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

Review of Treatment of Inflation 2020

31 July 2020

Dear Mr Anderson,

Aurizon Network welcomes the opportunity to contribute to the Australian Energy Regulator's (**AER**) Review of the Treatment of Inflation 2020 (**the 2020 Review**).

Aurizon Network is a regulated rail network and access provider under the certified state-based Queensland Rail Access Regime. As the service is regulated pursuant to the *Queensland Competition Authority Act 1998*, Aurizon Network is not directly subject to the outcomes of the AER's review. However, the evidence, analysis and findings from this review is likely to inform debate and consideration of estimating expected inflation in other regulatory forums and determinations. Therefore, Aurizon Network is an interested stakeholder in this review.

The Issues Paper released by the AER on 25 May 2020 notes that since the prior review of the treatment of inflation undertaken in 2017 (**the 2017 Review**), additional data and information has become available which makes it prudent to undertake a further review. Aurizon Network also considers that the 2017 Review did not evaluate information or options relevant to estimating the market expectations of inflation. The purpose of this submission is to present those aspects that Aurizon Network considers should be evaluated by the AER in the 2020 Review. In summary, the submission addresses the following matters:

1. The AER's current approach to estimating market expectations of inflation is a hybrid approach involving the AER's short term inflation forecasts and the long-term inflation target. The AER should consider alternate hybrid approaches of combining various measures to produce the most reliable and unbiased estimate of expected inflation.

2. The AER should test the reliability of medium-term estimates of expected inflation having regard the time period where liquidity of inflation indexed bonds improved. Failure to do so could result in the AER unreasonably rejecting a hybrid approach that produces better estimates than the current methodology.

3. Recent inflation outcomes have persistently fallen outside of the target band. When combined with changes to the monetary policy objectives in 2016 and international benchmarks, this suggests that longer term inflation expectations may not be firmly anchored at the mid-point or may be anchored at the lower end of the target range.

4. The AER's specification of relative congruence as an evaluation criterion does not adequately consider the congruence of how both nominal rates and inflation expectations are simultaneously determined.

5. Hybridisation of the regulatory financial model may be a reasonable approach to allocating forecasting error where there is no reliable, observable and market-based measure of inflation expectations between customers and service providers.

Alternate Hybrid Approaches for Market Expectations of Inflation.

The Issues Paper and 2017 Review considered a range of options for estimating the market expectations for inflation, including:

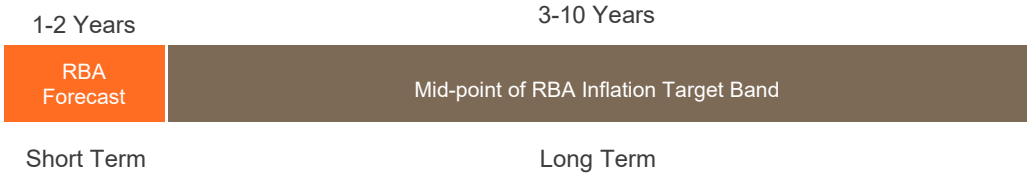
- the current approach of matching the RBA short term forecasts with the mid-point of the RBA Inflation Target Band;
- the glide path approach;
- market-based approaches such as inflation swaps and the bond break even rate of inflation (**BEI**); and
- survey evidence.

In practice, the 10-year expected rate of inflation can be considered a function of short, medium-term and longer-term inflation expectations. This suggests that a hybrid approach can also be applicable to determine the best unbiased estimate for inflation expectations by adopting the most reliable measure for the relevant period.

Within the measures described above, both the AER's current approach and glide path represent hybrid methods where different measures are applied to different terms of the 10-year forecast period as shown in Figure 1.

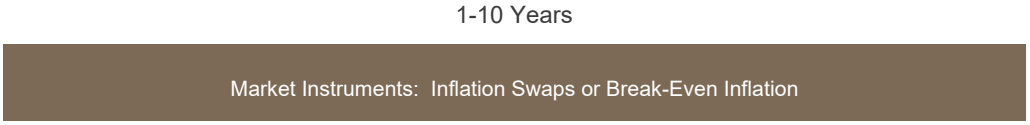
Figure 1. Summary of AER Options for Estimating Market Expectations of Inflation

a) AER's current approach to estimating expected inflation



b) AER's suggested glide path approach to estimating expected inflation

c) Market instrument approach to estimating expected inflation

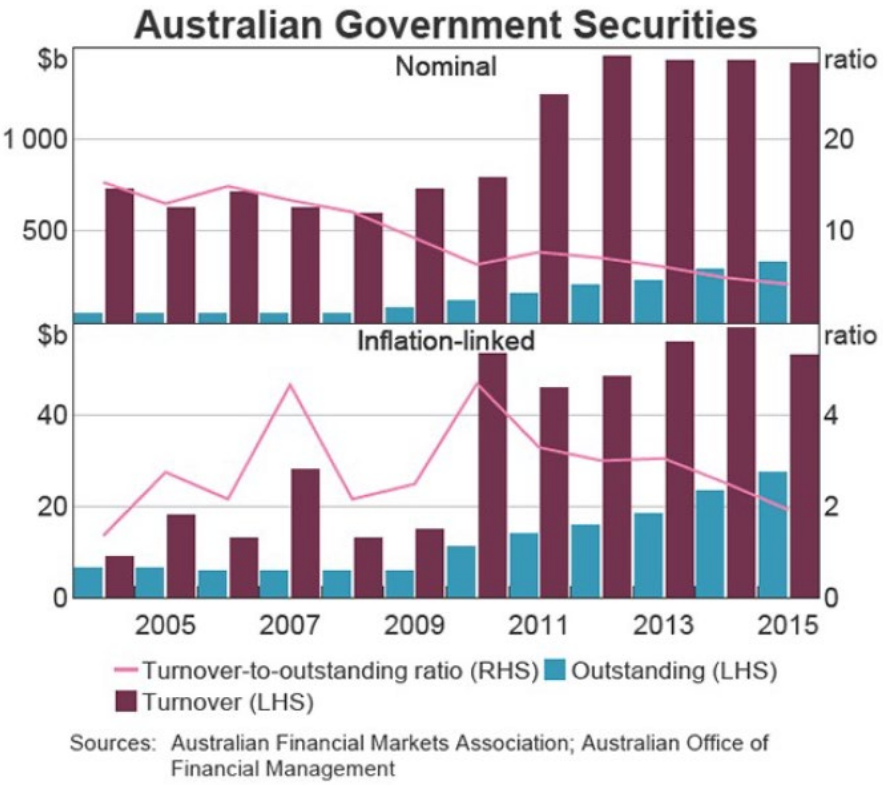


The 2017 Review considered the reliability and robustness of market instruments over the term of 10 years. These approaches were rejected on the basis of evidence of various risk premia and biases with the general presumption that:

- inflation swaps are likely to overstate inflation expectations due to[1]:
    - hedging costs;
    - inflation risk premium; and
    - liquidity premia
- break even inflation could over or understate inflation expectations depending on the strength of the relevant premia or biases. Recent market observations suggest this is likely to underestimate inflation expectations.

However, many of the issues associated with break-even inflation estimates, including liquidity premia, are influenced by data prior to 2010 where there were known issues of market liquidity. This is illustrated by Figure 2 below.

Figure 2. Improvements in Inflation Indexed Bond Liquidity[2]



The materiality of these premia and biases is also term dependent. Market-based approaches to inflation expectations over the medium-term may yield improved forecast reliability relative to the AER's current approach. Nevertheless, as the 2017 Review did not consider a hybrid approach of matching medium-term inflation expectations with other longer-term measures, the AER did not

[1] AER (2017) Regulatory Treatment of Inflation: Final Paper, Table 5, p. 56.

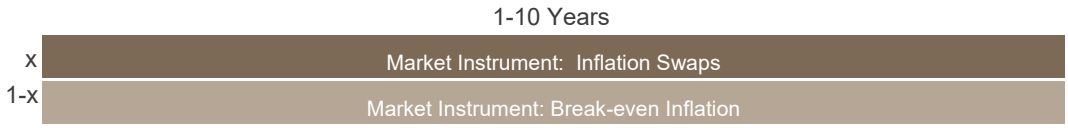
[2] Reserve Bank of Australia (2016) Bulletin: Measure of Inflation Expectations in Australia, December.

consider the reliability of alternate market-based measures over the medium-term. For example, the 2017 Review did not consider alternate hybrid methodologies such as those described in figure 3.

Figure 3. Alternate Hybrid Approach to Estimating Inflation Expectations

a) Matching medium-term market-based estimates with long term expectations

b) A weighted market-based approach to estimating inflation expectations



Given the evidence that:

- inflation swaps are likely to overstate inflation expectations; and
- break-even inflation expectations are typically lower than inflation swaps,

the AER should evaluate the reliability of a weighted market-based approach if there is evidence those premia are inversely correlated.

Similarly, the 2020 Review should evaluate the reliability and robustness of market-based methods over the medium-term noting IPART and the ERA assessments of liquidity of inflation indexed bonds of this duration:

> *Our analysis for this review suggests that inflation-linked bond liquidity is currently lower than liquidity in the nominal bond market. However, we consider that bond market liquidity is currently sufficient, if judgement is applied, to produce an estimate of inflation using the BEI method for 3-5 year regulatory period.*[3]
>
> *It has been suggested that a bias exists in the Treasury bonds approach, due to investors demanding an inflation premium to compensate for being exposed to the uncertainty around the future inflation rate. Another criticism of this approach is the relatively small quantity of indexed bonds, with maturities every five years, on issue. This is in contrast to the large quantity of CGS currently on issue. As a consequence, the interpolation of Treasury indexed bonds is significantly less than accurate the corresponding interpolation for CGS. However, the Authority considers that, on balance, the implied bond approach produces more accurate estimates, now that the liquidity of indexed bonds as improved and apparent liquidity premiums have subsided*[4].

[3] IPART (2017) Final Report: Review of our WACC Method, February, p.76

[4] ERA (2013) Explanatory Statement for the Rate of Return Guidelines

Best Unbiased Medium-Term Market Expectations for Inflation

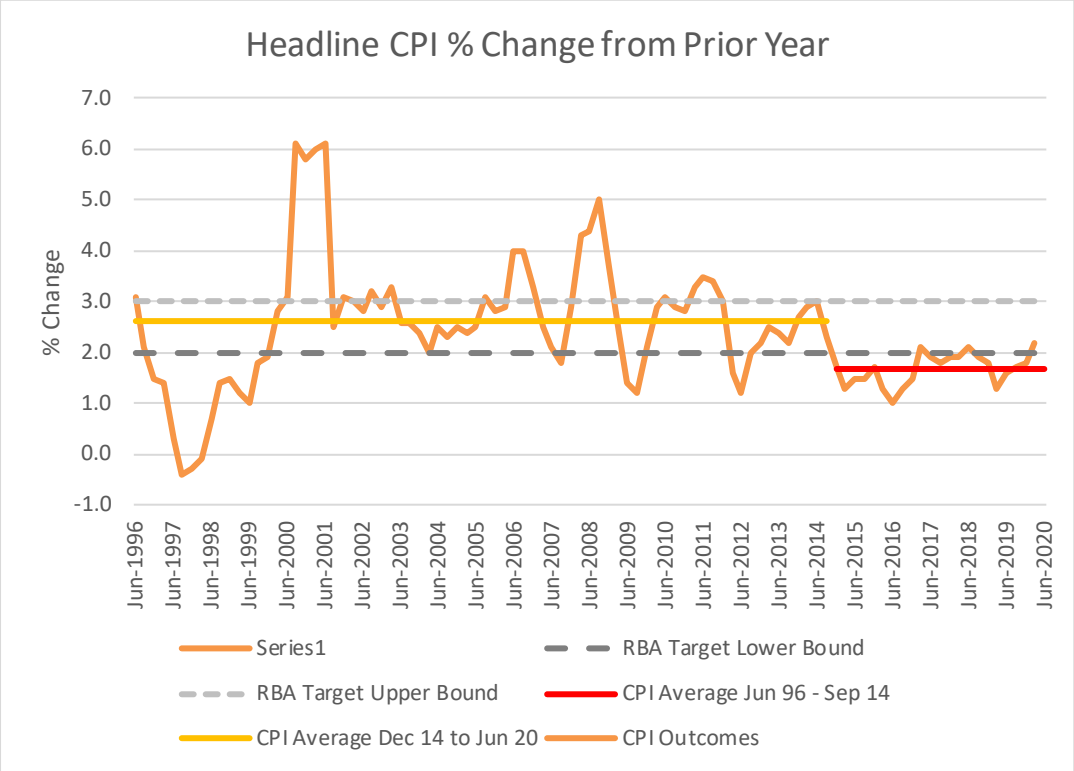
To ensure that AER's current approach to estimating inflation is unbiased, the following conditions would need be satisfied:

- the inflation rate is ***mean reverting and time constant***. This essentially requires that while the actual inflation rate may deviate from the target inflation rate, it should not influence the mean over time. In this regard, the mean annualised quarterly inflation is expected to be 2.5% when measured over the evaluation period.

- deviations of actual inflation from the mean are ***not persistent***. An explicit assumption of the current methodology is that the actual inflation rate will return to the RBA midpoint of 2.5% after 2 years regardless of whether the inflation forecasts in the first two years are above or below the long run mean. That is, the inflation rate must not persistently remain above or below the RBA target for more than 2 years.

As shown in figure 4, CPI has remained at or outside of the lower bound of the RBA inflation target range (2-3%) since December 2014 indicating that these conditions are no longer satisfied.

Figure 4. Consumer Price Index (Jun 1996 to Mar 2020). ABS Series A2325847F



Another assumption in the 2017 Review that may no longer be appropriate to hold was that the RBA second year inflation forecasts outperformed a random walk. Recent observations suggest this assumption is unlikely to hold and that the RBA second year forecasts have systematically overstated the inflation forecast. For the AER's use of the RBA forecasts to be unbiased, it would be necessary for the forecasting errors to be evenly distributed between positive and negative errors.

The following graphs shows that the RBA second year forecasts have consistently overestimated forecast inflation and that the cumulative error is significant. Unbiased inflation estimates would require the cumulative error to be zero.

Figure 5. RBA Second Year May/November Statement of Monetary Policy Forecast Errors since 2009[5].

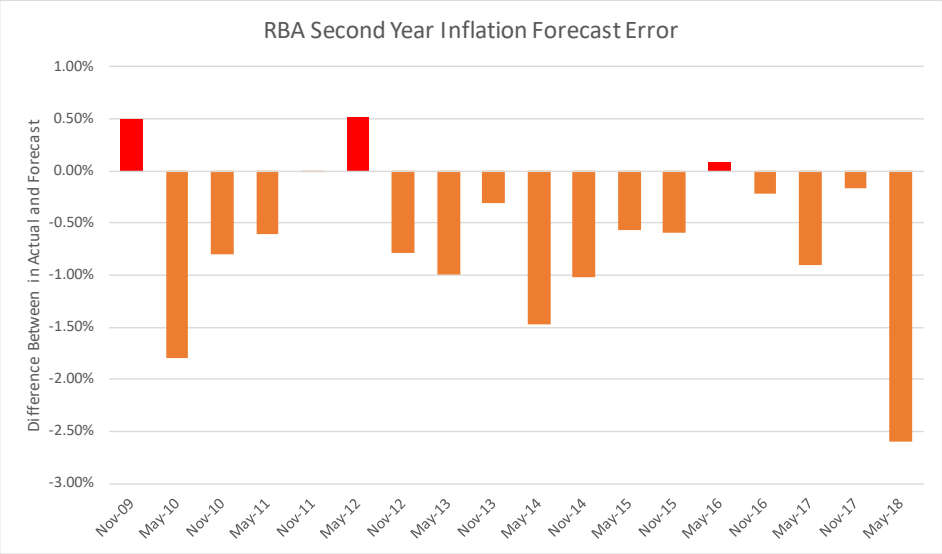
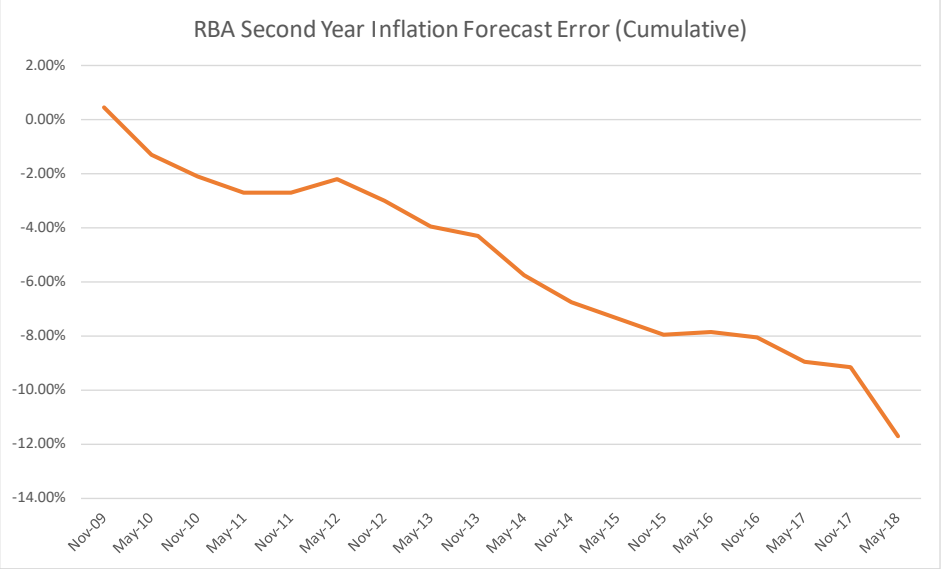


Figure 6. RBA Second Year May/November Statement of Monetary Policy Forecast Cumulative Error since 2009



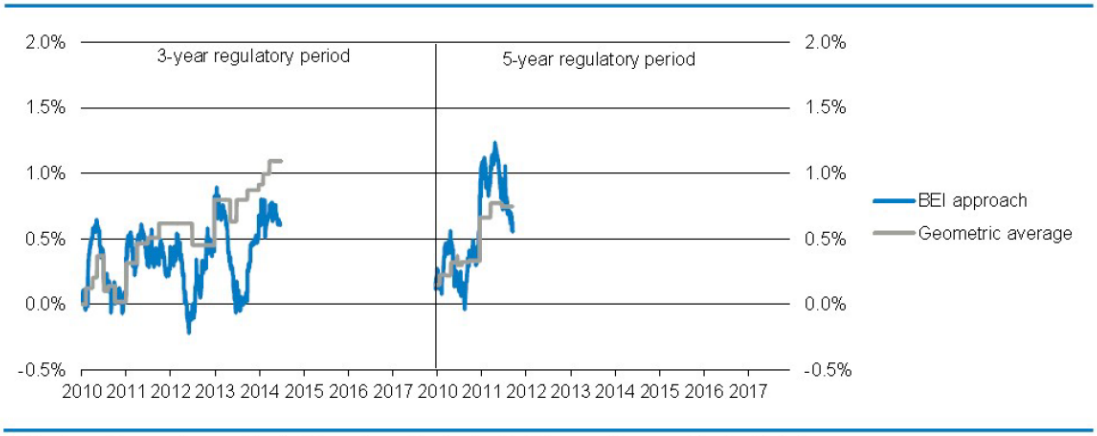
Noting the reliability of the RBA second year forecasts, it calls into question the reliability of the AER's underlying assumption that inflation reverts to the mid-point of the RBA target band strictly by year 3. Ongoing continued reliance on this assumption will systematically overestimate the market expectations for inflation and under estimate the real rate of return to investors in regulated infrastructure.

The concerns regarding under compensation from the use of the mid-point of the RBA target range for medium-term inflation expectations is demonstrated in IPART's analysis of the difference

[5] For example, the May 18 SoMP forecast for inflation for the period of June 19 to June 2020 are compared to actual inflation outcomes for that period,

between actual CPI inflation and the inflation estimates produced by the BEI method. The analysis shows that over a three-year period, the BEI method produces lower forecast errors, but the differences are comparable at five years.

Figure 7. IPART's Analysis of Realised Forecast Errors using the BEI and geometric average methods(%)[6]



Note: A positive number on the right-hand panel indicates that the model over-estimated inflation.

Aurizon Network has expanded on this analysis to evaluate the reliability of each method by forecasting inflation expectations for a four-year period using the geometric average of the RBA's 2 year CPI forecasts from the November and May Statements of Monetary Policy (**SoMP**) and 2.5% for years 3 and 4. The inflation expectations for inflation swaps and the BEI method are then obtained from June and December averaging periods for the May and November forecasts respectively. The inflation forecast estimates are then compared against the actual average annual CPI outcome for that four-year forecast period.

Table 1. A comparison of 4 Year Geometric Average and Market Based Inflation Forecast Methods

SoMP	Forecast Period	Geometric Average	Inflation Swaps	BEI Method	Actual CPI Outcomes
Nov-09	Dec 09 – Dec 13	2.44%	2.64%	2.61%	2.67%
May-10	Jun 10 – Jun 14	2.74%	2.88%	2.80%	2.54%
Nov-10	Dec 10 – Dec 14	2.68%	2.90%	2.74%	2.41%
May-11	Jun 11 – Jun 15	2.62%	2.87%	2.85%	2.03%
Nov-11	Dec 11 – Dec 15	2.56%	2.65%	2.38%	2.09%
May-12	Jun 12 – Jun 16	2.62%	2.56%	2.00%	1.98%
Nov-12	Dec 12 – Dec 16	2.50%	2.58%	2.43%	1.91%
May-13	Jun 13 – Jun 17	2.50%	2.41%	1.89%	1.87%
Nov-13	Dec 13 – Dec 17	2.36%	2.48%	2.22%	1.70%
May-14	Jun 14 – Jun 18	2.62%	2.60%	2.31%	1.64%
Nov-14	Dec 14 – Dec 18	2.50%	2.24%	1.80%	1.71%

[6] IPART (2017) Final Report: Review of our WACC Method, February, p.108

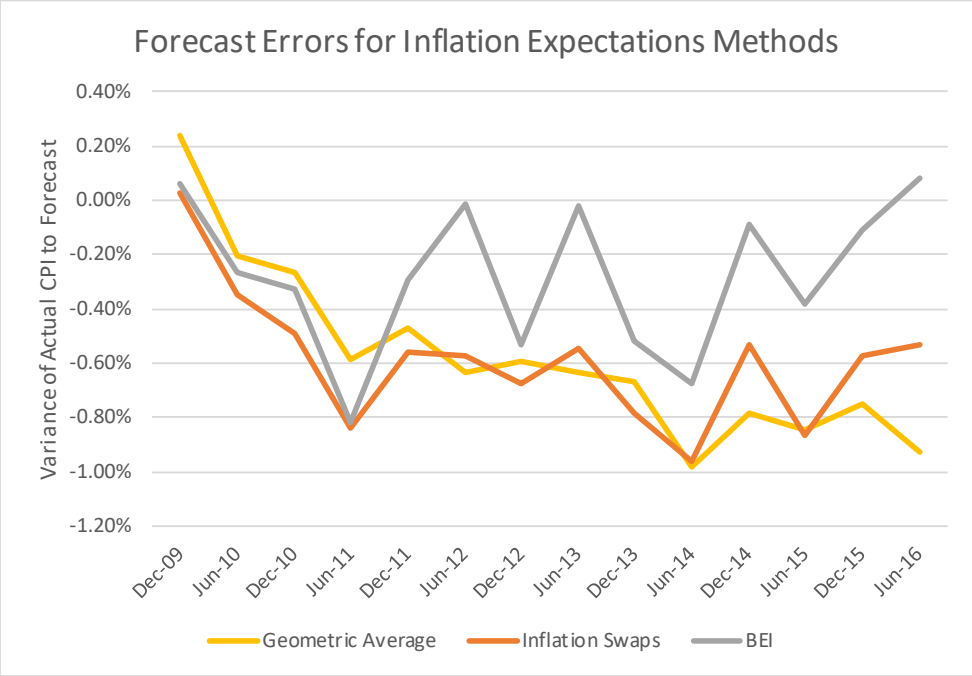
May-15	Jun 15 – Jun 19	2.50%	2.52%	2.03%	1.66%
Nov-15	Dec 15 – Dec 19	2.50%	2.33%	1.86%	1.75%
May-16^	Jun 16 – Jun 20	2.24%	1.84%	1.23%	1.31%
Cumulative Error		-8.10%	-8.23%	-3.88%	
Root mean square error		0.66%	0.63%	0.39%	

^ Inclusive of June 2020 CPI release.

Sources: ABS Series ID A2325847F, RBA: Indicative Mid Rates of Government Securities RBA: Statement of Monetary Policy, Bloomberg

The analysis shows that over a seven-year period the BEI method materially outperformed the geometric average method. The errors are plotted in the Figure 8 and the data in Table 1 shows that BEI had the lowest cumulative error and the lowest root mean square error for medium term inflation forecasts. This indicates that a hybrid approach of combining the BEI 4-year forecast with another measure of longer-term inflation expectations would be superior to the AER's current approach if the AER was to reject the use of BEI for a ten-year term.

Figure 8. Variance of Forecast to Actual Inflation Outcomes (Nov 09 – May 16)



Aurizon Network analysis

Are longer term market expectations still anchored at 2.5%?

The protracted under performance of CPI relative to the RBA target range since 2014 is also likely to influence market expectations of the prospects of inflation not only returning to mid-point but then exceeding it for the current approach to inflation estimation to be credible.

The longer-term inflation expectations are also likely to be lower than the midpoint of the RBA target band due to:

- changes in the monetary policy framework in 2016; and

- the long-term sustainability of the target given the benchmark targets of central banks.

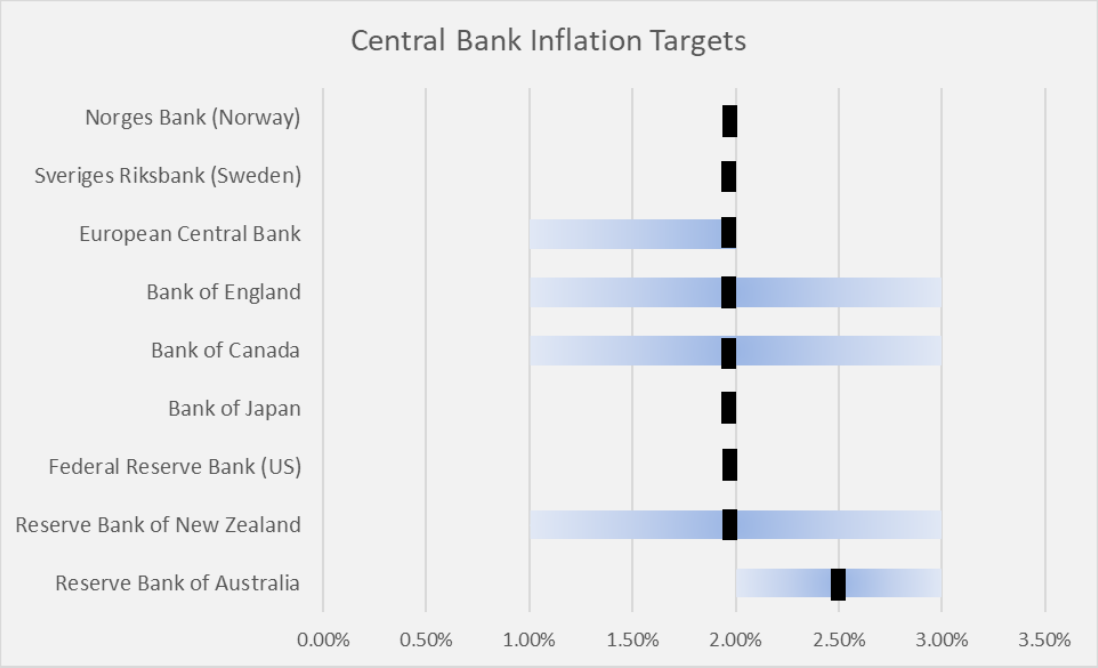
In respect of the monetary policy objectives, there was a change in the relevant provisions of the agreement on the monetary policy framework from 2013 as follows:

> *October 2013 Statement*
>
> *In pursuing the goal of medium-term price stability, both the Reserve Bank and the Government agree on the objective of keeping consumer price inflation between 2 and 3 per cent, on average,* ***over the cycle***
>
> *September 2016 Statement*
>
> *Both the Reserve Bank and the Government agree that a* ***flexible medium-term inflation target*** *is the appropriate framework for achieving medium-term price stability. They agree that an appropriate goal is to keep consumer price inflation between 2 and 3 per cent, on average,* ***over time****.*

The key change is the expectation that the inflation target, whilst important, need to be achieved in in the context of meeting the broader economic objectives, such as growth and employment. Similarly, the change from 'over the cycle' to 'over time' can be reasonably interpreted by market participants that extended periods of inflation outside of the band could occur given the relevant period for time is not specified. This is also consistent with the recent RBA commentary that it doesn't expect CPI to return to the mid-point for some time.

In terms of inflation targeting regimes, the RBA's target is higher than the central bank benchmarks as shown in Figure 9. This suggests that a constant real exchange would be more consistent with a longer-term inflation expectation closer to 2%.

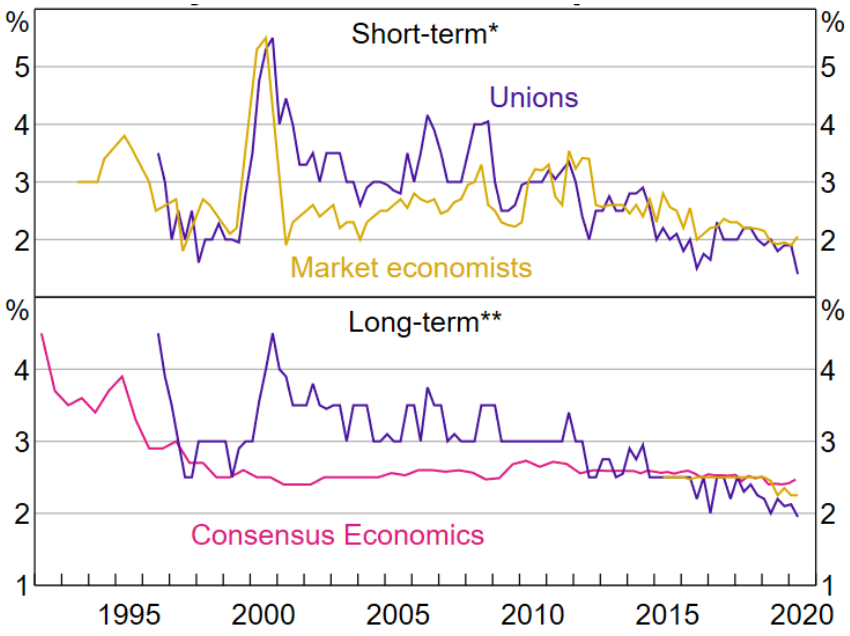
Figure 9. Central Bank Inflation Targets



Source: Central Bank Policy Statements

The change in monetary policy statement and current economic conditions has resulted in a downward drift in longer-term inflation expectations as shown in figure 10. This is also consistent with the longer-term performance of CPI which as averaged only **2.24%** for the period of June 1996 to March 2000 when the CPI figure for the September 2000 quarter is reduced from 3.8% to 0.8% consistent with the RBA's own adjustment to remove the effects of introducing GST.

Figure 10. Survey-based Inflation Expectations[7]



* Over the year ahead

** Average over the next five to ten years for market economists and unions; average over six to ten years in the future for Consensus

Sources: Australian Council of Trade Unions; Consensus Economics; RBA; Workplace Research Centre

The inherent challenge is that past CPI data does not provide information relevant to whether inflation expectations have been de-anchored or re-anchored to a lower point. The sustained materiality of the spread between the estimates obtained from the AER's geometric approach and the BEI method suggests this is likely to have occurred and the continuation of the current approach may not be empirically supported by studies undertaken after 2018. This supports de-anchoring when inflation persists below the central bank target such as in Europe and Japan.

Relative congruence is dependent on aligning the market determined nominal rates with the same market participant's formation of expectations of inflation.

Aurizon Network considers that the Issues Paper summation, i.e. that relative congruence should be assessed on the basis of whether the measure closely with 10-year market expectations of inflation, does not consider important aspects of congruence including:

- the extent to which the formation of those expectations aligns with the information relevant to the determination of nominal rates; or

[7] RBA (2020) Statement of Monetary Policy, May

- whether the market participants who determine the nominal rates are also the parties relevant to the formation of inflation expectations.

These points are important as the role of the inflation expectations is to determine the real risk-free rate from nominal rates. As nominal rates are a function of real rates and expected inflation, it is only the expectations of market participants in the market for nominal bonds that will be relevant to the determination of market expectations of inflation and therefore, the real risk-free rate.

The RBA and survey-based approaches are also subject to material timing mismatches between the determination of nominal interest rates and the information prevailing when the forecasts or surveys where undertaken.

Similarly, to the extent that market economist expectations are established using economic models calibrated with historical economic data and relationships with strong mean reversion assumptions, then the reliability of the subsequent survey results are questionable.

These factors do not appear to have been given enough weighting in the assessment of relative congruence undertaken in the report prepared for the AER by Deloitte Access Economics[8].

Aurizon Network's hybrid nominal/real regulatory financial model may better align to the review objectives

Aurizon Network has no direct interest in the regulatory financial model used by the AER in regulating energy utilities. However, as a regulated infrastructure provider Aurizon Network considers its regulatory financial model partially addresses the issues associated with the challenges of accurately and precisely determining the market expectations for inflation.

The market expectation for inflation is not a firm specific parameter and cannot be estimated with the same degree of accuracy as the nominal risk-free rate to derive the real risk-free rate with the same level of precision. This represents a model risk that cannot be adequately managed by either consumers or network owners. Therefore, there is no clear efficiency or equity basis for which party should assume that risk.

Table 2 summarises the difference between the AER's post tax revenue and RAB roll-forward approaches with those used in Aurizon Network's regulatory financial model.

Table 2. Comparison of AER and Aurizon Network Regulatory Financial Models

	AER Approach	Aurizon Network Approach
PTRM (at determination)	Price and Revenue estimated on nominal WACC.	Price and Revenue estimated on nominal WACC.
	RAB Escalated by Forecast Inflation	RAB Escalated by Forecast Inflation
	Deduct expected RAB inflation from cash flows	Deduct expected RAB inflation from cash flows

[8] Deloitte Access Economics (2020) Review of the regulatory treatment of inflation: A report prepared for the Australian Energy Regulator, June.

Annual Pricing Process	Adjust smoothed revenue to reflect actual inflation (CPI outcomes) within the regulatory period. This involves replacing the estimate of expected inflation for within-one regulatory period cash flows.	No adjustment for out-turn inflation for annual allowable revenue or tariffs during the regulatory term.
RFM	Include actual inflation in the RAB roll forward. This involves replacing the estimate of expected inflation for all regulatory period cash flows	Include actual inflation in the RAB roll forward for determination of opening asset value for next regulatory period.

The key difference between the two models is that Aurizon Network does not adjust revenues for out-turn inflation during the regulatory period but maintains the real value of the RAB over time. This is effectively a hybrid model which:

- targets nominal cash flows over the regulatory period to align with nominal debt funding costs estimated on an 'on the day' approach; and
- maintains equity investors real value of invested capital.

In respect of targeting a real return on equity, this model provides partial inflation forecast risk sharing between Aurizon Network and its customers. For example, to the extent that inflation is over-estimated and cash flows are suppressed through the deduction of inflation this is partially offset by a higher return on and off capital on the higher indexed RAB value later in the regulatory term. Most of the inflation forecast risk is retained by the regulated business.

This is potentially a model that the AER may wish to consider in respect of application of a hybrid model and it may be simpler to implement than the split RAB approach discussed in the Issues Paper. However, it is not an adequate substitute for determining the most reliable and accurate estimate of inflation expectations and a hybrid model should not be implemented to justify retention of the current approach to estimating market expectations of inflation.

Should you have any questions in relation to this submission or would like to discuss aspects of Aurizon Network's regulatory financial model further, please contact Dean Gannaway at [redacted]

Kind regards,

[redacted]

Jon Windle
Manager - Regulation
Aurizon Network