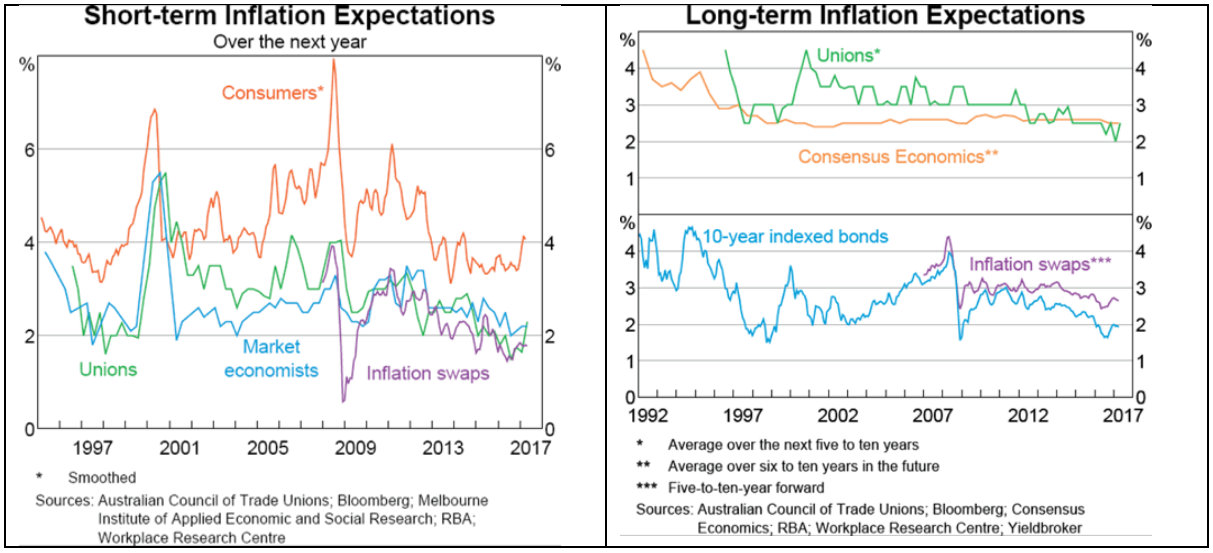
[19] See: http://www.rba.gov.au/publications/smp/2017/may/inflation.html and Figure 6.

near term forecasts of inflation support a gradual return to the RBA target range with annual headline inflation in the March 2017 quarter increasing to 2.1%.[20]

As a result, we conclude that there is little evidence to support the view that there has been a shift change in inflationary expectations for the longer-term outlook. In addition, at least some of the claims for the use of break-even inflation appear to rely on comparing 1 to 3 year break-even outcomes with actual inflation over the commensurate periods.[21]

Figure 6[22] shows how short and long term expectations do vary, with the later much more stable than the former and consistent with the RBA target range. It also suggests that 10 year indexed bonds are "out of step" with other long term expectations measures.

Figure 6: Short-term and long-term inflation expectations



The networks have proposed a move to the bond breakeven approach. Both this approach and the other market approach of inflation swaps show a level of volatility that may be driven by exuberance or pessimism in response to short term trends and events or other factors – such as biases, transaction costs and other factors affecting the market-based measures. The ACCC/AER Working Paper provides a comprehensive analysis of these matters concluding that:

- the biases/risk premia for swaps may be low, though this seems to be on the basis of a desktop study with little discussion with market participants (eg the discussion of inflation risk premia makes reference to a 1994 US study)
- the biases/risk premia for the indexed bond market were more volatile and potentially larger in magnitude.

[20] Ibid.
[21] See for instance, CEG, *Update to Inflation report, empirical results*, March 2017, figures 5,7, and 8.
[22] RBA Statement of Monetary Policy May 2017 - Inflation
https://www.rba.gov.au/publications/smp/2017/may/pdf/05-inflation.pdf

Arguably the case for market-based measures rests on the presumption of efficient financial markets but the existence of a sustained and significant difference between the two market-based measures raises the question of the efficiency of the relevant markets, particularly given the increases in the spread between the two measures.

While we do not believe the case has been made by the networks that the current approach is not a sound enduring methodology, consideration of the relative merits of the two market-based approaches also casts light on the assessment of market-based approaches vis a vis the current approach. Potential biases and transaction costs are a key issue in assessing the market-based approaches, as is an understanding of the nature of the markets and the participants in the markets.

The primary concern with the use of the indexed bond yields is the potential size and volatility of the liquidity premium. This was the primary factor in the move away from using the implied yield approach in 2008. At the time, the Assistant Governor of the RBA wrote that "the Reserve Bank has stated on many occasions that these break-even rates may not be providing an accurate reading of inflation expectations within the community. Such an observation would also imply that the indexed bond yield may no longer offer be the best estimate of a risk-free real rate."[23]

More recently, IPART conducted a review of its approach to estimating inflation. After considering the two market based measures (inflation swaps and break-even inflation) as well as the AER's approach, IPART concluded that it would adopt the latter with a modification to use only the first year RBA forecast.[24] Relevantly, IPART highlighted that it had used the break-even inflation rate for its WACC adjustment until 2009 and moved away from this based on similar liquidity reasons as the AER had observed. Further, IPART concluded that:[25]

> "While the Australian Office of Financial Management has begun issuing inflation indexed bonds again we require a **consistent and accurate approach to calculating forecast inflation**. The Australian Government's decision to issue inflation indexed bonds is based on their own risk portfolio. **They could decide to stop issuing inflation indexed bonds again in the future.** [emphasis added]

Although IPART's decision was made prior to the recent decline in actual CPI, it's reasoning on the policy risks around liquidity in the indexed bond market remains.

Given the importance of a consistent approach to regulation for consumers, regulators and long-term investors, it is necessary to show not just that the biases in the market measures are currently low but that they will be persistently low. However, this will only occur if there is reasonable stability and consistency in the type, tenor and volume (absolute and relative) of both the nominal and indexed bond markets. To the extent there are differences in these factors, and/or the relativities change over time, investors will perceive different levels of risk.

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[23] Letter from Guy Debelle, Assistant Governor, RBA to ACCC, 9 August 2007, downloaded from https://www.aer.gov.au/system/files/RBA%20-%20Letter%20to%20ACCC%20-%20Bias%20in%20CGS%20yields%20%289%20August%202007%29.pdf

[24] IPART, "New approach to forecasting the WACC inflation adjustment", December 2014, IPART, "New approach to forecasting the WACC inflation adjustment", March 2015.

[25] Ibid, December 2014, p. 7.

ElectraNet and other networks claim (on advice of CEG)[26] that there is little evidence of a liquidity premium bias in the break-even measure. However, our preliminary examination of the two markets for nominal and indexed bonds indicates there remain substantial differences in the size of the markets for nominal CGS vs indexed CGS and in the range of maturity dates.

There are far fewer active market makers in the secondary market for indexed bonds. For example, while the AOFM lists 18 active market makers for nominal CGS, there are only 10 active market makers for indexed bonds as at 23 June 2017[27]. Given the relative size of the two markets and the difference in the number of market makers in the secondary markets, it is reasonable to conclude that investors would see greater risk and seek liquidity premium in the indexed bond market.

In its 2015-16 Annual Report, the AOFM commented that despite the higher liquidity in recent years, pricing can still be distorted by large trades:

> "Although liquidity in Treasury Indexed Bonds remains good compared to global inflation-linked debt markets, it is more challenging than for Treasury Bonds. This is consistent with the relative liquidity of nominal and inflation-linked securities in other sovereign debt markets. Market participants reported that large trades may have to be executed carefully and over time, and can at times move market prices. Treasury Indexed Bond turnover in 2014-15 was around $50 billion. Market liaison suggests that liquidity may have deteriorated slightly in 2015-16."[28]

There is also evidence of separation between the markets for indexed bonds and nominal bands, with AOFM commenting that:

> "The issuance of these bonds typically attracts a different (and predominantly domestic) class of investor to nominal bonds."

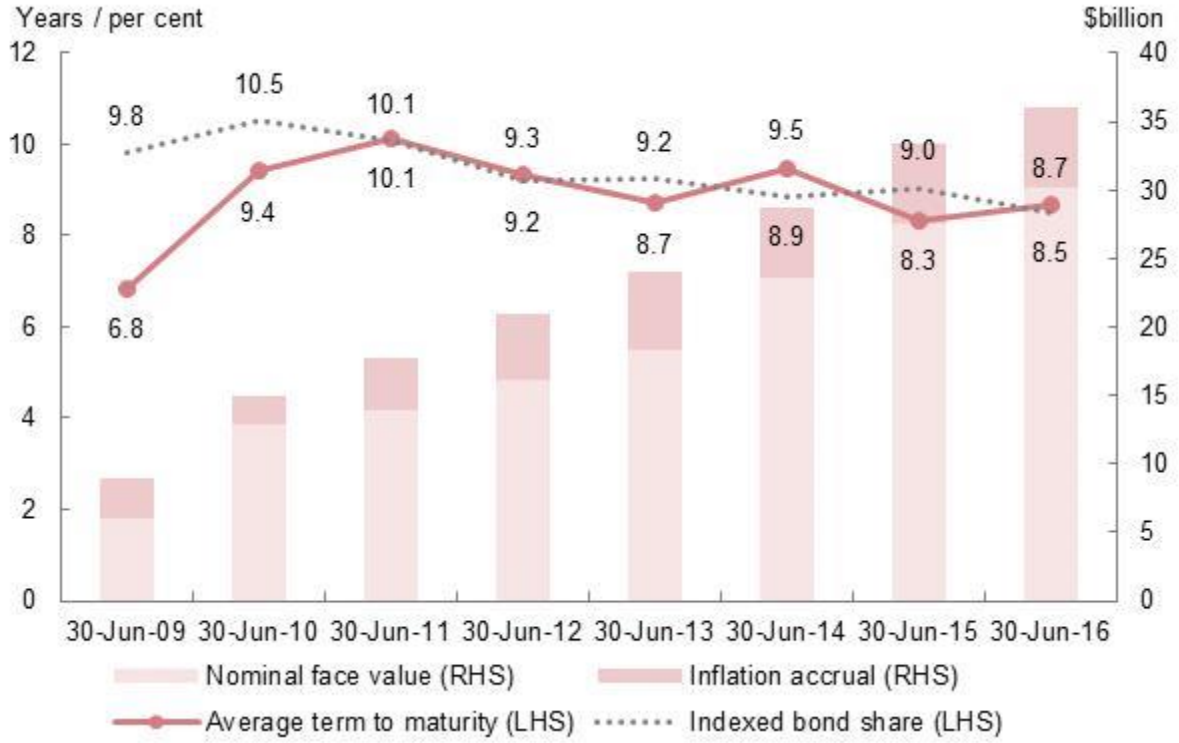
The overall size the indexed bond market remains quite small in absolute terms and relative to the nominal bond market.

[26] As noted previously, we have referred specifically to ElectraNet as it is the most recent proposal and draws on updated papers prepared by CEG. However, other networks have relied on various CEG reports in their regulatory proposals.

[27] See http://aofm.gov.au/ags/treasury-indexed-bonds/#Active_market_makers and http://aofm.gov.au/ags/treasury-bonds/

[28] Australian Office of Financial Management, Annual Report 2015-16 http://aofm.gov.au/publications/annual-reports/annual-report-2015-16/part-2-performance-and-outcomes/

Figure 7: Treasury Indexed Bonds average term to maturity and share of the long-term funding base



Based on the above assessments from the AOFM, we also agree with IPART's conclusions. While the Commonwealth Government has issued indexed bonds steadily in recent years, future issuances will depend on both its financing strategies and debt position. Given the separation between the markets and low volumes this makes it quite susceptible to changing liquidity premiums.

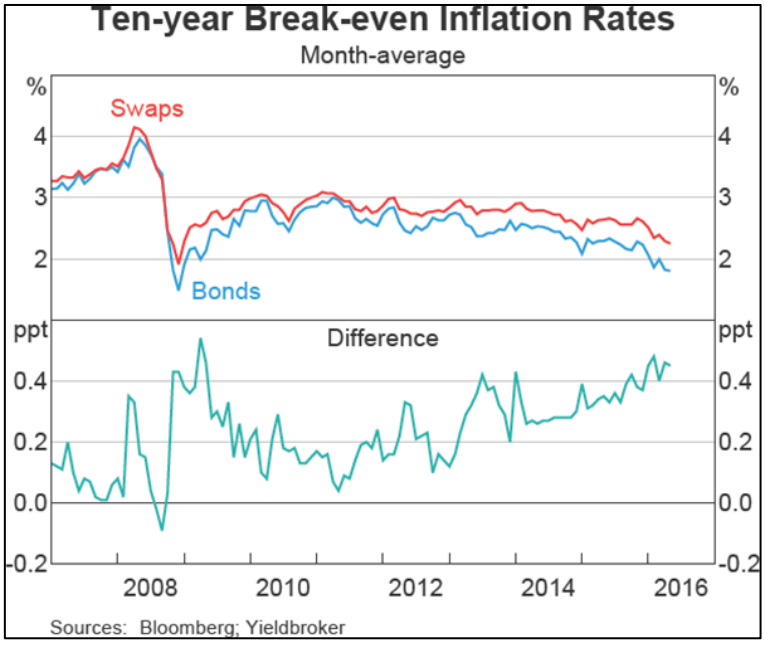
The RBA seems to draw a similar conclusion in a recent paper on measures of inflation expectations:[29]

> "There are a few characteristics of these markets {inflation swaps and inflation indexed bonds] that may cloud the interpretation of both the level and movements in inflation expectations. The first is that, in Australia, markets for these instruments are not particularly active or liquid. For inflation-linked bonds, liquidity is low relative to nominal AGS and so investors who wish to hold highly liquid assets will have a preference for nominal AGS. As a result, investors may demand a higher yield on inflation-linked AGS… "

Moreover, the RBA paper suggests that the liquidity premium in the indexed bond rates is not constant over time and may be a factor in explaining the increasing wedge between inflation swap market measures and the break-even measures as shown in Figure 8.[30]

[29] RBA Bulletin – December Quarter 2016, *Measures of Inflation Expectations in Australia*. https://www.rba.gov.au/publications/bulletin/2016/dec/3.html
[30] Ibid Graph 7

Figure 8: Comparison of 10-year swaps and break-even inflation expectations



Until this growing wedge between two market based estimates of expected inflation is properly explained, it is inappropriate to preferentially adopt either one of the measures.

The RBA paper also notes the limitations of the inflation swaps market although for somewhat different reasons than cited by ElectraNet/CEG. While the RBA notes that in theory, inflation swaps should be less affected by liquidity preferences, inflation swaps market activity is relatively low and may be supplied by only a few large market makers and therefore may not reflect the broader inflation expectations. [31]

As a result, the inflation swaps measures of inflation expectations may not be particularly representative, although the RBA concludes that the direction of this bias is unclear. Overall, however, while the RBA has some concerns with measures of shorter term inflation expectations, it concludes that: "long-term inflation expectations appear consistent with the RBA's medium-term inflation target."

The RBA's assessment is very similar to that in a Commonwealth Treasury paper.[32] The key comments and conclusions from that paper were:

> The use of bond market break-evens is also made somewhat problematic by the limited size and liquidity of the indexed bond market in Australia. While the market for (nominal) Treasury bonds is quite liquid, the market for Treasury indexed bonds is significantly less liquid (see Box 1). As a consequence, yields on Treasury indexed bonds likely trade at some premium relative to nominal Treasury bond yields — since investors will demand compensation for holding this liquidity risk. This, in turn, biases down implied inflation expectations taken from calculated break-even rates.(p.7)

[31] RBA Bulletin op cit

[32] W Devlin and D Patwardhan, "Measuring market inflation expectations", Economic Round-up, Issue 2, 2012, Commonwealth Treasury.

While relative liquidity conditions between the indexed and nominal bond markets may be reasonably stable during normal times, the relative liquidity premium incorporated in real bond yields can become more elevated during periods of heightened risk aversion (when investors show a strong preference for more liquid assets). (p.11)
As a measure of market inflation expectations, inflation swap rates (also called inflation swap 'break-evens') offer some advantages over bond market break-evens. They are available over a much wider range of tenors — quoted rates are available from one–year out to 30 years — and, thus, are able to provide a read on both short and long-horizon inflation expectations. As a primary (or, dealers) market, where contracts can be created as required, inflation swap rates are not subject to the kind of liquidity premia that can affect bond market break-evens. While inflation swap rates may incorporate some premium for counterparty risk, this is likely to be negligible since contracts are negotiated with reference to notional amounts (that is, there is no exchange of principal) and make use of standard agreements that provide some legal protection in the event of counterparty default (Hurd and Relleen 2006).

However, despite their advantages, inflation swaps are also unlikely to give a perfectly clean measure of market inflation expectations. As with bond market break-evens, inflation swap rates likely incorporate some premia for inflation risk — compensation demanded by the inflation payer for potential volatility in realised inflation over the term of the swap. Moreover, while inflation swaps are more liquid than Treasury indexed bonds in the sense that they can be created as required, the tailoring of contracts and their bilateral nature makes inflation swaps less liquid 'on the way out' — since the holder of an inflation swap who wished to exit the contract early would have to renegotiate terms with the original issuer, who may or may not be willing to do so. Compensation for this risk may bias inflation swap rates away from the market's true expected inflation rate. Further, regulatory changes enacted in recent years have meant that banks dealing in the inflation swaps market are required to set aside significantly more capital against any derivatives exposures. Compensation demanded by banks for these higher capital charges may also have introduced a systematic bias into inflation swap rates. (pp11-12)

5.3 Do short term changes in expected inflation influence the asset owners' decision to invest?

A final comment in this section is around what appears to be an underlying network argument – failure to address the problem they have identified will adversely impact on network investors willingness to invest in the long term and this will have an adverse impact on the networks' ability to meet reliability standards.

The ACCC/AER Working paper provides evidence that short term volatility in inflation rates does not influence long term investors' return requirements. Evidence supporting this ACCC/AER view seems to also come from the comments of recent investors in privatised networks who were willing to pay a very high RAB multiple.

Michael Sabia, the President and Chief Executive Officer of Caisse de dépôt et placement du Québec (CEPQ), which recently purchased a 24.99% interest in Transgrid, describes CEPQ's investment philosophy as:

> "It's time to start investing based on long-term fundamentals rather than short-term volatility."[33]

and goes on to say:

> "Infrastructure is a natural asset class for the long-term investor."[34]

Commented that the Transgrid purchasing vehicle, NSWEN, CEPQ commented that it:

> "…includes Spark Infrastructure and Hastings Funds Management, two Australian investors who have considerable experience in managing electricity networks in Australia, as well as investors Tawreed Investments Ltd. (a wholly-owned subsidiary of the Abu Dhabi Investment Authority) and Wren House Infrastructure Management, two global investors with a long track record in long-term investing."

And went on to comment that:

> "TransGrid's regulated revenues will generate stable and predictable returns for our clients over the long term."[35]

Hastings Funds Management describes its purpose as:

> "Transforming global infrastructure opportunities to deliver long-term value."[36]

And it describes the common characteristics of infrastructure as a "long term investment profile" and that:

> "Infrastructure investment is attractive to investors with long-term liabilities seeking assets that demonstrate attractive and stable returns over an extended period of time…"[37]

5.4 Summary

Our modelling reported in Section 4 did not show the effects claimed by APA when considered over multiple regulatory periods. When inflation outturns were less than the forecast inflation, networks were still able to achieve the real rate of return underpinning the original decision and the NPV of cash flows actually increased slightly.

Nevertheless, there may be merit in further consideration of APA's proposals with:

- Updating the forecast CPI with the actual CPI (lagged) each year in the same manner as the AER updates the cost of debt each year; and/or

[33] https://www.cdpq.com/en/about-us
[34] https://www.cdpq.com/en/news/articles/building-a-business-owner-mind-set
[35] "CDPQ participates in the acquisition of the 99-year lease of Australia's largest electricity transmission network" Press Release November 24 2015 https://www.cdpq.com/en/news/pressreleases/cdpq-participates-in-the-acquisition-of-the-99-year-lease-of-australias-largest
[36] https://www.hastingsinfra.com/
[37] https://www.hastingsinfra.com/about/hastings-business/about-infrastructure

- Consider whether the AER should apply the RBA's published short term forecasts of CPI for Year 1 (and year 2) while applying the mid-point of the RBA's target range for the remaining years of the regulatory period. This approach would replace the use of a constant CPI based on the geometric average of the 10-year CPI forecast.

It is essential that such an examination considers the impact of changes within the overall framework and that it carefully identifies the changes in risks and allocation of risks between consumers and the networks.

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.

Should the long term PTRM/RFM modelling indicate there is a problem of sufficient materiality to justify considering a change to a market base measure of expected inflation, then the CCP would look for further evidence around these measures. For the AER:

- further consideration of the Australian market evidence on the size of the biases/risk premia in the swaps method of measuring expected inflation, given this measure was their second preference after the RBA approach and before the bond breakeven approach, and

For the networks:

- further explanation of why they prefer the bond breakeven method over the swaps method – given both are market based measures and why it is a reflection of the operation of an efficient market
- why their preferred method is a sustainable measure of expected inflation ie even if biases are currently low, why will they be low over the long term - and why parties will not return to the same issue in a few years' time because the chosen method no longer meets networks' requirements.

In summary, at this stage we conclude that:

- while actual inflation is currently below long term expectations, we are yet to see evidence that a couple of years of years of actual inflation below the RBA target range, plus an expectation that this will continue for a couple more years, is sufficient evidence that inflation expectations in the long term have moved outside the RBA range

- the case has not been made to move away from the current AER approach, assuming material problem exists

6. Should we change the framework?

The AER Discussion Paper asks:

Question 1: Should inflation compensation be set in real or nominal terms? Should inflation compensation be set in real or nominal terms at the regulatory asset base level or at the equity and debt level? Explain why your selection is preferable.

In considering this question it is essential to consider the interactions with other components of the regulatory regime and the impacts on incentives for efficiency and incentives for gaming. Hence it is also relevant to consider the following questions as well in this context:

Question 2: Is there an adjustment to the PTRM that could be made to remove the incentive to insert bias in to the inflation expectation? Does this adjustment still achieve the same inflation compensation outcomes?

Question 3: Are there preferable changes to achieve the appropriate inflation compensation that have regard to the relevant items in the NER, minimise impact to other building blocks and do not reduce regulatory stability and certainty?

Question 4: If changes are made to reduce inflation risk, should the median credit rating or the equity beta be adjusted in the short term? Are there other parameters that also should be adjusted?

As we noted above, good regulatory practice means that changing regulatory frameworks should not be done lightly. Fundamental changes can have unintended consequences and can create windfall gains and losses, especially if there are not effective binding transition arrangements. The recent decision of the Federal Court which upheld the decision of the Australian Competition Tribunal to remove the transition on the change in the debt highlights these risks. This decision raises the prospect that consumers may pay for the high corporate debt margins post-GFC twice – once in earlier decisions using an on-the-day rate and now through the possible adoption of the trailing average without a transition period.

Frequent changes in approach can also reduce the certainty and predictability of regulatory arrangements and prices for all stakeholders.

That said, there is also a sound argument for simplicity in regulation and the current approach which combines a nominal WACC with and indexed RAB but tries to achieve the same outcome as if a real WACC is quite complex.

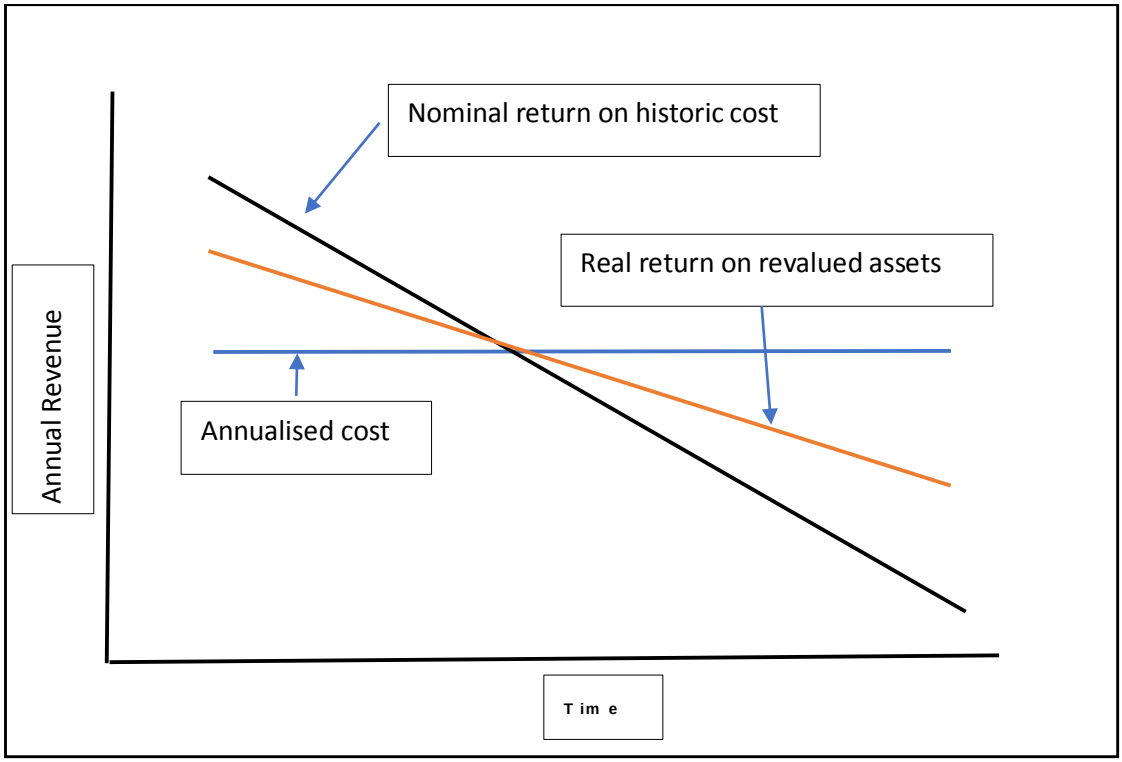
There are a number of different frameworks that have been adopted in regulatory businesses and in particular the compensation for capital costs:

1. Historic costs with a benchmark nominal return on equity and recovery of prudent debt costs (nominal).
2. Real return on indexed/revalued asset base
3. Nominal return on a historic cost asset base

4. Annualised capital costs (covering both return on and return of capital)

If the first approach is used with a historic test year no forecast of inflation may be required. But in all other cases, some forecast of inflation is required to forecast future costs in nominal terms and/or convert an observed nominal return on capital into a real return on capital. The current approach to energy regulation in Australia approximates the 'real on real' approach under (2). While a nominal WACC is specified, depreciation is adjusted to yield the same outcome as if a real WACC was used. In principle, approaches 2-4 should achieve the same outcome in terms of the NPV of revenues over the life of the assets but with a different profile of prices over time. Figure 9 illustrates this in stylised terms.

Figure 9: Revenue pathways under different regulatory frameworks



One of the benefits of the 'real return on an indexed asset base' approach relative to the nominal return approach is that it:

1. offered greater stability of prices over time
2. provided a more equitable recovery of costs from consumers over time (inter-generational equity)
3. it provided a better stream of income for funding replacement investment.

These are significant benefits.

The AER discussion paper briefly raises the option targeting the nominal return rather than the real return in setting the ex ante MAR. At this stage it has not been demonstrated how this approach would work so it is difficult to offer comment at this stage. In principle, there are potential advantages of such an approach, if it were demonstrated to be feasible. By downgrading or dismissing the importance of the real WACC it may reduce the significance of the assumption on

inflation expectations. However, it appears likely that inflation forecasts would still be required for projecting nominal costs. In this case the incentive for the NSPs will be to seek a higher rather lower estimate of inflation, but the incentive for bias in estimates of inflation will persist.

The current approach is consistent with the NEO in that it provides assurance that the utility can recover its efficient costs, including a reasonable return and assurance to customers that prices should not be any greater than necessary to achieve this. In order to demonstrate an alternative approach meets the requirements of the NEO and the long term interest of consumers it must be demonstrated that:

- it does not increase real future revenues in NPV terms over the life of the assets
- it will not lead to a step change in prices in the short term
- it has other benefits, such as reduced or better allocation of risk or greater certainty, to offset the possible loss of the benefits of the real-on-real approach such as greater stability of prices over time and greater inter-generational equity
- reductions in risks for the NSPs will be reflected in the cost of capital via the beta estimate.

The other option raised in the issue paper is to set a separate return on equity on either a nominal or real basis. The same issues that apply to the choice of a nominal or real return on assets (see above) apply to the choice of a nominal or real return on equity.

A decision to move to separately setting a return on equity and a return on debt would be a major change in approach. One of the key factors in using a return on asset approach was to provide the networks with strong incentives to optimise the financing strategies, including the choice between debt and equity. Setting separate returns on equity and debt may well create distortions through differences in the returns relative to risk. Furthermore, any change would need to be undertaken concurrently with a review of the current approach on debt and taxes.

The recent Federal Court decision on AER's appeal of the ACT decision in the NSW/ACT electricity networks case will require the AER to review its current approach on debt. Importantly, the Court's decision may make it difficult for the AER to establish a benchmark cost of debt that is truly independent of the debt strategy chosen by the individual NSP. If so, the incentive to optimise financing strategies will be diluted and the AER will need to consider if it would be better to pass through debt costs as incurred, subject to a prudency test. If debt were to be move to an approach based on the pass-through of actual costs, then the same approach should be considered for tax. The current approach on tax creates a strong incentive for tax minimisation and profit shifting to the detriment of other taxpayers who (mostly) are also taxpayers.

In summary in response to the questions posed:

<u>Question 1:</u> Should inflation compensation be set in real or nominal terms?

The current approach has led to extensive debate around forecasting inflation and incentives for NSPs to propose lower forecasts. However, this is not sufficient to justify change. A strong positive case must be made to demonstrate the case for a change. At this stage the proposed alternative has not been specified and its impacts quantified.

Question2: Is there an adjustment to the PTRM that could be made to remove the incentive to insert bias in to the inflation expectation?

In theory, a nominal WACC may reduce the current incentives for bias. But this will depend on how it is implemented. Furthermore, inflation forecasts will still be needed, creating new and different incentives for biased estimates.

Question 3: Are there preferable changes to achieve the appropriate inflation compensation that have regard to the relevant items in the NER, minimise impact to other building blocks and do not reduce regulatory stability and certainty?

It is important that any changes are consistent with other components of the revenue requirements and that major changes, such as the potential for changes in the treatment of debt, are considered concurrently with this. It also important to preserve the stability and certainty of regulatory decisions. These are widely accepted principles of regulation and certainty and consistency of methodologies used from decision-to-decision is critical for this. Hence, if a change were to be made it is important that it be demonstrated that the methodology is robust and will continue to work well through the business cycle and changing financing strategies and requirements of key players in financial markets, such as the Commonwealth Government.

Question 4: If changes are made to reduce inflation risk, should the median credit rating or the equity beta be adjusted in the short term? Are there other parameters that also should be adjusted?

Clearly if changes reduce the financing risks for the utilities, the benefits should be passed onto the consumers. This is consistent with sound economic principles and the proposition that regulation should seek to replicate outcomes of competitive product and capital markets.

Overall these matters are very complex and go to the fundamental basis for the current regulatory regime. They will no doubt be central in the forthcoming review of the Rate of Return Guideline. The CCP considers that we need to begin by getting agreement that there is indeed a problem and if so whether this can be addressed by changes in the approach to measuring expected inflation, before we go too far down the solution road that involves fundamental change to the entire regulatory framework.

Consumer Challenge Panel
29 June 2017

Attachment A: Results of Modelling

Outcomes under current inflation scenario- 1(a) low inflation assumption, unchanged inflation

Year		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Actual Inflation	Chosen inf	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Closing RAB (PTRM)	Nominal	1131.2	1222.1	1312.5	1402.3	1491.3	1578.6	1665.7	1751.6	1836.2	1919.2	1871.5	1821.2	1768.1	1712.1	1653.2	1591.3	1526.2	1457.8	1386.2	1311.0
MAR (PTRM)	Nominal	93.8	103.2	112.8	122.5	132.4	142.2	152.3	162.6	172.9	183.3	193.9	193.0	191.9	190.7	189.4	187.9	186.3	184.6	182.8	180.7
MAR (Pricing)	**Nominal**	**93.8**	**103.2**	**112.8**	**122.5**	**132.4**	**142.2**	**152.3**	**162.6**	**172.9**	**183.3**	**193.9**	**193.0**	**191.9**	**190.7**	**189.4**	**187.9**	**186.3**	**184.6**	**182.8**	**180.7**
Opening RAB (RFM)	Nominal	1039.9	1131.0	1221.7	1312.0	1401.5	1490.4	1578.6	1665.7	1751.6	1836.2	1919.2	1871.5	1821.2	1768.1	1712.1	1653.2	1591.3	1526.2	1457.8	1386.2
Capex (RFM)	Nominal	105.8	107.9	110.1	112.3	114.5	116.8	119.2	121.5	124.0	126.5	0	0	0	0	0	0	0	0	0	0
Reg Depreciation (RFM)	Nominal	14.7	17.2	19.9	22.7	25.7	28.7	32.0	35.6	39.4	43.4	47.7	50.3	53.1	56.0	58.9	61.9	65.1	68.3	71.7	75.1
Closing RAB (RFM)	**Nominal**	**1131.0**	**1221.7**	**1312.0**	**1401.5**	**1490.4**	**1578.6**	**1665.7**	**1751.6**	**1836.2**	**1919.2**	**1871.5**	**1821.2**	**1768.1**	**1712.1**	**1653.2**	**1591.3**	**1526.2**	**1457.8**	**1386.2**	**1311.0**
Cash Flow	Nominal	-12.0	-4.7	2.7	10.2	17.8	25.4	33.2	41.0	48.9	56.9	193.9	193.0	191.9	190.7	189.4	187.9	186.3	184.6	182.8	180.7
Cash Flow	Real	-11.8	-4.5	2.6	9.4	16.1	22.6	28.9	35.0	40.9	46.7	156.0	152.1	148.3	144.5	140.7	136.9	133.1	129.3	125.5	121.6
NPV end period						-0.6					-0.6					-0.6					-0.6
NPV overall																					
Closing RAB (PTRM)	Real	1109.0	1174.6	1236.8	1295.5	1350.7	1401.7	1450.1	1495.0	1536.4	1574.4	1505.2	1436.0	1366.8	1297.6	1228.4	1159.1	1089.9	1020.7	951.5	882.3
MAR (Pricing)	Real	92.0	99.2	106.3	113.2	119.9	126.3	132.6	138.7	144.7	150.4	156.0	152.1	148.3	144.5	140.7	136.9	133.1	129.3	125.5	121.6
Opening RAB (RFM)	Real	1019.6	1087.1	1151.3	1212.0	1269.4	1323.4	1374.2	1421.6	1465.7	1506.3	1543.5	1475.7	1407.8	1340.0	1272.1	1204.3	1136.4	1068.6	1000.7	932.9
Capex (RFM)	Real	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reg Depreciation (RFM)	Real	14.4	16.6	18.7	21.0	23.3	25.5	27.9	30.4	33.0	35.6	38.3	39.7	41.1	42.4	43.8	45.1	46.5	47.8	49.2	50.6
Closing RAB (RFM)	Real	1108.8	1174.3	1236.3	1294.8	1349.9	1401.7	1450.1	1495.0	1536.4	1574.4	1505.2	1436.0	1366.8	1297.6	1228.4	1159.1	1089.9	1020.7	951.5	882.3

Outcomes under current inflation scenario- Base Case

Year		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Actual Inflation	Chosen inf	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Closing RAB (PTRM)	Nominal	1134.3	1231.6	1329.5	1427.6	1525.9	1624.2	1722.3	1820.2	1917.5	2014.1	1973.7	1930.1	1883.0	1832.3	1778.0	1719.7	1657.5	1591.1	1520.3	1444.9
MAR (PTRM)	Nominal	88.6	98.1	107.8	117.8	127.9	138.4	149.0	159.9	171.0	182.4	194.0	194.2	194.3	194.2	194.1	193.8	193.4	192.8	192.1	191.2
MAR (Pricing)	**Nominal**	**88.6**	**98.1**	**107.8**	**117.8**	**127.9**	**138.4**	**149.0**	**159.9**	**171.0**	**182.4**	**194.0**	**194.2**	**194.3**	**194.2**	**194.1**	**193.8**	**193.4**	**192.8**	**192.1**	**191.2**
Opening RAB (RFM)	Nominal	1037.4	1134.3	1231.6	1329.5	1427.6	1525.9	1624.2	1722.3	1820.2	1917.5	2014.1	1973.7	1930.1	1883.0	1832.3	1778.0	1719.7	1657.5	1591.1	1520.3
Capex (RFM)	Nominal	106.3	109.0	111.7	114.5	117.4	120.3	123.3	126.4	129.6	132.8	0	0	0	0	0	0	0	0	0	0
Reg Depreciation (RFM)	Nominal	9.5	11.6	13.9	16.4	19.1	22.0	25.2	28.6	32.2	36.2	40.4	43.7	47.1	50.6	54.4	58.2	62.2	66.4	70.8	75.3
Closing RAB (RFM)	**Nominal**	**1134.3**	**1231.6**	**1329.5**	**1427.6**	**1525.9**	**1624.2**	**1722.3**	**1820.2**	**1917.5**	**2014.1**	**1973.7**	**1930.1**	**1883.0**	**1832.3**	**1778.0**	**1719.7**	**1657.5**	**1591.1**	**1520.3**	**1444.9**
Cash Flow	Nominal	-17.7	-10.9	-3.9	3.2	10.6	18.0	25.7	33.5	41.5	49.6	194.0	194.2	194.3	194.2	194.1	193.8	193.4	192.8	192.1	191.2
Cash Flow	Real	-17.3	-10.4	-3.6	2.9	9.3	15.6	21.6	27.5	33.2	38.7	147.8	144.4	140.9	137.5	134.0	130.5	127.1	123.6	120.2	116.7
Closing RAB (PTRM)	Real	1106.6	1172.3	1234.5	1293.3	1348.7	1400.5	1448.9	1493.9	1535.4	1573.4	1504.3	1435.1	1365.9	1296.8	1227.6	1158.5	1089.3	1020.1	951.0	881.8
MAR (Pricing)	Real	86.5	93.4	100.1	106.7	113.1	119.3	125.4	131.2	136.9	142.5	147.8	144.4	140.9	137.5	134.0	130.5	127.1	123.6	120.2	116.7
Opening RAB (RFM)	Real	1012.1	1079.6	1143.7	1204.4	1261.8	1315.8	1366.4	1413.6	1457.5	1497.9	1535.1	1467.6	1400.1	1332.6	1265.2	1197.7	1130.2	1062.7	995.3	927.8
Capex (RFM)	Real	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reg Depreciation (RFM)	Real	9.3	11.0	12.9	14.8	16.9	19.0	21.2	23.4	25.8	28.3	30.8	32.5	34.2	35.8	37.5	39.2	40.9	42.6	44.3	46.0
Closing RAB (RFM)	Real	1106.6	1172.3	1234.5	1293.3	1348.7	1400.5	1448.9	1493.9	1535.4	1573.4	1504.3	1435.1	1365.9	1296.8	1227.6	1158.5	1089.3	1020.1	951.0	881.8

Differences in Outcomes (scenario - Base Case

Year		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Closing RAB (PTRM)	Nominal	-3.1	-9.5	-17.0	-25.3	-34.6	-45.6	-56.7	-68.6	-81.3	-94.9	-102.2	-108.9	-114.9	-120.2	-124.8	-128.5	-131.3	-133.2	-134.1	-133.9
MAR (PTRM)	Nominal	5.2	5.1	5.0	4.8	4.4	3.9	3.3	2.7	1.9	1.0	-0.1	-1.2	-2.4	-3.5	-4.7	-5.9	-7.0	-8.2	-9.3	-10.5
MAR (Pricing)	**Nominal**	5.2	5.1	5.0	4.8	4.4	3.9	3.3	2.7	1.9	1.0	-0.1	-1.2	-2.4	-3.5	-4.7	-5.9	-7.0	-8.2	-9.3	-10.5
Opening RAB (RFM)	Nominal	2.5	-3.2	-9.9	-17.5	-26.0	-35.5	-45.6	-56.7	-68.6	-81.3	-94.9	-102.2	-108.9	-114.9	-120.2	-124.8	-128.5	-131.3	-133.2	-134.1
Capex (RFM)	Nominal	-0.5	-1.1	-1.6	-2.2	-2.8	-3.5	-4.2	-4.9	-5.6	-6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reg Depreciation (RFM)	Nominal	5.2	5.6	6.0	6.3	6.6	6.7	6.9	7.1	7.2	7.3	7.3	6.7	6.0	5.3	4.5	3.7	2.8	1.9	0.9	-0.2
Closing RAB (RFM)	**Nominal**	-3.2	-9.9	-17.5	-26.0	-35.5	-45.6	-56.7	-68.6	-81.3	-94.9	-102.2	-108.9	-114.9	-120.2	-124.8	-128.5	-131.3	-133.2	-134.1	-133.9
Cash Flow	Nominal	5.7	6.2	6.6	7.0	7.3	7.4	7.5	7.5	7.5	7.3	-0.1	-1.2	-2.4	-3.5	-4.7	-5.9	-7.0	-8.2	-9.3	-10.5
Cash Flow	Real	5.5	5.9	6.2	6.5	6.8	7.0	7.3	7.5	7.7	7.9	8.1	7.8	7.4	7.1	6.7	6.4	6.0	5.6	5.3	4.9
Closing RAB (PTRM)	Real	2.4	2.3	2.3	2.2	2.1	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5
MAR (Pricing)	Real	5.5	5.9	6.2	6.5	6.8	7.0	7.3	7.5	7.7	7.9	8.1	7.8	7.4	7.1	6.7	6.4	6.0	5.6	5.3	4.9
Reg Depreciation (RFM)	Real	5.2	5.5	5.8	6.1	6.4	6.5	6.7	7.0	7.2	7.4	7.6	7.2	6.9	6.6	6.2	5.9	5.6	5.2	4.9	4.6
Closing RAB (RFM)	Real	2.3	2.0	1.7	1.5	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5

Outcomes under current inflation scenario- 1 low actual inflation , unchanged expected inflation

Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Actual Inflation	Chosen inflation		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Closing RAB (PTRM)	Nominal	1037.4	1134.0	1231.1	1328.7	1426.5	1524.5	1582.5	1678.0	1773.2	1867.9	1961.9	1876.1	1834.6	1789.9	1741.7	1690.0	1595.2	1537.4	1475.8	1410.1	1340.2
MAR (PTRM)	Nominal		88.6	98.1	107.8	117.7	127.8	134.8	145.2	155.8	166.6	177.7	184.4	184.6	184.7	184.6	184.5	179.8	179.4	178.9	178.2	177.4
MAR (Pricing)	**Nominal**		**88.6**	**97.6**	**106.7**	**116.0**	**125.4**	**134.8**	**144.5**	**154.3**	**164.2**	**174.2**	**184.4**	**183.7**	**182.9**	**181.9**	**180.9**	**179.8**	**178.5**	**177.1**	**175.6**	**174.0**
Opening RAB (RFM)	Nominal		1037.4	1128.3	1218.8	1308.8	1398.2	1486.8	1574.7	1661.6	1747.4	1831.7	1914.5	1867.0	1816.8	1763.8	1708.0	1649.2	1587.4	1522.5	1454.3	1382.8
Capex (RFM)	Nominal	1024.7	105.6	107.7	109.8	112.0	114.3	116.5	118.9	121.3	123.7	126.2	0	0	0	0	0	0	0	0	0	0
Reg Depreciation (RFM)	Nominal		14.7	17.2	19.8	22.6	25.6	28.6	32.0	35.5	39.3	43.3	47.6	50.2	53.0	55.8	58.8	61.8	64.9	68.2	71.5	74.9
Closing RAB (RFM)	**Nominal**	**1037.4**	**1128.3**	**1218.8**	**1308.8**	**1398.2**	**1486.8**	**1574.7**	**1661.6**	**1747.4**	**1831.7**	**1914.5**	**1867.0**	**1816.8**	**1763.8**	**1708.0**	**1649.2**	**1587.4**	**1522.5**	**1454.3**	**1382.8**	**1307.9**
Cash Flow	Nominal	-1037.4	-16.9	-10.1	-3.1	4.0	11.1	18.3	25.6	33.0	40.5	48.1	184.4	183.7	182.9	181.9	180.9	179.8	178.5	177.1	175.6	174.0
Cash Flow	Real	-1037.4	-16.6	-9.7	-2.9	3.7	10.1	16.2	22.3	28.2	33.9	39.4	148.3	144.8	141.4	137.9	134.4	131.0	127.5	124.0	120.5	117.1
NPV end period							1.4					3.6					5.4					6.7
NPV overall		8.34																				
Closing RAB (PTRM)	Real	1037.4	1111.8	1183.3	1252.0	1317.9	1380.8	1405.2	1460.8	1513.4	1563.0	1609.5	1508.9	1446.6	1383.6	1320.0	1255.7	1162.0	1098.0	1033.3	968.0	901.9
MAR (Pricing)	Real		86.9	93.8	100.6	107.1	113.6	119.7	125.8	131.7	137.4	142.9	148.3	144.8	141.4	137.9	134.4	131.0	127.5	124.0	120.5	117.1
Opening RAB (RFM)	Real		1017.1	1084.5	1148.5	1209.1	1266.4	1320.2	1370.9	1418.2	1462.1	1502.6	1539.8	1472.1	1404.4	1336.7	1269.0	1201.4	1133.7	1066.0	998.3	930.6
Reg Depreciation (RFM)	Real		14.4	16.5	18.7	20.9	23.2	25.4	27.8	30.3	32.9	35.5	38.2	39.6	41.0	42.3	43.7	45.0	46.4	47.7	49.1	50.4
Closing RAB (RFM)	Real	**1037.4**	1106.2	1171.5	1233.3	1291.7	1346.6	1398.3	1446.6	1491.4	1532.7	1570.6	1501.6	1432.5	1363.5	1294.4	1225.4	1156.3	1087.3	1018.2	949.2	880.2

Outcomes under current inflation scenario- Base Case

Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Actual Inflation	Chosen inflation		2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Closing RAB (PTRM)	Nominal	1037.4	1134.3	1231.6	1329.5	1427.6	1525.9	1624.2	1722.3	1820.2	1917.5	2014.1	1973.7	1930.1	1883.0	1832.3	1778.0	1719.7	1657.5	1591.1	1520.3	1444.9
MAR (Pricing)	**Nominal**		**88.6**	**98.1**	**107.8**	**117.8**	**127.9**	**138.4**	**149.0**	**159.9**	**171.0**	**182.4**	**194.0**	**194.2**	**194.3**	**194.2**	**194.1**	**193.8**	**193.4**	**192.8**	**192.1**	**191.2**
Opening RAB (RFM)	Nominal		1037.4	1134.3	1231.6	1329.5	1427.6	1525.9	1624.2	1722.3	1820.2	1917.5	2014.1	1973.7	1930.1	1883.0	1832.3	1778.0	1719.7	1657.5	1591.1	1520.3
Capex (RFM)	Nominal	1024.7	106.3	109.0	111.7	114.5	117.4	120.3	123.3	126.4	129.6	132.8	0	0	0	0	0	0	0	0	0	0
Reg Depreciation (RFM)	Nominal		9.5	11.6	13.9	16.4	19.1	22.0	25.2	28.6	32.2	36.2	40.4	43.7	47.1	50.6	54.4	58.2	62.2	66.4	70.8	75.3
Closing RAB (RFM)	**Nominal**	**1037.4**	**1134.3**	**1231.6**	**1329.5**	**1427.6**	**1525.9**	**1624.2**	**1722.3**	**1820.2**	**1917.5**	**2014.1**	**1973.7**	**1930.1**	**1883.0**	**1832.3**	**1778.0**	**1719.7**	**1657.5**	**1591.1**	**1520.3**	**1444.9**
Cash Flow	Nominal	-1037.4	-17.7	-10.9	-3.9	3.2	10.6	18.0	25.7	33.5	41.5	49.6	194.0	194.2	194.3	194.2	194.1	193.8	193.4	192.8	192.1	191.2
Cash Flow	Real	-1037.4	-17.3	-10.4	-3.6	2.9	9.3	15.6	21.6	27.5	33.2	38.7	147.8	144.4	140.9	137.5	134.0	130.5	127.1	123.6	120.2	116.7
Closing RAB (PTRM)	Real	1037.4	1106.6	1172.3	1234.5	1293.3	1348.7	1400.5	1448.9	1493.9	1535.4	1573.4	1504.3	1435.1	1365.9	1296.8	1227.6	1158.5	1089.3	1020.1	951.0	881.8
MAR (Pricing)	Real		86.5	93.4	100.1	106.7	113.1	119.3	125.4	131.2	136.9	142.5	147.8	144.4	140.9	137.5	134.0	130.5	127.1	123.6	120.2	116.7
Opening RAB (RFM)	Real		1012.1	1079.6	1143.7	1204.4	1261.8	1315.8	1366.4	1413.6	1457.5	1497.9	1535.1	1467.6	1400.1	1332.6	1265.2	1197.7	1130.2	1062.7	995.3	927.8
Reg Depreciation (RFM)	Real		9.3	11.0	12.9	14.8	16.9	19.0	21.2	23.4	25.8	28.3	30.8	32.5	34.2	35.8	37.5	39.2	40.9	42.6	44.3	46.0
Closing RAB (RFM)	Real	**1037.4**	1106.6	1172.3	1234.5	1293.3	1348.7	1400.5	1448.9	1493.9	1535.4	1573.4	1504.3	1435.1	1365.9	1296.8	1227.6	1158.5	1089.3	1020.1	951.0	881.8

Differences in Outcomes (scenario - Base Case

Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
MAR (Pricing)	**Nominal**		0.0	-0.5	-1.1	-1.8	-2.6	-3.5	-4.5	-5.6	-6.8	-8.2	-9.6	-10.5	-11.4	-12.3	-13.2	-14.0	-14.9	-15.7	-16.5	-17.3
Opening RAB (RFM)	Nominal		0.0	-6.0	-12.9	-20.7	-29.4	-39.1	-49.4	-60.7	-72.8	-85.8	-99.6	-106.7	-113.3	-119.2	-124.4	-128.8	-132.3	-135.0	-136.8	-137.5
Capex (RFM)	Nominal	0.0	-0.8	-1.3	-1.9	-2.5	-3.1	-3.8	-4.4	-5.1	-5.9	-6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reg Depreciation (RFM)	Nominal		5.2	5.6	5.9	6.3	6.6	6.6	6.8	7.0	7.1	7.2	7.2	6.6	5.9	5.2	4.4	3.6	2.7	1.7	0.7	-0.4
Closing RAB (RFM)	**Nominal**	0.0	-6.0	-12.9	-20.7	-29.4	-39.1	-49.4	-60.7	-72.8	-85.8	-99.6	-106.7	-113.3	-119.2	-124.4	-128.8	-132.3	-135.0	-136.8	-137.5	-137.1
Cash Flow	Nominal	0.0	0.8	0.8	0.8	0.7	0.5	0.2	-0.1	-0.5	-1.0	-1.5	-9.6	-10.5	-11.4	-12.3	-13.2	-14.0	-14.9	-15.7	-16.5	-17.3
Cash Flow	Real	0.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Closing RAB (PTRM)	Real	0.0	5.2	11.0	17.5	24.6	32.2	4.6	11.8	19.5	27.6	36.0	4.6	11.5	17.7	23.2	28.1	3.5	8.7	13.2	17.0	20.1
MAR (PTRM)	Real		0.4	0.9	1.4	2.0	2.7	0.4	1.0	1.7	2.5	3.3	0.5	1.2	1.8	2.5	3.1	0.4	1.0	1.6	2.2	2.7
MAR (Pricing)	Real		0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Reg Depreciation (RFM)	Real		5.1	5.5	5.8	6.1	6.4	6.4	6.7	6.9	7.1	7.3	7.5	7.1	6.8	6.5	6.1	5.8	5.5	5.1	4.8	4.5
Closing RAB (RFM)	Real	0.0	-0.4	-0.8	-1.2	-1.6	-2.0	-2.2	-2.4	-2.5	-2.7	-2.8	-2.7	-2.6	-2.5	-2.4	-2.2	-2.1	-2.0	-1.9	-1.8	-1.6

Outcomes under current inflation scenario- 1(a) low inflation assumption, low inflation

Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Actual Inflation	Chosen inflation		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Closing RAB (PTRM)	Nominal	1039.9	1131.2	1222.1	1312.5	1402.3	1491.3	1578.6	1665.7	1751.6	1836.2	1919.2	1871.5	1821.2	1768.1	1712.1	1653.2	1591.3	1526.2	1457.8	1386.2	1311.0
MAR (PTRM)	Nominal		93.8	103.2	112.8	122.5	132.4	142.2	152.3	162.6	172.9	183.3	193.9	193.0	191.9	190.7	189.4	187.9	186.3	184.6	182.8	180.7
MAR (Pricing)	**Nominal**		**93.8**	**103.2**	**112.8**	**122.5**	**132.4**	**142.2**	**152.3**	**162.6**	**172.9**	**183.3**	**193.9**	**193.0**	**191.9**	**190.7**	**189.4**	**187.9**	**186.3**	**184.6**	**182.8**	**180.7**
Opening RAB (RFM)	Nominal		1039.9	1131.0	1221.7	1312.0	1401.5	1490.4	1578.6	1665.7	1751.6	1836.2	1919.2	1871.5	1821.2	1768.1	1712.1	1653.2	1591.3	1526.2	1457.8	1386.2
Capex (RFM)	Nominal	1027.2	105.8	107.9	110.1	112.3	114.5	116.8	119.2	121.5	124.0	126.5	0	0	0	0	0	0	0	0	0	0
Reg Depreciation (RFM)	Nominal		14.7	17.2	19.9	22.7	25.7	28.7	32.0	35.6	39.4	43.4	47.7	50.3	53.1	56.0	58.9	61.9	65.1	68.3	71.7	75.1
Closing RAB (RFM)	**Nominal**	**1039.9**	**1131.0**	**1221.7**	**1312.0**	**1401.5**	**1490.4**	**1578.6**	**1665.7**	**1751.6**	**1836.2**	**1919.2**	**1871.5**	**1821.2**	**1768.1**	**1712.1**	**1653.2**	**1591.3**	**1526.2**	**1457.8**	**1386.2**	**1311.0**
Cash Flow	Nominal	-1039.9	-12.0	-4.7	2.7	10.2	17.8	25.4	33.2	41.0	48.9	56.9	193.9	193.0	191.9	190.7	189.4	187.9	186.3	184.6	182.8	180.7
Cash Flow	Real	-1039.9	-11.8	-4.5	2.6	9.4	16.1	22.6	28.9	35.0	40.9	46.7	156.0	152.1	148.3	144.5	140.7	136.9	133.1	129.3	125.5	121.6
NPV end period							-0.6					-0.6					-0.6					-0.6
NPV overall		-0.65																				
Closing RAB (PTRM)	Real	1037.4	1109.0	1174.6	1236.8	1295.5	1350.7	1401.7	1450.1	1495.0	1536.4	1574.4	1505.2	1436.0	1366.8	1297.6	1228.4	1159.1	1089.9	1020.7	951.5	882.3
MAR (PTRM)	Real		92.0	99.2	106.3	113.2	119.9	126.3	132.6	138.7	144.7	150.4	156.0	152.1	148.3	144.5	140.7	136.9	133.1	129.3	125.5	121.6
MAR (Pricing)	Real		92.0	99.2	106.3	113.2	119.9	126.3	132.6	138.7	144.7	150.4	156.0	152.1	148.3	144.5	140.7	136.9	133.1	129.3	125.5	121.6
Opening RAB (RFM)	Real		1019.6	1087.1	1151.3	1212.0	1269.4	1323.4	1374.2	1421.6	1465.7	1506.3	1543.5	1475.7	1407.8	1340.0	1272.1	1204.3	1136.4	1068.6	1000.7	932.9
Capex (RFM)	Real	1024.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reg Depreciation (RFM)	Real		14.4	16.6	18.7	21.0	23.3	25.5	27.9	30.4	33.0	35.6	38.3	39.7	41.1	42.4	43.8	45.1	46.5	47.8	49.2	50.6
Closing RAB (RFM)	Real	**1037.4**	1108.8	1174.3	1236.3	1294.8	1349.9	1401.7	1450.1	1495.0	1536.4	1574.4	1505.2	1436.0	1366.8	1297.6	1228.4	1159.1	1089.9	1020.7	951.5	882.3

Outcomes under current inflation scenario- Base Case

Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Actual Inflation	Chosen inflation		2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Closing RAB (PTRM)	Nominal	1037.4	1134.3	1231.6	1329.5	1427.6	1525.9	1624.2	1722.3	1820.2	1917.5	2014.1	1973.7	1930.1	1883.0	1832.3	1778.0	1719.7	1657.5	1591.1	1520.3	1444.9
MAR (PTRM)	Nominal		88.6	98.1	107.8	117.8	127.9	138.4	149.0	159.9	171.0	182.4	194.0	194.2	194.3	194.2	194.1	193.8	193.4	192.8	192.1	191.2
MAR (Pricing)	**Nominal**		**88.6**	**98.1**	**107.8**	**117.8**	**127.9**	**138.4**	**149.0**	**159.9**	**171.0**	**182.4**	**194.0**	**194.2**	**194.3**	**194.2**	**194.1**	**193.8**	**193.4**	**192.8**	**192.1**	**191.2**
Opening RAB (RFM)	Nominal		1037.4	1134.3	1231.6	1329.5	1427.6	1525.9	1624.2	1722.3	1820.2	1917.5	2014.1	1973.7	1930.1	1883.0	1832.3	1778.0	1719.7	1657.5	1591.1	1520.3
Capex (RFM)	Nominal	1024.7	106.3	109.0	111.7	114.5	117.4	120.3	123.3	126.4	129.6	132.8	0	0	0	0	0	0	0	0	0	0
Reg Depreciation (RFM)	Nominal		9.5	11.6	13.9	16.4	19.1	22.0	25.2	28.6	32.2	36.2	40.4	43.7	47.1	50.6	54.4	58.2	62.2	66.4	70.8	75.3
Closing RAB (RFM)	**Nominal**	**1037.4**	**1134.3**	**1231.6**	**1329.5**	**1427.6**	**1525.9**	**1624.2**	**1722.3**	**1820.2**	**1917.5**	**2014.1**	**1973.7**	**1930.1**	**1883.0**	**1832.3**	**1778.0**	**1719.7**	**1657.5**	**1591.1**	**1520.3**	**1444.9**
Cash Flow	Nominal	-1037.4	-17.7	-10.9	-3.9	3.2	10.6	18.0	25.7	33.5	41.5	49.6	194.0	194.2	194.3	194.2	194.1	193.8	193.4	192.8	192.1	191.2
Cash Flow	Real	-1037.4	-17.3	-10.4	-3.6	2.9	9.3	15.6	21.6	27.5	33.2	38.7	147.8	144.4	140.9	137.5	134.0	130.5	127.1	123.6	120.2	116.7
NPV overall		0.00																				
Closing RAB (PTRM)	Real	1037.4	1106.6	1172.3	1234.5	1293.3	1348.7	1400.5	1448.9	1493.9	1535.4	1573.4	1504.3	1435.1	1365.9	1296.8	1227.6	1158.5	1089.3	1020.1	951.0	881.8
MAR (PTRM)	Real		86.5	93.4	100.1	106.7	113.1	119.3	125.4	131.2	136.9	142.5	147.8	144.4	140.9	137.5	134.0	130.5	127.1	123.6	120.2	116.7
MAR (Pricing)	Real		86.5	93.4	100.1	106.7	113.1	119.3	125.4	131.2	136.9	142.5	147.8	144.4	140.9	137.5	134.0	130.5	127.1	123.6	120.2	116.7
Opening RAB (RFM)	Real		1012.1	1079.6	1143.7	1204.4	1261.8	1315.8	1366.4	1413.6	1457.5	1497.9	1535.1	1467.6	1400.1	1332.6	1265.2	1197.7	1130.2	1062.7	995.3	927.8
Capex (RFM)	Real	1024.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reg Depreciation (RFM)	Real		9.3	11.0	12.9	14.8	16.9	19.0	21.2	23.4	25.8	28.3	30.8	32.5	34.2	35.8	37.5	39.2	40.9	42.6	44.3	46.0
Closing RAB (RFM)	Real	**1037.4**	1106.6	1172.3	1234.5	1293.3	1348.7	1400.5	1448.9	1493.9	1535.4	1573.4	1504.3	1435.1	1365.9	1296.8	1227.6	1158.5	1089.3	1020.1	951.0	881.8

Differences in Outcomes (scenario - Base Case

Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Closing RAB (PTRM)	Nominal	2.5	-3.1	-9.5	-17.0	-25.3	-34.6	-45.6	-56.7	-68.6	-81.3	-94.9	-102.2	-108.9	-114.9	-120.2	-124.8	-128.5	-131.3	-133.2	-134.1	-133.9
MAR (PTRM)	Nominal		5.2	5.1	5.0	4.8	4.4	3.9	3.3	2.7	1.9	1.0	-0.1	-1.2	-2.4	-3.5	-4.7	-5.9	-7.0	-8.2	-9.3	-10.5
MAR (Pricing)	**Nominal**		5.2	5.1	5.0	4.8	4.4	3.9	3.3	2.7	1.9	1.0	-0.1	-1.2	-2.4	-3.5	-4.7	-5.9	-7.0	-8.2	-9.3	-10.5
Opening RAB (RFM)	Nominal		2.5	-3.2	-9.9	-17.5	-26.0	-35.5	-45.6	-56.7	-68.6	-81.3	-94.9	-102.2	-108.9	-114.9	-120.2	-124.8	-128.5	-131.3	-133.2	-134.1
Capex (RFM)	Nominal	2.5	-0.5	-1.1	-1.6	-2.2	-2.8	-3.5	-4.2	-4.9	-5.6	-6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reg Depreciation (RFM)	Nominal		5.2	5.6	6.0	6.3	6.6	6.7	6.9	7.1	7.2	7.3	7.3	6.7	6.0	5.3	4.5	3.7	2.8	1.9	0.9	-0.2
Closing RAB (RFM)	**Nominal**	2.5	-3.2	-9.9	-17.5	-26.0	-35.5	-45.6	-56.7	-68.6	-81.3	-94.9	-102.2	-108.9	-114.9	-120.2	-124.8	-128.5	-131.3	-133.2	-134.1	-133.9
Cash Flow	Nominal	-2.5	5.7	6.2	6.6	7.0	7.3	7.4	7.5	7.5	7.5	7.3	-0.1	-1.2	-2.4	-3.5	-4.7	-5.9	-7.0	-8.2	-9.3	-10.5
Cash Flow	Real	-2.5	5.5	5.9	6.2	6.5	6.8	7.0	7.3	7.5	7.7	7.9	8.1	7.8	7.4	7.1	6.7	6.4	6.0	5.6	5.3	4.9
Closing RAB (PTRM)	Real	0.0	2.4	2.3	2.3	2.2	2.1	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5
MAR (PTRM)	Real		5.5	5.9	6.2	6.5	6.8	7.0	7.3	7.5	7.7	7.9	8.1	7.8	7.4	7.1	6.7	6.4	6.0	5.6	5.3	4.9
MAR (Pricing)	Real		5.5	5.9	6.2	6.5	6.8	7.0	7.3	7.5	7.7	7.9	8.1	7.8	7.4	7.1	6.7	6.4	6.0	5.6	5.3	4.9
Reg Depreciation (RFM)	Real		5.2	5.5	5.8	6.1	6.4	6.5	6.7	7.0	7.2	7.4	7.6	7.2	6.9	6.6	6.2	5.9	5.6	5.2	4.9	4.6
Closing RAB (RFM)	Real	0.0	2.3	2.0	1.7	1.5	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5