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Sebastian Roberts
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Australian Energy Regulator
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Dear Sebastian

Submission on the impact of capitalisation on benchmarking

Essential Energy welcomes the Australian Energy Regulator's (AER's) examination of the impact of differences in capitalisation practices as an important step in improving the benchmarking of distribution network service providers (DNSP's). We appreciate the opportunity to provide a submission on this issue.

We agree with the AER that:

- there are differences in capitalisation practices between DNSPs
- these differences can lead to differences in operating expenditure ("opex") and capital expenditure ("capex") unrelated to true efficiency, and are likely to have a material impact on the AER's benchmarking results for opex
- it is therefore important to address and account for the different capitalisation practices of DNSPs in the AER's benchmarking analysis – so the benchmarking results more truly reflect differences in DNSPs' opex efficiency, not other factors such as differences in capitalisation practices.

The AER has stated it currently favours applying an operating environment factor (OEF) adjustment to the target efficiency score for each DNSP, based on frozen 2014 cost allocation methodologies (CAM's) and a mix of opex/capital ratios - the 'ex-post approach'.

Essential Energy suggests that there are two other feasible approaches that should be explored further:

- adding an explanatory variable to the econometric benchmarking models that directly captures capitalisation practices - the 'econometric approach'
- obtaining efficiency scores on the basis of a common opex/capital ratio applied to all businesses prior to undertaking the benchmarking analysis - the 'ex-ante approach'.

In Attachment 1 we present analysis undertaken for us by Frontier Economics on each of these approaches, their respective advantages and disadvantages, benchmarking efficiency scores, and how they compare to the status quo.

The following ranking of methodologies shows our preference for how the differences in capitalisation practices should be captured for benchmarking DNSPs:

1. econometric approach
2. ex-ante approach
3. ex-post approach.

We consider that the AER's proposed approach of applying an ex-post OEF adjustment for capitalisation differences has weaknesses relative to the other two approaches, however it would also be preferable to the status quo.

If you have any queries in relation to this submission, please contact [redacted] on [redacted] or via [redacted].

Yours sincerely

Chantelle Bramley
Executive General Manager Corporate Affairs

Evaluation of options for addressing the impact of differences in capitalisation practices on the AER's benchmarking analysis

Summary

Our first observation is that all three approaches discussed are feasible. This is demonstrated by **Table 1**, which summarises the efficiency scores obtained by implementing the three approaches. Our second observation is that all of the approaches have some limitations.

In view of this evaluation, we consider that adding an explanatory variable to the econometric opex cost function benchmarking models that directly captures capitalisation practices would best account for differences in capitalisation practices in the AER's benchmarking analysis. This econometric approach has two key advantages: (1) it takes capitalisation practices into account when estimating the opex efficiency of the Australian DNSPs, and (2) it does not impose a common opex/capital ratio; instead, it determines the efficiency of each DNSP conditional on its opex/capital ratio. It is also the simplest approach to implement, requiring only a minor modification to the AER's existing benchmarking models. The data availability limitations noted by the AER for this approach have been resolved, and explained in detail further below.

The main potential limitation of this approach is that the opex ratio variables added to capture capitalisation practices may not be independent of opex (i.e. not exogenous), since changes in opex could influence the opex ratios. This could lead to biased estimates. However, by taking the average of these variables over a long period, any dependence of the opex ratios on opex would be greatly reduced. Moreover, the same opex ratio variables are used in all three approaches and hence all three approaches are subject to this potential limitation.

If the econometric approach is not accepted by the AER, then we consider the ex-ante approach, with amendments as proposed below, to be the next best approach. It has the advantage that the benchmarking models are estimated after opex has been modified to take account of capitalisation practices and hence the estimated efficiency scores are more comparable across DNSPs than the ex-post approach. A possible limitation of the ex-ante approach is that it uses a common opex/capital ratio to make the modifications to opex, and the efficiency scores are likely to be sensitive to the choice of the common ratio.

We consider that the AER's proposed approach of applying an ex-post OEF adjustment for capitalisation practices has weaknesses relative to the above two approaches. The ex-post approach relies on benchmarking models that do not make an allowance for capitalisation practices, so it is likely to suffer from omitted variable bias, resulting in misleading estimates of DNSPs' efficiency scores. Another possible limitation is that, like the ex-ante approach, it uses a common opex/capital ratio when making the ex-post adjustment. Nevertheless, it would be an improvement on the status quo and clearly preferable to doing nothing.

Econometric approach - Adding an explanatory variable to the econometric benchmarking models that directly captures capitalisation practices

The econometric approach is discussed in Section 4.2 of the Consultation Paper. The AER states that this option has theoretical appeal but due to a lack of comparable capital data for the Ontarian DNSPs it is not feasible. We agree with the AER that the econometric approach has theoretical appeal. However, contrary to the AER's assessment, we found that data is available from the Ontario Energy Board (OEB) that enables the annual user cost of capital (AUC) and totex to be calculated for each Ontarian DNSP in the sample used in the 2021 Annual Benchmarking report, with the exception of 2020.[1] This means that the two opex/capital ratios used by the AER in its recent determination for Jemena can be computed for each of the Ontarian DNSPs. Hence, the econometric approach is feasible and merits further investigation.

Opex efficiency results obtained using the econometric approach are shown in the column headed "Econometric approach" in **Table 1** below. These efficiency scores were generated by re-estimating the AER's econometric benchmarking models for opex using data for the 2006 to 2020 and 2012 to 2020 sample periods,[2] after adding either the opex/total cost ratio or the opex/totex ratio to the model specification.[3] The efficiency score for each DNSP in the table is the average of the efficiency scores obtained using the two different versions of the opex ratio. We present

[1] https://www.oeb.ca/ontarios-energy-sector/performance-assessment

[2] Observations for Ontario for 2020, for which the opex ratios could not be calculated, were excluded from the estimation sample.

[3] The opex ratios can be added to the model specification either as ratios themselves or as logarithmic of the ratios. The efficiencies reported here are for the logarithmic form; however, the results for the specification with the ratios themselves are virtually identical. The estimated coefficients on the ratio variables are highly statistically significant (prob-value = 0.000) for almost all the models estimated.

these results in this submission as a 'proof of concept' to demonstrate that the econometric approach is feasible in practice.

The key advantages of the econometric approach are that:

- The efficiency scores it generates take account of differences in capitalisation practices. This guards against the possibility that a DNSP whose capitalisation practices lean towards reducing opex is assessed as being opex efficient.
- There is no need to apply a common opex/capital ratio to all the businesses. In effect, the econometric model assesses each DNSP's efficiency relative to other businesses with a similar opex/capital ratio.
- It is very simple to implement. It only requires a very minor modification to the specification of the econometric models – all subsequent calculations are the same as in the current approach.

A possible limitation of the econometric approach is that the opex ratio used in the modified econometric models may not be independent of opex (i.e. not exogenous), since changes in opex could influence the opex ratio. This could lead to biased estimates. Any concerns about lack of exogeneity are, however, mitigated by taking the average ratio over a long time period. For the purposes of the analysis presented in this submission, we have used the average ratio over the period 2006 to 2020 for each DNSP for the long sample models, and the average ratio over the period 2012 to 2020 for each DNSP for the short sample models. Moreover, on page 6 of its Consultation Paper, the AER concludes that for the purposes of assessing opex efficiency, capitalisation practices can be treated as if they are exogenous. We are using the same average ratios to capture capitalisation practices that the AER is considering for its preferred OEF adjustment approach. Hence, any concerns about lack of exogeneity would apply equally to the AER's preferred approach.

Ex-ante approach - Obtaining efficiency scores on the basis of a common opex/capital ratio applied to all businesses

The ex-ante approach is discussed in Section 4.4 of the AER's Consultation Paper. The aim of this approach is to assess the efficiency of DNSPs' opex on a like-for-like basis by making amendments to the opex data prior to undertaking the benchmarking analysis to account for differences in capitalisation practices. Section 3.2 and Table 2 of the Consultation Paper present a partial implementation of this approach, in which the amendments to opex are applied to individual DNPSs one at a time.

The column headed "Ex-ante approach" in **Table 1** shows the efficiency scores for a full implementation of this approach. These efficiency scores were generated by first amending the opex data for the Australian DNSPs[4] to apply a common opex/total cost ratio or opex/totex ratio and then re-estimating the AER's econometric benchmarking models using the same sample as discussed above in the econometric approach. The efficiency score for each DNSP in the table is the average of the efficiency scores obtained using the two different versions of the opex ratio.

The comparator group chosen to calculate the common opex/total cost and opex/totex ratios is the group of all Australian DNSPs. The common ratios were calculated as the customer weighted average of the corresponding ratios for the individual DNSPs, which can be interpreted as industry ratios. Using the Australian DNSPs as the comparator group avoids the need to specify a subgroup of DNSPs prior to estimating the efficiency scores of the DNSPs. It is also more stable over time than using a subgroup of DNSPs deemed to be efficient as the comparator group, since membership of this subgroup can change over time and across benchmarking models.

The key advantage of the ex-ante approach is that the efficiency scores it generates take account of differences in capitalisation practices. This guards against the possibility that a DNSP whose capitalisation practices lean towards reducing opex is assessed as being opex efficient.

The main limitation of the ex-ante approach is that a common opex/capital ratio needs to be applied to all the businesses. The results are likely to be sensitive to the choice of this common ratio. Since the opex/capital ratio for a given DNSP is the result of both its cost allocation method and allocative efficiency trade-offs between opex and capex, care should be taken in deciding on the appropriate comparison group for determining the common opex/capital ratio.

Ex-post approach - Applying an OEF adjustment for capitalisation using opex/capital ratios

The ex-post approach of applying an OEF for capitalisation using opex/capital ratios is discussed in Section 4.1 of the Consultation Paper. It is the AER's initial preferred approach to account for differences in capitalisation practices.

[4] Given that data is available to calculate the opex/total cost and opex/totex ratios for the international sample for most years, the common opex/capital ratio could also have been applied to the whole sample and not just the Australian DNSPs.

Since the OEF adjustment is made after the benchmarking analysis, we refer to this approach as the ex-post approach.

Moreover, since the adjustments for capitalisation practices in the ex-post approach are made after the benchmarking analysis, they have no impact on the efficiency scores. Hence, the efficiency scores shown in **Table 1** in the column headed "Ex-post approach" are the same as the scores shown in the "Status quo" column, which are the scores shown in the last column of Table 3.4 of Economic Insight's 2021 Benchmarking Report.[5]

The main advantage of the ex-post approach is that it is consistent with the AER's current approach to handling other exogenous factors that differ between DNSPs and influence opex.

There are, however, a number of limitations to adopting this approach:

- The ex-post approach has no impact on the estimated efficiency scores. Hence, a DNSP whose capitalisation practices lean towards reducing opex could be assessed to be very efficient in this approach and be included in the efficient comparison group, even though after adjusting for capitalisation practices it is assessed to be no longer opex efficient.
- The econometric approach discussed above found that the opex/total cost and the opex/totex ratios have a highly statistically significant impact on opex in the benchmarking models. The ex-post approach excludes these significant ratios from the specification of the benchmarking models. Excluding a significant variable from an econometric model is likely to result in omitted variable bias. This could lead to biased estimates of the output elasticities used as output weights in the AER's roll-forward model and misleading estimates of opex efficiencies. A comparison of the status quo efficiency scores and the efficiency scores for the econometric approach in **Table 1** indicates that some of the estimates of the efficiency scores using the current approach (and hence the proposed OEF approach) are seriously biased.
- Since some of the efficiency scores are biased, the 'efficient' DNSPs in the comparator group for making OEF adjustments could be misclassified.
- The proposed ex-post approach also has the same disadvantage as the ex-ante approach in having to apply a common opex/capital ratio to all the businesses. The results are likely to be sensitive to the choice of this common ratio. Since the opex/capital ratio for a given DNSP is the result of both its cost allocation method and allocative efficiency trade-offs between opex and capex, care should be taken in deciding on the appropriate comparison group for determining the common opex/capital ratio.

Results of applying the above approaches

Table 1 summarises the efficiency scores obtained by implementing the three approaches. The "Status quo" column reproduces the scores shown in the last column of Table 3.4 of Economic Insight's 2021 Benchmarking Report.[6] The other columns show the efficiency scores obtained by applying the three approaches. As noted above, the last column in the table shows that the ex-post approach has no impact on the status quo efficiency scores.

To assist in interpreting the results in **Table 1**, **Table 2** presents the opex/total cost and opex/capex ratios used in the analysis, as well as the deviations of each DNSP's ratios from the industry average. Comparison of the two tables indicates that the direction of the deviations of the econometric and ex-ante efficiency scores from the status quo are broadly in line with whether a utility's opex ratio is above or below the industry average. By far the largest deviation from the status quo is for CitiPower, which is consistent with the fact that CitiPower has the lowest opex/capital ratios. For the other DNSPs, the deviations of the average of the econometric and ex-ante scores from the status quo are more modest, with the largest deviation being 3.8 percentage points.

The deviations of the scores for the econometric approach from the status quo are, on average, smaller than those for the ex-ante approach (an average absolute deviation of 2.4 percentages points for the econometric approach versus 4.5 percentage points for the ex-ante approach). However, the average of the efficiency scores across all DNSPs, and the standard deviations, are fairly similar across all three approaches.

[5] There are a few minor differences between the status quo efficiency scores in **Table 2** and the Economic Insights (EI) report. For three of the DNSPs, EI has excluded the results for the translog LSE model due to monotonicity violations. We have not done this so as to maintain comparability across approaches. There are also some minor differences due to rounding.

[6] There are a few minor differences between the status quo efficiency scores in **Table 1** and the Economic Insights (EI) report. For three of the DNSPs, EI has excluded the results for the translog LSE model due to monotonicity violations. We have not done this so as to maintain comparability across approaches. There are also some minor differences due to rounding.

Table 1: Efficiency scores (generated using data for the 2006 to 2020 and 2012 to 2020 sample periods)

DNSP	Status quo	Econometric approach	Ex-ante approach	Ex-post approach
Evoenergy	46.5%	48.5%	52.3%	46.5%
Ausgrid	44.4%	44.8%	41.1%	44.4%
CitiPower	86.2%	71.6%	65.5%	86.2%
Endeavour Energy	60.9%	61.4%	58.0%	60.9%
Energex	59.6%	59.6%	55.3%	59.6%
Ergon Energy	61.3%	58.8%	57.2%	61.3%
Essential Energy	67.6%	68.3%	69.4%	67.6%
Jemena	57.7%	59.3%	62.8%	57.7%
Powercor	98.1%	97.8%	97.5%	98.1%
SA Power Networks	78.8%	82.2%	82.0%	78.8%
AusNet Dist.	65.3%	64.8%	63.3%	65.3%
TasNetworks Dist.	78.7%	75.7%	78.1%	78.7%
United Energy	72.2%	73.8%	76.1%	72.2%

Source: DNSP RIN data, Frontier Economics analysis

Note: To maintain comparability between approaches, no results have been excluded because of monotonicity violations

Table 2: DNSP opex ratios

DNSP	Opex to totex ratio		Departure from industry average (% points)		Opex to total cost ratio		Departure from industry average (% points)	
	2006-20 period	2012-20 period	2006-20 period	2012-20 period	2006-20 period	2012-20 period	2006-20 period	2012-20 period
Evoenergy	47.6%	46.2%	8.9%	6.0%	38.4%	38.5%	3.5%	4.0%
Ausgrid	36.3%	40.2%	-2.5%	0.0%	33.6%	30.8%	-1.3%	-3.7%
CitiPower	30.8%	31.3%	-7.9%	-8.9%	25.2%	26.4%	-9.7%	-8.2%
Endeavour Energy	37.4%	40.4%	-1.4%	0.2%	34.3%	34.1%	-0.6%	-0.4%
Energex	35.9%	40.6%	-2.8%	0.4%	32.5%	32.8%	-2.4%	-1.8%
Ergon Energy	36.1%	38.4%	-2.6%	-1.8%	33.4%	33.3%	-1.5%	-1.2%
Essential Energy	39.0%	42.5%	0.3%	2.3%	38.4%	37.6%	3.0%	3.1%
Jemena	42.7%	41.2%	3.9%	1.0%	40.7%	39.7%	5.8%	5.1%
Powercor	39.5%	37.0%	0.8%	-3.2%	38.5%	38.3%	3.6%	3.8%
SA Power Networks	46.0%	43.7%	7.3%	3.5%	33.9%	36.6%	-1.0%	2.1%
AusNet Dist.	36.9%	36.0%	-1.8%	-4.2%	38.1%	37.7%	3.2%	3.1%
TasNetworks Dist	39.6%	42.4%	0.9%	2.2%	34.6%	34.8%	-0.2%	0.2%
United Energy	44.5%	41.9%	5.7%	1.7%	36.8%	36.1%	1.9%	1.5%
Industry average	**38.7%**	**40.2%**			**34.9%**	**34.5%**		

Source: DNSP RIN data, Frontier Economics analysis

Note: The industry average ratios are the customer weighted averages of the corresponding ratios for the individual DNSPs

Data appendix

Australian DNSPs

Annual user cost of capital (AUC)

To calculate the AUC for Australian DNSPs, several adjustments were made to the Economic Insights (EI) spreadsheet "DNSP AUC calculation (2020).xslx" provided as supporting material for EI's 2021 Benchmarking Report:

To derive the AUC by DNSP/asset category/year, EI sums the Return on Capital, the Return of Capital (depreciation) and the associated benchmark tax liability (tax payable minus the value of imputation credits). In the approach taken here, the tax liability is not included as part of the AUC, that is, the AUC is defined as the sum of the returns on and of capital. Conceptually, the AUC measures the annual consumption of the existing capital stock, where the capital stock is proxied by the Regulatory Asset Base (RAB). The return on and of capital is directly related to the consumption of the RAB; the tax allowance is not. We note that the OEB does not include tax allowances in its measure of the AUC.

To derive the return on capital, EI applies a benchmark weighted average cost of capital (WACC) to the RAB of each asset class. This WACC varies from year to year, though is common across DNSPs (with the exception of the Victorian DNSPs, which have different financial years, and hence a different WACC). EI's WACC results in parameter values that are inconsistent with the prevailing AER rate of return guideline/instrument/decisions. For simplicity, the WACC values in the analysis reported here use RBA data for the cost of debt. However, under the AER's 2018 Rate of Return Instrument, the return on debt allowance is computed by also giving some weight to Bloomberg and Refinitiv data. In principle, the WACC used in the AUC calculations should follow the method actually used by the AER to determine the allowed rate of return (which EI does not appear to be doing). However, for the purposes of demonstrating the feasibility of the different methods, we have adopted a simplified WACC method that makes use of RBA data only. We have adopted the regulatory depreciation values used by EI, but note that the AER should check that the depreciation values used in the AUC calculations align with the depreciation allowances actually set by the AER in past determinations for individual DNSPs.

Capex

Data for capex has been obtained from the EI spreadsheet.

Ontario DNSPs

Data obtained from the OEB enabled AUC and capex to be obtained for each DNSP for the full sample used in the 2021 Annual Benchmarking report, with the exception of 2020. Checks were performed to ensure DNSPs are aggregated correctly by reconciling the opex with the opex in the EI dataset.

AUC

The OEB provides information on the capital cost in the annual benchmarking spreadsheet. This sums the return on and of capital for each DNSP for the year of the spreadsheet.

Capex

Capex is also obtained from the OEB spreadsheets.

New Zealand DNSPs

The New Zealand Commerce Commission (NZCC) provides a database containing disclosure data.

AUC

The data in the NZCC database enables the AUC to be calculated for each DNSP from 2011 onwards, by multiplying the opening RAB value by the midpoint estimate of the vanilla WACC, adding depreciation and subtracting revaluations.

Capex

The data in the NZCC database enables capex to be obtained for each DNSP from 2010 onwards by taking the value of assets commissioned.