# Appendix 2.1: Operating expenditure – base year efficiency

Regulatory proposal for the ACT electricity
distribution network 2024–29

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# 1. Overview

The AER applies a base-step-trend approach to set DNSPs' operating expenditure (opex) allowances over each regulatory period. The AER uses economic benchmarking analysis—principally using four econometric benchmarking models—to assess the efficiency of a DNSP's actual base year opex when implementing the base-step-trend approach.

This Appendix implements the AER's standard benchmarking approach to assess the efficiency of Evoenergy's actual opex in the proposed base year of 2021/22. In doing so, Evoenergy has:

- Implemented the econometric benchmarking models typically used by the AER when assessing the efficiency of a DNSP's base year opex.
- Adopted the historical benchmarking dataset (covering the period 2006 to 2021) used by the AER in the 2022 Annual Benchmarking Report (ABR). However, Evoenergy corrected historical data on Evoenergy's Ratcheted Maximum Demand (RMD) to ensure that:
  - Non-coincident maximum demand is reported consistently over time; and
  - To recognise properly utilisation of dual function assets and the network outputs delivered by those assets, which comprise a significant portion (18 per cent in 2020/21) of Evoenergy's asset base.
- Adopted the same Operating Environment Factors (OEFs) that the AER applied to Evoenergy for the 2019—24 reset. However, Evoenergy has:
  - Updated the costs associated with backyard reticulation; and
  - Proposed a new OEF to take account of the fact that Evoenergy faces materially higher workers' compensation insurance costs than DNSPs in any other jurisdiction in Australia—including the reference DNSPs.
- Accounted for step changes in Evoenergy's vegetation management opex in the base year, which the AER has previously approved as being efficient and prudent, when estimating an efficient level of opex for 2021/22.

The application of this approach results in an estimate of efficient base year opex of $53.7million, 8 per cent lower than Evoenergy's actual base year opex of $58.6 million ($2021/22).[1] However, Evoenergy notes that the estimate of efficient base year opex (i.e., $53.7 million), derived using the AER's benchmarking approach, did not account for differences in capitalisation practices between DNSPs. The AER has determined that:[2]

- There are material differences in capitalisation practices between DNSPs;
- These differences can have a material impact on benchmarking results and affect the comparability between DNSPs within the benchmarking analysis; and
- Some change to account for capitalisation differences must be adopted to ensure that the benchmarking analysis (and, therefore, the assessment of efficient base year opex) is not distorted.

The AER is currently consulting on approaches to account for differences in capitalisation practices. The AER has identified several potential approaches but has not yet made a final determination of which approach it will adopt.

In addition, many shortcomings and limitations are associated with the AER's benchmarking approach. For example:

- The AER's benchmarking models have limited ability to account for the vast intrinsic differences in operating environments faced by different DNSPs. Some aspects of a DNSP's operating environment may change over time, rather than remain static over the

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[1] The base year represents expenditure in 2021/22, adjusted for movements in provisions, the Demand Management Incentive Allowance, and the administration costs associated with the ACT Government's Large Feed in Tariff Scheme (discussed in Attachment 2 Operating Expenditure).

[2] AER, *How the AER will assess the impact of capitalisation differences on our benchmarking Draft Guidance note*, October 2022.

historical period over which the AER performs benchmarking analysis. The limited number of OEFs recognised by the AER and incorporated into the benchmarking analysis is inadequate to allow proper, like-with-like comparisons between DNSPs that would produce reliable estimates of efficient opex.

- The AER's extensive use of post-modelling OEF adjustments, rather than normalisation of costs for differences in DNSP operating environments before the benchmarking models are estimated, are likely to produce unreliable estimates of efficiency for individual DNSPs and potentially misidentify reference DNSPs.
- The AER's benchmarking approach (in particular, its approach of benchmarking opex separately) fails to account for efficient opex-capex substitution choices that DNSPs might make. The AER's indicative preferred approach for accounting for differences in capitalisation practices is not capable of addressing differences in efficient opex-capex investment choices that DNSPs may adopt.
- The AER's benchmarking models continue to suffer from monotonicity violations, even as the dataset available to conduct the analysis has expanded over time. The AER has recently asked its advisers, Quantonomics, to investigate this issue. However, Quantonomics has not been able to identify an approach that would address the problem of monotonicity violations properly.
- The estimated output weights used by the AER in the benchmarking analysis are highly sensitive to the historical benchmarking period applied, vary significantly between the benchmarking models used by the AER, and are influenced more heavily by the data on Ontarian DNSPs than the data on the Australian DNSPs which the AER seeks to benchmark and set allowances for.
- The vast majority of the data used by the AER in its benchmarking analysis relates to data on DNSPs overseas, which operate in very different circumstances to that of the Australian DNSPs. In the dataset used in the AER's 2022 ABR, only approximately 19 per cent of the observations related to Australian DNSPs. The extent to which the results of the AER's benchmarking analysis are driven by the overseas data makes conclusions about the efficiency of individual Australian DNSPs derived from that analysis unreliable.
- When rolling forward the AER's estimate of efficient opex to the base year, the AER's roll-forward model fails to account for step changes in opex that the AER has deemed to be prudent and efficient (e.g., a step change in vegetation management costs incurred by Evoenergy over the 2019—24 regulatory control period).

These limitations, combined with the fact that the results presented above do not account for differences between DNSPs capitalisation practices, means that the AER should not conclude that Evoenergy's actual base year opex was materially inefficient.

# 2. The role of benchmarking and how it is used

The AER uses economic benchmarking analysis to assess the efficiency of DNSPs' actual standard control services (SCS) opex in the base year. If the AER finds no evidence of "material inefficiency" in a DNSP's actual base year opex, then that opex is used as the starting point to forecast the DNSP's efficient opex over the next regulatory period using the 'base-step-trend' approach. If, however, the AER determines that the DNSP's opex is materially inefficient, then the AER's practice is to substitute the DSNP's actual opex in the base year with its own estimate of efficient opex.

The AER's approach to assessing the efficient level of SCS opex in the base year involves the following steps:

1. First, the AER selects a historical period over which it will perform its benchmarking analysis (the historical benchmarking period). The AER currently uses two historical benchmarking periods:
    a. The period from 2006 onwards (i.e., the 'long period'), 2006 being the earliest year for which the AER has Economic Benchmarking Regulatory Information Notice (EBRIN) data that may be used to perform benchmarking analysis; and
    b. The period from 2012 onwards (i.e., the 'short period').
2. Next, for each historical benchmarking period, the AER estimates four econometric benchmarking models that posit a relationship between the DNSP's actual real opex and a number of variables that may explain changes in real opex, including a number of output variables. The specification of these models is outlined in section 4 below. The four econometric benchmarking models the AER estimates are:
    a. A Least Squares Estimation Translog model (LSE-TLG);
    b. A Least Squares Estimation Cobb-Douglas model (LSE-CD);
    c. A Stochastic Frontier Analysis Translog model (SFA-TLG); and
    d. A Stochastic Frontier Analysis Cobb-Douglas model (SFA-CD).
3. The AER uses data on DNSPs from three jurisdictions (the NEM States in Australia, New Zealand, and Ontario) to populate the database used to estimate these four models.
4. The AER uses the results from these benchmarking models to estimate an efficiency score for the DNSP in question (for each historical benchmarking period, and for each model). The efficiency score ranges from 0 to 1 and represents an estimate of the average efficiency of the DNSP over the historical benchmarking period. A score of 1 indicates that the DNSP has achieved maximal efficiency (i.e., it lies on the estimated efficient frontier for the industry).
5. The AER then compares the DNSP's estimated efficiency score to a target score of 0.75, adjusted up or down for Operating Environment Factors (OEFs). OEFs are discussed further in section 5 below. The larger the OEF adjustment, the lower will be the target score.
6. If the DNSP's estimated efficiency score is higher than the adjusted target score, the AER deems that no adjustment to base year opex is required, and the DNSP is considered a 'reference DNSP'.
7. If the DNSP's estimated efficiency score is lower than the adjusted target score, then AER derives its own estimate of efficient opex in the base year, against which the DNSP's actual opex in that year is compared.
8. If the DNSP is not identified as a reference DNSP in step six, the AER estimates a 'period average' level efficient opex for the DNSP by multiplying the DNSP's average real annual opex over the benchmarking period by the difference between:
    a. The DNSP's estimated efficiency score over the period; and
    b. The adjusted target score.

    The AER interprets the resulting figure as an estimate of the efficient level of opex for the DNSP at the midpoint of the historical benchmarking period.

9. The AER then rolls forward the period average level of efficient opex to the base year, taking account of the DNSP's actual growth in outputs[3] and real input costs, and year-on-year changes in productivity, between the midpoint of the historical benchmarking period and the base year.
10. The AER performs steps 4 to 9 for each of the four benchmarking models, for each of the two historical benchmarking periods. As a consequence, the AER derives up to eight different estimates of the DNSP's efficient opex in the base year.[4] The AER then obtains its overall estimate of the DNSP's efficient base year opex by calculating the arithmetic average of the efficient opex estimates for the different historical benchmarking periods, which were derived using the different models. The AER compares this figure to the DNSP's actual opex in the base year. If the AER concludes that the actual opex observed in the base year is materially higher than its estimate of efficient opex in the base year, the AER concludes that the DNSP's actual opex in the base year is materially inefficient. In such instances, the AER replaces the DNSP's actual base year opex with its own estimate of opex in the base year, as the starting point for forecasting opex over the next regulatory control period.
11. Whilst the AER follows the process outlined above in most instances, when assessing the efficiency of DNSPs' base year opex, the AER's assessment process is not a purely mechanistic. The AER may, and does, exercise its judgment when determining whether a DNSP's actual base year opex is efficient or not. In doing so, the AER may have regard to a range of other evidence presented in its most recently published ABR, including the results from:
    a. The analysis of Partial Performance Indicators (PPIs);
    b. Opex Multilateral Partial Factor Productivity (MPFP) analysis; and
    c. Multilateral Total Factor Productivity (MTFP) analysis.

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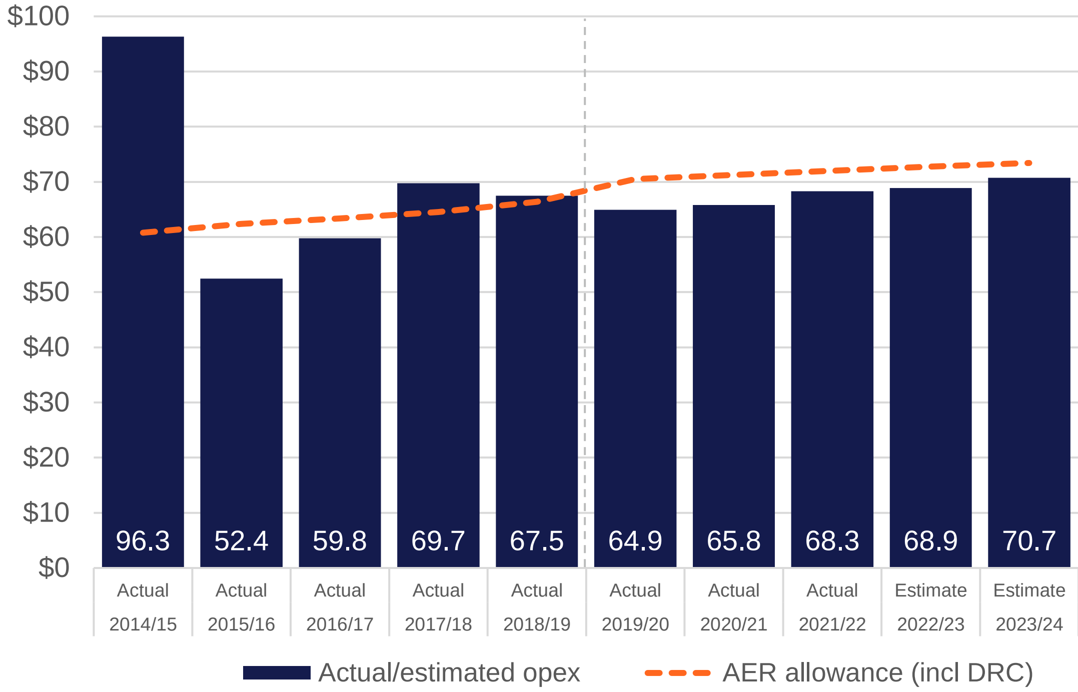
[3] Customer numbers, ratcheted maximum demand, and circuit length. Growth in underground share of circuit length is also applied as an explanatory variable in the econometric benchmarking models.

[4] The AER may use fewer than eight estimates because it excludes from the analysis any of the benchmarking models in any historical benchmarking period that do not satisfy the AER's criterion for monotonicity violations in the estimated elasticities.

# 3. Historical opex performance

Despite operating an increasingly complex network with increasing Distributed Energy Resources (DER), moving towards full electrification across the ACT, and significant cost pressures across the current regulatory period, incurred opex for the 2019–24 regulatory period is expected to be 5.9 per cent below the AER's efficient opex allowance. Evoenergy has typically spent less than the AER's allowance since 2015/16, as shown in Figure 1.

*Figure 1* ***Evoenergy actual/expected opex performance ($ million, 2023/24)***



Source: Evoenergy analysis.

# 4. Econometric benchmarking models

## Model specification

Each of the AER's four econometric benchmarking models specifies opex as a function of three outputs:

- Customer numbers;
- Circuit length; and
- Ratcheted maximum demand (RMD).

Each model also includes the share of underground cables and year-on-year technical change as explanatory variables.

The Cobb-Douglas model specifies that opex is a linear function of the three outputs, with both opex and the three outputs entering the function as logarithms. The translog model extends the Cobb-Douglas model by adding the squares and cross-products of the logarithms of the output variables as additional variables in the model. The translog model is, therefore, a generalisation of the Cobb-Douglas model. Conversely, the Cobb-Douglas model is a special case of the translog model obtained by setting the coefficients on all the squared and cross-product variables in the translog model equal to zero.

The AER's benchmarking models make allowance for opex inefficiency in two different ways. In the LSE version of the models, opex inefficiency is accounted for by adding a separate dummy variable for each Australian DNSP. The estimated coefficients on these dummy variables provide an indication of a DNSP's opex performance relative to the other Australian DNSPs.

In the SFA version of the models, opex inefficiency is represented by a random variable with a truncated normal distribution. After estimating the model, an estimate of each DNSP's inefficiency can be calculated. Fairly sophisticated statistical methods are required to estimate the SFA model and to derive estimates of the inefficiency of each DNSP from these models.[5]

Each of the four econometric benchmarking models listed above (LSE-TLG, LSE-CD, SFA-TLG and SFA-CD) is estimated over two time periods, a long period (from 2006 onwards) and a short period (from 2012 onwards). Hence the AER obtains eight separate estimates of the efficiency score for each DNSP. However, the translog model sometimes produces results inconsistent with fundamental economic theory, referred to by the AER as monotonicity violations.[6] Before using any of the translog models to calculate a DNSP's efficiency score, the AER checks that the model does not have too many monotonicity violations.

## Monotonicity violations

A model violates the monotonicity condition if the model predicts that an increase in any particular output leads to a decrease in opex. Such an outcome is inconsistent with economic theory. The Cobb-Douglas models estimated by the AER do not result in a monotonicity violation. However, for the translog models, monotonicity violations do occur. For the translog models, monotonicity violations can occur for any of the three outputs at any observation in the dataset. If a translog model has too many monotonicity violations, the AER excludes that model when calculating a DNSP's efficiency score. In its 2022 benchmarking report, the AER has used the following criterion to exclude a particular translog (TLG) model when estimating a DNSP’s efficiency score:

> "where a majority of a DNSP’s observations in a given model violate this property … we exclude that model’s efficiency score in calculating that DNSP’s model-average score …. Furthermore, if a model shows monotonicity violations for the majority of Australian DNSPs,

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[5] The estimation of the LSE models by Economic Insights and Quantonomics also allows for heteroscedasticity and autocorrelation in the data. No allowance for heteroscedasticity or autocorrelation is made when estimating the SFA models since no readily available software exists for this task. Another difference between the two approaches to modelling inefficiency is that in the LSE approach, the inefficiency terms only apply to the Australian DNSPs, whereas in the SFA approach the inefficiency term applies to all DNSPs in the sample.

[6] Monotonicity means that an increase in output can only be achieved with an increase in inputs, ceteris paribus.

> then we exclude the model from calculating the model-average efficiency score for all Australian DNSPs even though the property is satisfied for some DNSPs."[7]

Based on this criterion, in the 2022 ABR, the AER excluded the SFA-TLG model for the short period altogether when calculating model-averaged efficiency scores and excluded the LSE-TLG model for the short period when calculating the model-averaged efficiency scores for Ausgrid, CitiPower, Energex, Jemena and United Energy.

Evoenergy notes that monotonicity violations seem to be quite sensitive to the data period used to estimate the models. In the 2021 ABR, using the same criterion, the AER excluded both the LSE-TLG and the SFA-TLG models for the short period altogether due to having too many monotonicity violations for more than half of Australian DNSPs. The AER also excluded the LSE-TLG model for the long period when calculating the model-averaged efficiency scores for CitiPower, Jemena, and United Energy.

We also note that the efficiency scores can differ quite considerably across models. Hence, if a different set of models is used to calculate the efficiency scores for some of the DNSPs compared to other DNSPs, the comparison of efficiency scores between DNSPs is not performed on a like-with-like basis.

## Tests of translog versus Cobb-Douglas specifications

Quantonomics, the AER's benchmarking consultant, has also carried out statistical hypothesis tests of the translog versus the Cobb-Douglas specifications for the models used in the AER's 2022 benchmarking report.[8] The null hypothesis in these tests is that the translog model does not fit the data significantly better than the Cobb-Douglas model. Four such tests can be carried out: SFA-TLG vs SFA-CD for the long period, SFA-TLG vs SFA-CD for the short period, and the corresponding two tests for the LSE models. Table 1 summarises the results of these tests and the monotonicity violations for the translog model in each case.

Table 1 shows that in three of the four tests, the null hypothesis is rejected very strongly, with p-values much smaller than the standard 0.05 criterion. In these cases, the translog model fits the data significantly better than the Cobb-Douglas model. Only in the case of the SFA models for the long period is the null hypothesis not rejected. In this case, the Cobb-Douglas model is a statistically acceptable simplification of the translog model. Tables C.3 and C.4 of Quantonomics's benchmarking report show that, in this case, the elasticities of the Cobb-Douglas model (and hence the output weights) are reasonably similar to the average elasticities of the translog model.[9]

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[7] AER, *Annual Benchmarking Report: Electricity Distribution Network Service Providers*, November 2022, pp.32–33.

[8] Quantonomics, *Economic Benchmarking Report for the Australian Energy Regulator's DNSP 2022 Annual Benchmarking Report*, 17 November 2022.

[9] Elasticities show the percentage change in inputs (opex) required to deliver a one per cent percent change in the outputs.

*Table 1 Comparison of Cobb-Douglas and translog models*

| CD vs TLG models | Wald test p-value | TLG monotonicity violations Aust DNSPs | DNSPs not meeting monotonicity criterion |
|---|---|---|---|
| LSE long | 0.0000 | 0.0% | |
| SFA long | 0.4440 | 0.0% | |
| LSE short | 0.0000 | 42.3% | AGD, CIT, ENX, JEN, UED |
| SFA short | 0.0001 | 65.4% | All except ERG, ESS, SAP, and TND |

Source: Quantonomics, Economic Benchmarking Report for the Australian Energy Regulator's DNSP 2022 Annual Benchmarking Report, 17 November 2022.

Econometricians would typically not use the results from a model when it is rejected in a hypothesis test compared to a more general model. Moreover, in the case of the long period LSE model, there are no monotonicity violations for the Australian DNSPs. It would be difficult to justify the use of the Cobb-Douglas model in this case since the translog model fits the data significantly better than the Cobb-Douglas model, and it has no monotonicity violations for the Australian DNSPs.

For the short period models, in cases where the Cobb-Douglas model is rejected strongly, and the translog model does not meet the monotonicity criterion, one would have to argue that economic principles override statistical criteria when selecting the preferred model. The translog model would then be rejected on economic grounds, not statistical criteria. However, in these cases, it is likely that the Cobb-Douglas model is a poor fit to the data for at least some of the DNSPs due to misspecification of the relationship between opex and the outputs. This could lead to biased estimates of the efficiencies of the DNSPs.

## Output weights

The AER calculates output weights from the estimated coefficients for each econometric benchmarking model.[10] These output weights are used in two ways in the AER's regulatory determinations:

1. To determine efficient opex in the base year for the next regulatory period, the AER ‘rolls forward’ the estimate of efficient opex in the middle of the sample period to the base year to allow for output growth, technical change, and changes in undergrounding between the middle of the sample period and the base year. This is done for each benchmarking model that satisfies the AER's monotonicity criterion. That is, for each DNSP, the same set of models is used in the roll-forward model as in the calculation of efficiency scores. These model-specific estimates of efficient base year opex are then averaged to obtain the final estimate of efficient base year opex for each DNSP.
2. The AER uses a base-step-trend model to determine efficient opex over the regulatory period. Output weights are used in this model to combine the projected growth in the three individual outputs (i.e., customer numbers, circuit length and RMD) over the regulatory period into a combined measure of overall output growth over the period. Output growth forms part of the trend component in the base-step-trend model.

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[10] The benchmarking models are specified so that the coefficients on the output variables can be interpreted as elasticities. The elasticities are then normalised so that they add up to 1 to produce the output weights.

The remainder of this section explains that:

- The output weights used by the AER to estimate an efficient level of opex in the base year differ from the output weights used by the AER to implement the base-step-trend approach when forecasting efficient opex over the next regulatory period. Evoenergy considers that the AER's justification underpinning the inconsistent application of output weights is not clear.
- The output weight estimates vary significantly depending on which econometric model is used to derive those estimates.
- The estimated output weights differ significantly for Australian, New Zealand and Ontarian DNSPs. Since the AER's benchmarking sample is dominated by Ontarian DNSPs, which represents 52 per cent of the sample, the output weights produced by the AER's models are influenced heavily by the Ontarian data and do not necessarily reflect well the output weights for Australian DNSPs.
- The output weight estimates are highly sensitive to the historical time horizon used to derive those estimates. This means that the output weights used by the AER to derive estimates of efficient base year opex are subject to significant sampling error and not stable over time.

These all represent shortcomings or limitations of the AER's benchmarking approach and suggest that the AER should take great care when drawing conclusions about the efficiency or otherwise of a DNSP's base year opex.

## Output weights vary across applications

The output weights used by the AER in the base-step-trend model are not the same as the output weights used in the calculation of the efficiency scores and in the roll-forward model, as shown in Table 2.

*Table 2 Outputs/factors applied to opex efficiency assessment and forecast*

| Outputs/factors | AER's roll forward approach | AER's base-step-trend approach |
|---|---|---|
| Customer numbers | ✓ | ✓ |
| Circuit length (km) | ✓ | ✓ |
| Ratcheted maximum demand | ✓ | ✓ |
| Returns to scale | ✓ | |
| Technical change | ✓ | ✓ |
| Business conditions (undergrounding) | ✓ | |

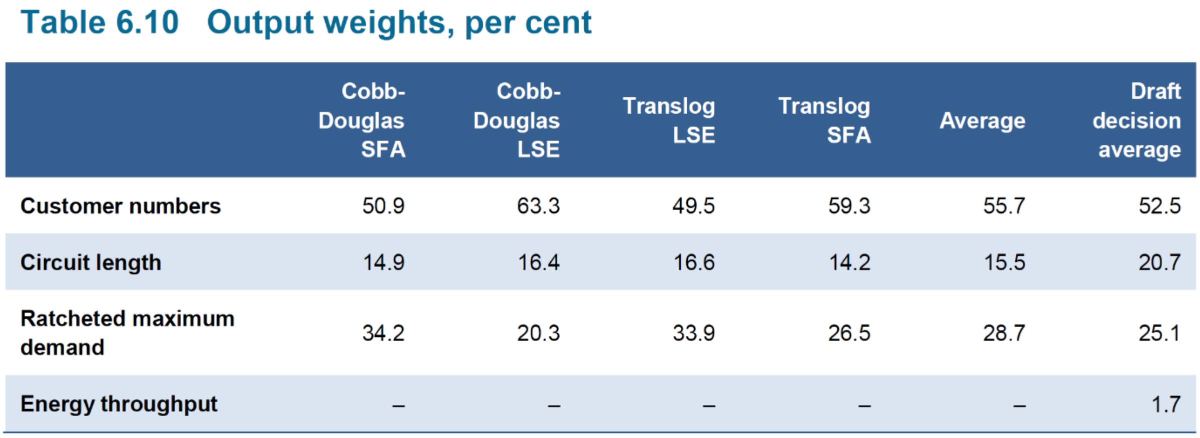
Source: Evoenergy

For the base-step-trend model, the AER uses output weights derived from the four long period models and uses the same output weights for all DNSPs. In the calculation of efficiency scores and the roll-forward model, the AER considers both the long period and the short period models. The short period Cobb-Douglas models are always included in the calculations, but the AER excludes any translog models that do not satisfy the monotonicity condition. Both long period and short period translog models could be excluded if they don't meet the monotonicity criterion, and a model may be excluded for all DNSPs or only for some of them.

For example, in its determinations for the Victorian DNSPs in 2021, the AER used the four benchmarking models for the long period from its 2020 benchmarking report to estimate the output weights for the base-steep-trend model. These output weights, which are shown in Table 3, were used for all the Victorian DNSPs, even though, for Jemena and United Energy, the SFA-TLG model for the long period did not meet the monotonicity criterion and was not used for these DNSPs in calculating their efficiency scores or in the roll-forward model.

None of the short period models was used to determine the output weights used in the base-step-trend model, even though the short period models were used for some of the Victorian DNSPs to determine their efficiency scores and output weights for the roll-forward model.

*Table 3 Output weights used by the AER to forecast output growth in Victorian DNSP determinations*



## Table 6.10 Output weights, per cent

| | Cobb-Douglas SFA | Cobb-Douglas LSE | Translog LSE | Translog SFA | Average | Draft decision average |
|---|---|---|---|---|---|---|
| **Customer numbers** | 50.9 | 63.3 | 49.5 | 59.3 | 55.7 | 52.5 |
| **Circuit length** | 14.9 | 16.4 | 16.6 | 14.2 | 15.5 | 20.7 |
| **Ratcheted maximum demand** | 34.2 | 20.3 | 33.9 | 26.5 | 28.7 | 25.1 |
| **Energy throughput** | – | – | – | – | – | 1.7 |

Source: AER (2021) Final Decision: Powercor Distribution Determination 2021 to 2026, Attachment 6 – Operating Expenditure.

## Output weights vary across models

Table 4 shows the estimated output weights derived from the different econometric models estimated by Quantonomics for its 2022 benchmarking report.[11] The table shows that the output weights vary considerably between the models. For example, the weight assigned to customer numbers ranges from 39.6 per cent to 62.2 per cent, circuit length ranges from 8.4 per cent to 21.6 per cent, and ratcheted maximum demand ranges from 19.6 to 46.1 per cent.

Hence, which models are included in the calculation of efficiency scores and base year efficient opex, and in the base-step-trend model, can have a substantial bearing on the outcome of these calculations. The inclusion or exclusion of particular models for different purposes or for different DNSPs should therefore be done with considerable care. It is particularly concerning that in some cases, the AER uses a different set of models in its calculations for some DNSPs than for other DNSPs.

For example, in the AER's 2022 ABR, the efficiency scores derived from the short period TL-LSE model are included when calculating the across-models average efficiency scores for most DNSPs, but they are not included when calculating the average efficiency scores for Ausgrid, CitiPower, Energex, Jemena and United Energy. For each of the DNSPs when the short period TL-LSE efficiency score is not used to calculate the average efficiency score, the short period TL-LSE efficiency score is lower than the efficiency scores for each of the benchmarking models that is included in calculating the efficiency score. Hence, for each of these DNSPs, exclusion of the short period TL-LSE when calculating the average efficiency scores has resulted in a higher efficiency

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[11] For the translog models, these are average output weights across the whole sample. For the Cobb-Douglas models, the output weights are the same for all DNSPs in the sample.

score than if the short period TL-LSE model had been included when calculating the average efficiency score.

*Table 4 Estimated output weights from econometric benchmarking models*

| | | Short sample | | |
|---|---|---|---|---|
| **Output variable** | **CD-LSE** | **CD-SFA** | **TL-LSE** | **TL-SFA** |
| Customer numbers | 62.2% | 45.5% | 41.1% | 39.6% |
| Circuit length | 18.2% | 20.9% | 21.6% | 20.8% |
| Ratcheted max demand | 19.6% | 33.6% | 37.3% | 39.7% |
| | | **Long sample** | | |
| **Output variable** | **CD-LSE** | **CD-SFA** | **TL-LSE** | **TL-SFA** |
| Customer numbers | 60.9% | 43.1% | 45.1% | 47.6% |
| Circuit length | 15.7% | 10.8% | 17.2% | 8.4% |
| Ratcheted max demand | 23.4% | 46.1% | 37.6% | 43.9% |

Source: Frontier Economics analysis of results produced for Quantonomics' 2022 DNSP Annual Benchmarking Report (not adjusted for Evoenergy's revised RMD data). The short sample covers the period 2012-2021, and the long sample covers the period 2006–2021.

Note: The weights for each model may not sum exactly to one due to rounding.

### Output weights depend on the sample of DNSPs used in the estimation

Estimates of output weights are also very sensitive to the sample used to estimate the output weights. Table 5 presents the output weights derived from the long period translog LSE model for the different jurisdictions in the sample. For the translog models, there is a different output weight for each DNSP and each year in the sample. The output weights in the table are obtained by averaging these DNSP and year specific output weights across all DNSPs in the relevant jurisdiction.

The Table 5 shows that there are very large differences in the output weights for these different sub-samples of the dataset. This is the case, even though all the output weights are derived from the same estimated model which used all the data for the three jurisdictions. If the model were re-estimated using different sub-samples of the data, one could expect similar, or even larger, variations in the estimates of the output weights.

We note that the sample used by the AER to estimate its models is dominated by Ontarian DNSPs, which comprise more than 52 per cent of the sample. Hence, the output weights produced by the

AER's models are influenced heavily by the Ontarian data and do not necessarily reflect well the output weights for Australian DNSPs.

*Table 5 Output weights by country obtained from the TL-LSE long period model in Quantonomics (2022)*

| Country | Proportion of sample size | Customer numbers | Circuit length | Ratcheted max demand |
|---|---|---|---|---|
| Australia | 19.4% | 33.0% | 24.2% | 42.8% |
| New Zealand | 28.3% | 71.2% | 22.3% | 6.5% |
| Ontario | 52.3% | 36.1% | 11.6% | 52.3% |
| Total | 100% | 45.1% | 17.2% | 37.7% |

Source: Frontier Economics analysis of results produced for Quantonomics' 2022 DNSP Annual Benchmarking Report (not adjusted for Evoenergy's revised RMD data).

## Output weights are not stable over time

Table 6 compares the output weights derived from the benchmarking models used in the AER's Determination for Evoenergy in 2019, with the output weights derived from Quantonomics' most recent benchmarking report. For simplicity, only the results for the long sample period are presented. In the 2019 Determination, the long period covered the years 2006 to 2017. The long period used in the most recent benchmarking report covers the period 2006 to 2021.

Note that there is a large overlap in the two sample periods used in the estimations, since the period 2006 to 2017 is common to the two samples. That is, the 2006–2017 sample represents 75 per cent of the 2006–2021 sample. Despite this, there are some startling differences in the estimated output weights between the two samples. Of particular note is the change in the estimated output weight for customer numbers for the CD-SFA model, which was equal to 70.9 per cent using the 2006–2017 sample but declined to 43.2 per cent using the 2006–2021 sample. The reduction in this weight was primarily transferred to ratcheted maximum demand, the weight for which increased from 16.4 per cent to 46.1 per cent. While the changes in the weights over time for the other models are not as extreme, they are nevertheless quite large, in most cases resulting in a proportionate increase or decrease in the weight of at least 15 per cent to 20 per cent. Such large changes in the estimates of the output weights, when there is a 75 per cent overlap in the sample periods, indicate that the output weights are not stable over time. Hence, the output weights calculated from the historical data may not be representative of the output weights that apply over an upcoming regulatory period.

*Table 6 Estimated output weights from econometric benchmarking models used in the 2019 Evoenergy determination and the 2022 benchmarking report*

| | 2006-2017 | | | | |
|---|---|---|---|---|---|
| **Output variable** | **CD-LSE** | **CD-SFA** | **TL-LSE** | **TL-SFA[1]** | **Average across models[1]** |
| Customer numbers | 68.5% | 70.9% | 57.3% | *75.4%* | 65.57% |
| Circuit length | 10.7% | 12.6% | 11.3% | *12.8%* | 11.53% |
| Ratcheted max demand | 20.7% | 16.4% | 31.4% | *11.8%* | 22.83% |
| | **2006-2021** | | | | |
| **Output variable** | **CD-LSE** | **CD-SFA** | **TL-LSE** | **TL-SFA** | **Average across models** |
| Customer numbers | 60.9% | 43.2% | 45.1% | 47.7% | 49.23% |
| Circuit length | 15.7% | 10.8% | 17.2% | 8.4% | 13.03% |
| Ratcheted max demand | 23.4% | 46.1% | 37.7% | 43.9% | 37.78% |

Source: Frontier Economics analysis of results produced for Quantonomics' 2022 DNSP Annual Benchmarking Report and results produced for Economic Insights' 2017 DNSP Annual Benchmarking Report.

Note: the TL-SFA results were not used in the 2019 Evoenergy determination. Hence the TL-SFA model has also been excluded when calculating the average outputs weights in last column. The weights for each model may not sum exactly to one due to rounding.

# Demand and capturing services provided by dual function assets

The data used in the benchmarking and timeseries analysis should be comparable between DNSPs and consistent over time. Evoenergy has identified that the maximum non-coincident demand at the transmission connection point reported in the annual EBRINs has not been reported on a consistent basis, and therefore, cannot be used for timeseries or benchmarking analysis. For example, some years may have reported coincident demand, non-coincident demand on the day of maximum coincident demand, differing basis of calculation methodology between years, or used different datasets between reporting years. Evoenergy considers that demand used in economic benchmarking should correspond to the support that the network provides through the high voltage (HV) transmission system in the ACT and the south-eastern region of NSW as well as local demand.

Evoenergy is registered with the Australian Energy Market Operator (AEMO) as a distribution network service provider.[12] However, since 2012, Evoenergy has owned and operated dual function assets that support the HV transmission system and electricity supply arrangements in the ACT and the south-eastern region of NSW.[13] Evoenergy incurs prudent and efficient expenditure to operate and maintain assets. Expenditure related to dual function assets is included as part of the SCS opex, benchmarked by the AER. Therefore, it is essential that the measured outputs for Evoenergy that relate to utilised assets be adequately included in the AER's benchmarking analysis. Failure to do so would unreasonably and inaccurately suggest that Evoenergy is less efficient than it in fact is.

Dual function assets are defined in the NER as:[14]

> "any part of a network owned, operated or controlled by a Distribution Network Service Provider which operates between 66 kV and 220 kV and which operates in parallel, and provides support, to the higher voltage transmission network is deemed to be a dual function asset"

Dual function assets constitute a material proportion of Evoenergy's asset base, and the AER applies transmission pricing to Evoenergy's dual function assets.[15] The additional services that Evoenergy delivers in supporting the NEM transmission system should be adequately reflected in the AER's benchmarking analysis.

Evoenergy is not directly comparable to other DNSPs in the AER's 2022 ABR as additional services are provided through dual function assets to support the National Electricity Market (NEM) transmission network, which is not consistently captured in the historical data. The benchmarking model specification should reflect the SCS that Evoenergy delivers. Opex is used as an input to the AER's benchmarking analysis, reflecting the distribution and transmission operating costs that Evoenergy's incurs, including expenditure associated with additional regulatory obligations of TNSPs.[16] Additionally, output data used in benchmarking analysis should reflect the services delivered, including support of the transmission system through the utilised capacity of Evoenergy's dual function assets.

In benchmarking, the AER uses the non-coincident summated raw system annual demand (MW) at the transmission connection point (TCP) to measure maximum demand.[17] Non-coincident summated raw system annual maximum demand is defined as:[18]

> "the actual unadjusted (i.e. not weather normalised) summation of actual raw annual maximum demands for the requested asset level (**either the zone substation or**

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[12] AEMO, *NEM Registration and Exemption List*, 20 September 2022

[13] Evoenergy, Evoenergy Distribution Determination 2019 to 2024 Attachment B Pricing Methodology, April 2019; AER, *Framework and approach Evoenergy (ACT) Regulatory control period commencing 1 July 2024*, July 2022

[14] NER 6.24.2

[15] AER, *Framework and approach Evoenergy (ACT) Regulatory control period commencing 1 July 2024*, July 2022, p. 49; AER, *AER - Final decision - Evoenergy distribution determination 2019-24 - Attachment B - Pricing methodology*, April 2019

[16] Examples of these costs are for metering and national emergency management response and responsibilities.

[17] AER, *Electricity distribution network service providers Annual Benchmarking report*, November 2014; RIN definition source: AER, DNSP 2024-29 - Draft Reset RIN - Appendix B - Definitions, 2022, p. 19

[18] RIN definition source: AER, DNSP 2024-29 - Draft Reset RIN - Appendix B - Definitions, 2022, p. 19

> **transmission connection points**) irrespective of when they occur within the year. This maximum demand is not to be adjusted for embedded generation." [Emphasis added.]

Ratcheted maximum demand (RMD), which is an output variable used by the AER in its opex benchmarking models, recognises network utilised capacity and is measured as the highest maximum demand of DNSPs.[19]

The AEMO defines the TCP as: [20]

> "the physical point at which the assets owned by a transmission network service provider (TNSP) meet the assets owned by a distribution network service provider (DNSP), … or transmission connected industrial loads. These may also be known as bulk supply points (BSPs), terminal stations, or exit points, and in the NEM's market metering and settlements processes they are called transmission node identities (TNIs)."

Given that Evoenergy has dual function assets and based on the definition of maximum demand, two different measurements can result, including:

- *Zone substation connection point,* including DNSP to DNSP metering, which captures maximum demand as measured at the zone substation level and includes network load spread across Evoenergy's 16 zone substations and switching stations, as shown in Figure 2.[21] For Evoenergy, maximum demand measured at the zone substation level and the transmission connection point can be considered the same as Evoenergy owns and operates dual function assets - the physical points between Evoenergy's transmission (dual function assets) and Evoenergy's distribution assets can be considered the zone substations. Consequently, for some years, Evoenergy reported non-coincident demand in the EBRIN on the basis that TCP and zone substation refer to the same connection point.
- Alternatively, demand can be measured at the *transmission connection point*, which captures the network load measured at the bulk supply point (TNSP to DNSP metering). Given that Evoenergy is not currently registered by AEMO as a TNSP,[22] Evoenergy may report maximum demand across its four bulk supply points, including the substations for Canberra, Stockdill, Queanbeyan and Williamsdale, shown in Figure 2. Evoenergy has been able to backcast its EBRIN data consistent with this definition of maximum demand from 2014/15 onwards using the metering data available.

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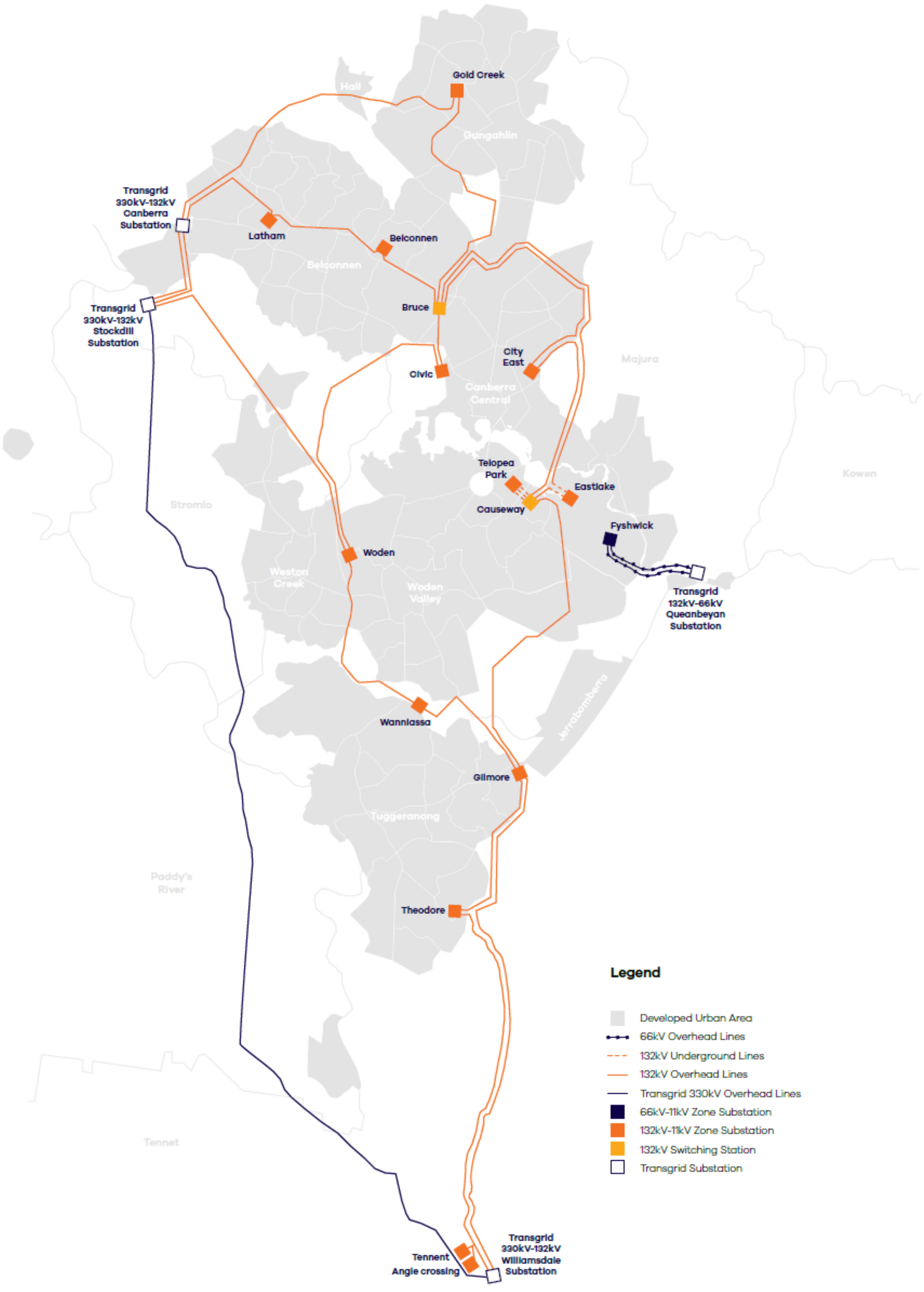
[19] AER*, Annual Benchmarking Report Electricity distribution network service providers*, November 2021, p. 3

[20] AEMO, *Transmission Connection Point Forecasting Methodology*, August 2021, p. 5.

[21] Evoenergy's 16 zone substations include Gold Creek, Latham, Belconnen, Bruce, Civic, City East, Telopea Park, Causeway, East Lake, Fyshwick, Woden, Gilmore, Wanniassa, Theodore, Tennent, and Angle Crossing.

[22] AEMO, *NEM Registration and Exemption List*

*Figure 2 Evoenergy dual function assets map*



Source: Evoenergy, Annual Planning Report, December 2022.

While both demand measures at the zone substation and transmission connection point satisfy the AER's RIN definition, the former does not capture the services that Evoenergy delivers in supporting the NEM transmission system. That is, demand measured at the zone substation level does not reflect services if Transgrid's Williamsdale or Stockdill BSP substation supply is out of service or if Transgrid's Williamsdale to Stockdill 330KV line is out of service, and throughput was fully managed through Evoenergy's dual function assets and distribution network. In benchmarking, the AER use RMD measured at the transmission connection point.

Notably, the non-coincident maximum network demand, as measured across four bulk supply points, produces a different demand level compared to being measured across 16 zone substations. There are several reasons for changes in non-coincident network demand, including:

- Planned or unplanned outages on TransGrid or Evoenergy's transmission network are a driver of changing power flows, including constantly changing power flows on the Transgrid network driven by the NEM and weather conditions. These outages and conditions can substantially shift the sharing of power flows on the Evoenergy transmission network between Canberra, Stockdill and Williamsdale BSP substations. Evoenergy's transmission network must be of sufficient capacity to supply the demand of the ACT and the south-eastern region of NSW and the corresponding maximum non-coincident demands from each of the Transgrid BSPs.
- Over the past decade, there have been two major changes to the Evoenergy transmission network. Since the commissioning of the Williamsdale BSP substation in 2012, there have been regular periods of power flows through the Evoenergy transmission network to support the NSW southern east region over that above the ACT demand. These flows increased the non-coincident maximum demand on the original Canberra DSP substation.
- In 2020, a further change in Evoenergy's transmission network occurred with the commissioning of Stockdill BSP substation. This changed energy flows across Evoenergy's dual function transmission assets, and increased non-coincident maximum demand on the Canberra and Williamsdale DSP substation.

A driver for the network changes was the requirement for Evoenergy under the ACT Transmission Code to provide a transmission network to connect with TransGrid's connection points to supply for single contingency and special contingency events. The ACT Transmission Code states:[23]

> **ActewAGL Distribution (and its successors)**
>
> ActewAGL must plan, design, construct, test, commission, maintain, operate and manage its electricity transmission networks and connection points that supply customers and that will operate at 132 kV and 66 kV, to achieve the following:
>
> > (1) the provision of a 132 kV and 66 kV transmission network to connect with the TransGrid connection points and the ActewAGL substations supplying the distribution network;
> >
> > (2) continue to allow electricity supply at maximum demand to each ActewAGL substation (excluding Angle Crossing and Tennent Substations) immediately and

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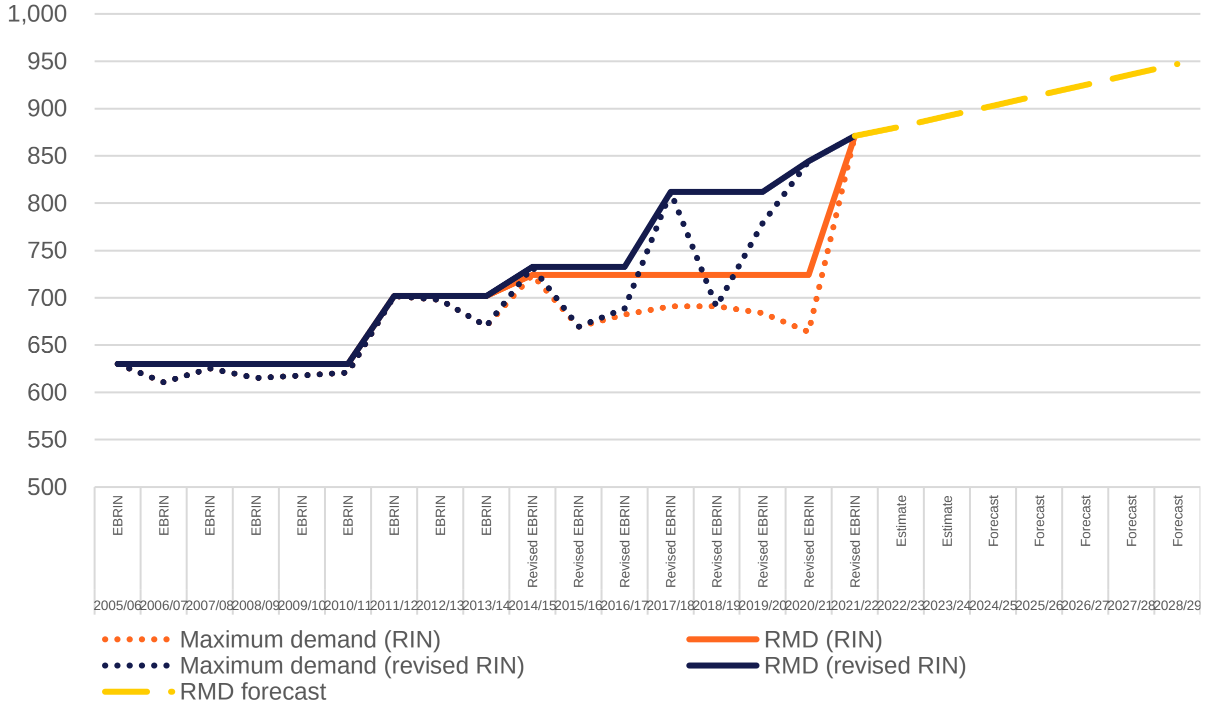
[23] Utilities (Technical Regulation) (Electricity Transmission Supply Code) Approval 2016 (No 1)*, Disallowable instrument DI2016–189, 11 July 2016, p. 5.

automatically after a credible contingency event subject to supply availability from TransGrid;

(3) continue to allow electricity supply from the TransGrid network connection point(s) consistent with sections 4.1.1(1)(c) and 4.1.1(1)(d).

Evoenergy’s historical EBRIN, revised EBRIN, and forecast data is presented below in Figure 3. The RMD, based on corrected data, reflects the network changes described above in 2012 and 2020 in addition to the variability of weather impacts, especially during periods of hot weather.

***Figure 3 Evoenergy non-coincident summated raw system annual maximum demand (MW) at the transmission connection point***



Source:  Evoenergy data.

Evoenergy considers that the measure of demand at the bulk supply point better captures the transmission support services provided to the NEM, reflecting the utilised network capacity that Evoenergy provides to customers, and is consistent with the relevant regulatory definitions. Demand measured at Evoenergy’s bulk supply points also ensures consistency and alignment with other DNSPs across time, which can be used for time series analysis. Given that the outputs used in benchmarking analysis should reflect the inputs used to deliver those outputs, and should not disadvantage DNSPs providing additional support to the transmission system, RMD measured at the zone substation level is not fit for benchmarking purposes because it does not sufficiently capture the outputs delivered by Evoenergy.

Output data used in benchmarking analysis should adequately reflect the services delivered to customers and the support Evoenergy provides to the transmission system. This significantly increases the output on Evoenergy’s network, which is expected to increase further going forward with significant growth in electrification in response to the ACT Government’s climate change commitments and based on consumer feedback.

Appropriately capturing utilised network capacity involves using recast RMD data from 2014/15 onwards, accurately reflecting maximum demand at the transmission connection point, including consistent data over time to reflect the change in energy flows. Evoenergy submits that this would be the most direct and simplest way to ensure that the benchmarking analysis properly reflects the network capacity delivered to customers.

# 5. Operating Environment Factors

## The role of OEFs in the AER's benchmarking analysis

The AER's econometric benchmarking models seek to estimate a cost function that describes the relationship between DNSPs' opex, factors that explain opex, and efficiency. The factors that explain DNSPs' opex include core cost drivers (such as the outputs produced by the DNSPs) and differences in the environment in which the DNSP operate. The AER's econometric cost function models explain as much of the variation (between DNSPs and over time) in opex using these cost drivers, and then seeks to 'split' any unexplained variation between random statistical noise and an estimate of each DNSP's efficiency.

A failure to account for differences in operating environment factors (OEFs) between DNSPs will provide a distorted picture of relative efficiencies by identifying genuine variation in operating conditions as inefficiency. Benchmarking analysis that does not account properly for differences of circumstances between DNSPs will tend to systematically advantage those networks that operate in particularly favourable circumstances and disadvantage those networks that operate in particularly unfavourable circumstances.

The purpose of OEF adjustments is to make DNSPs more comparable to one another, before assessing their efficiency, by accounting for differences in factors that drive opex but are unrelated to efficiency. By improving comparability between DNSPs in this way, the estimate of relative efficiency is improved.

## The AER's standard adjustments for material OEFs

Following a process of consultation that concluded in October 2018, the AER identified a small number of 'material' OEFs that it would have regard to as part of its benchmarking analysis for DNSPs.[24] The AER also published a methodology and model developed by its consultants Sapere and Merz for calculating the adjustments to target efficiency scores for each of those material OEFs.[25]

During that review, the AER identified four material OEFs that it considered applies to Evoenergy:

- Ownership of sub-transmission assets - Costs associated with maintaining cables and lines > 33kV and transformers > 66kV.
- Backyard reticulation - Evoenergy is responsible for ensuring public safety related to backyard lines in the ACT. In carrying out these responsibilities, Evoenergy incurs costs related to the inspection of lines to ensure vegetation clearances are met, issuing notices when trimming is required, follow-up inspections, emergency vegetation management, and additional costs associated with maintaining/accessing assets.
- Termite exposure - Costs associated with termite prevention, monitoring, detection, and treatment of termite damage.
- Occupational Health & Safety (OH&S) regulations - Costs associated with complying with Model Work Health Safety (WHS) laws adopted by all jurisdictions except Victoria.

Evoenergy accepts that all of these OEFs are relevant to its circumstances and has adopted adjustments for all of these OEFs in its benchmarking analysis. However, as discussed below, Evoenergy has reviewed the individual costs that were originally used to estimate the OEF adjustment for backyard reticulation (which were based on information nearly five years old and omitted vegetation inspection costs) and has consequently updated the estimate of that OEF adjustment. Evoenergy has also proposed a new OEF adjustment to account for the fact that workers'

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[24] The AER has typically interpreted an OEF as being 'material' if it has an impact of 0.5% or more (in absolute terms) on the target efficiency score.

[25] Sapere-Merz, *Independent review of Operating Environment Factors used to adjust efficient operating expenditure for economic benchmarking*, August 2018.

compensation insurance costs are materially higher in the ACT relative to other jurisdictions. This proposed OEF adjustment is also discussed in further detail below.

## Bushfire risk management and division of responsibility OEFs

In its most recent determinations for Queensland and Victorian DNSPs, the AER has developed and applied two additional OEF adjustments to account for differences in the:

- vegetation management obligations relating to managing bushfire risk; and
- division of responsibility for vegetation clearance with local councils, road authorities and landowners.

As the 2022 ABR explains, the AER quantified the first of these OEF adjustments by:[26]

> "examining the increase in costs faced by Victorian DNSPs following the 2009 Black Saturday bushfires"

And that:[27]

> "This quantification was based on forecast costs of step changes and opex pass throughs for the Victorian DNSPs that we approved for the 2011–15 period. The increased opex incurred as a result of these new regulations is used as a proxy for the differences in costs of managing bushfire risks in Victoria compared to other states."

As Evoenergy has previously submitted to the AER, this OEF adjustment does not reflect the costs associated with managing bushfire risks but, rather, the impact of bushfire-related regulations imposed on Victorian networks in 2011. Furthermore, Evoenergy has submitted that there have been recent changes to Evoenergy's vegetation management obligations, which are not reflected in this OEF adjustment. The bushfire risk management OEF applied by the AER assumes that:

- Victorian DNSPs have faced a historical cost disadvantage compared to non-Victorian DNSPs, due to more stringent obligations to manage bushfire risk; and
- This assumed cost disadvantage has remained unchanged over time, even though expanded vegetation management obligations in non-Victorian jurisdictions have expanded over time.

The Victorian DNSPs have also contested the materiality of the division of responsibility OEF adjustment applied by the AER.[28]

Evoenergy notes that the bushfire risk management and division of responsibility OEFs have not been subject to broad consultation of the kind undertaken by the AER in 2017/18 when it developed its standard set of OEFs. Rather, these additional OEFs were developed through the revenue resets of a small number of DNSPs, and were therefore, subject to much narrower consultation, feedback, and review by stakeholders.

For these reasons, Evoenergy submits that the bushfire risk management and division of responsibility OEFs should not be applied more widely (including to Evoenergy in the 2024–29 reset) until the AER has consulted more broadly on those OEF adjustments.

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[26] AER, *Annual Benchmarking Report – Electricity distribution network service providers*, November 2022, p. 51

[27] AER, *Annual Benchmarking Report – Electricity distribution network service providers*, November 2022, p. 51

[28] AER, *Annual Benchmarking Report – Electricity distribution network service providers*, November 2022, pp. 51-52.

## Accounting for differences in capitalisation practices

The AER had noted in several previous ABRs that several DNSPs had raised concerns that the AER's benchmarking analysis did not account adequately for differences in capitalisation practices between DNSPs, and that this may be distorting its assessment of efficient opex using that benchmarking analysis.[29]

In its most recent determination for Jemena's electricity distribution network, the AER made an ex-post OEF adjustment for differences in capitalisation practices, when benchmarking Jemena's opex.

Subsequently, in November 2021, the AER commenced a review of its approach to accounting for differences in capitalisation practices between DNSPs. A draft guidance note published by the AER in 2022 concluded that it was necessary to make changes to its benchmarking framework to account for differences in capitalisation practices and shortlisted five options for addressing material differences in capitalisation practices, including:

- Option 1 – Apply an ex-post OEF adjustment for capitalisation to the benchmarking results under the DNSPs' 'frozen' 2014 cost allocation methodologies (CAMs) using opex/capital ratios;
- Option 2 – Adding an explanatory variable to the econometric opex cost function modelling that directly captures capitalisation differences;
- Option 3 – Benchmarking on the basis of DNSPs' current CAMs, with an ex-post OEF adjustment for capitalisation differences;
- Option 4 – Applying a common opex/capital ratio to all DNSPs as a pre-modelling adjustment; or
- Option 5 – Benchmarking on the basis of a fixed proportion of overheads classified as opex for benchmarking purposes

The draft guidance note indicated that the AER's preference was to move away from an approach that involved the use of ex-post OEF adjustments. The AER also indicated that its current preference is to adopt Option 5, noting that this was "an on-balance decision, with each approach having pros and cons" and that it was seeking further stakeholder views on the options it had proposed to address differences in capitalisation practices.[30]

Evoenergy commends the AER for initiating a review on how differences in capitalisation practices should be accounted for in its benchmarking analysis, as this is an important step towards addressing what has historically been a major shortcoming in the process for benchmarking DNSPs' opex. Evoenergy intends to set out its views on the options proposed by the AER in the draft guidance note in a separate submission. Evoenergy also note that the AER's decision on the treatment of capitalisation on benchmarking will have a material impact on the assessment of base year efficient opex; Option 1 applies an OEF adjustment of approximately 10-11 percent to Evoenergy.[31]

Given that the outcome of the AER's consultation process on this matter has not yet been finalised, Evoenergy has not incorporated into the benchmarking analysis presented in this regulatory proposal any of the possible options for accounting for capitalisation differences considered by the AER.

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[29] AER, *Annual Benchmarking Report – Electricity distribution network service providers*, November 2018, p. 3.

[30] AER, *How the AER will assess the impact of capitalisation differences on our benchmarking Draft Guidance note*, October 2022, p. 29.

[31] Taken from the "Results.xlsx" spreadsheet provided by the AER as supporting information.

## Backyard reticulation

Evoenergy has updated the inputs used to derive costs associated with pole inspection and planned and reactive maintenance activities as applied previously by the AER. The revised analysis suggests an OEF of $1.8m, as shown in Table 7 below.

*Table 7 Costs incurred by Evoenergy due to backyard reticulation (2021/22 dollars)*

| Cost category | EN19 total | EN24 total |
|---|---|---|
| Total pole inspection costs | $388,692 | $546,568 |
| Backyard vegetation inspection costs | $442,164 | $751,432 |
| Planned and reactive maintenance activities | $418,881 | $455,580 |
| **Total** | **$1,249,737** | **$1,753,579** |

Source: Evoenergy data.

Around 69,202 of Evoenergy's customers have trees or vegetation in their backyard that encroaches on the electricity network, impacting the security, safety, and reliability of supply. Therefore, Evoenergy undertakes backyard vegetation inspections to ensure that the electricity network and the public are kept safe. Evoenergy sometimes needs to request that customers clear vegetation in their backyard when it is encroaching on the network, which involves inspecting (sometimes Evoenergy has access issues due to locked gates or dogs) and sending letters to ensure that the network remains safe, especially in the context of changing climate and weather events. Sometimes, and unfortunately, Evoenergy customers do not carry out requests to clear vegetation, and Evoenergy incurs a write off for undertaking work which cannot be recovered if a customer refuses. The incremental costs associated with inspecting vegetation encroaching on the network in customer backyards reflect prudent and efficient costs incurred by Evoenergy, which should be included in assessing opex efficiency.

The total additional costs incurred due to backyard reticulation, $1.8 million, represents 4.43% of the ideal efficient base opex, per the Sapere-Merz 2018 methodology over the 2006-21 sample, or 4.19% over the 2012-21 sample. As backyard reticulation does not apply to any of the reference DNSPs, the OEF adjustment for backyard reticulation would therefore be 4.43% for the 2006-21 benchmarking period and 4.19% for the 2012-21 benchmarking period.

## Workers' compensation insurance costs

Evoenergy faces a material cost disadvantage relative to the reference DNSPs due to the high workers' compensation insurance premiums paid by employers in the ACT.

An expert report provided by leading insurance brokers Marsh notes that the ACT workers' compensation scheme is the most expensive scheme for employers in any Australian jurisdiction. Marsh concludes that:

> "Based on the data supplied in this report, Marsh is of the opinion that if ActewAGL Distribution were to be located in a managed fund jurisdiction such as Victoria, the premium

> payable for workers' compensation based on industry and risk would be less than that of the current ACT premium."[32]

Marsh presents data that suggest that workers' compensation premium rates for the electricity industry in the ACT are 2.7 times greater than any other state.[33]

Marsh explains that the higher workers' compensation insurance premium costs faced by all employers in the ACT, including Evoenergy, are due to a number of factors, including: [34]

- unfettered access in the ACT to Common Law, with no thresholds on eligibility and uncapped damages;
- medical costs in the ACT have increased materially more than in other Australian jurisdictions;
- discretion allowed in the *Limitation Act 1985 (ACT)* to extend a 3-year limitation period where it is considered in the interests of justice, whereas this discretion is not extended to other types of personal injury claims (public liability, motor vehicle) in the ACT;
- The *Civil Law Wrongs Act 2002 (ACT)* does not allow a reduction for contributory negligence when there is found to be a breach of statutory duty (e.g., *Work Health and Safety Act 2011 (ACT)*). In contrast to this, other jurisdictions have legislated to allow a reduction for contributory negligence from common law damages;
- the ACT does not have any restrictions on personal injury claim advertising by plaintiff law firms;
- the *Motor Accident Injuries Act 2019 (ACT)* restricts access to entitlements to benefits for workers' compensation applicants, increasing workers' compensation claim costs for Journey claims. Restrictions placed on access to benefits under the *Motor Accident Injuries Act 2019 (ACT)* further reduces the ability for workers' compensation insurers to seek recovery of payments in circumstances where another driver was at fault in an accident; and
- the ACT scheme premium pool is small at around $255 million. By comparison, the NSW premium pool is greater than $3.3 billion. Smaller schemes place insurers under pressure because they do not have the ability to use the scale to manage claims.

As demonstrated by SafeWork Australia data, shown in Table 8 below, the premium rates for workers in the electricity, gas and water supply industry are substantially higher in the ACT than in other states. In 2020/21, the standardised rate in the ACT was more than 2.5 times that in Victoria, at 3.2% of payroll.[35][36]

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[32] Marsh, *Appendix 2.2 Australian Capital Territory Workers Compensation*, 20 December 2022, p. 13.

[33] Marsh, *Appendix 2.2 Australian Capital Territory Workers Compensation*, 20 December 2022, p. 5.

[34] Marsh*, Appendix 2.2 Australian Capital Territory Workers Compensation*, 20 December 2022, p. 2.

[35] SafeWork Australia, *Comparative Performance Monitoring Report 24 – Workers' Compensation Premiums*, 2022, p. 13.

[36] Rates are relatively high in the ACT for most industries presented by Safework in the 24th Comparative Performance Monitoring Report.

*Table 8 Average premiums over 2016/17 to 2020/21 by jurisdiction*

| Jurisdiction | Electricity, gas and water supply premium (% of payroll) |
|---|---|
| ACT | 2.44% |
| NSW | 1.79% |
| QLD | 0.83% |
| SA | 1.25% |
| Tas | 0.86% |
| Vic | 1.23% |

Source: SafeWork Australia, Comparative Performance Monitoring Report 24 – Workers' Compensation Premiums, 2022.

Comparing the average over the five-year period shows that the insurance costs are historically materially higher in the ACT than in other jurisdictions, particularly those in which the reference DNSPs are located.[37]

To quantify the operating environment, Evoenergy has applied the average percentage of payroll in the table above to the labour proportion of costs as used by the AER in opex benchmarking, 59.2 per cent.[38] These yield the OEFs presented in the table below. Comparing to the customer weighted average of the reference firms[39] yields the OEF adjustments presented in Table 9 showing that Evoenergy faces a 0.73 per cent disadvantage due to the high workers' compensation insurance premiums it faces compared to the reference DNSPs. Evoenergy submits that this exceeds the 0.5 per cent materiality threshold adopted by the AER, so it should be included as a relevant OEF adjustment in the AER's benchmarking analysis.

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[37] Historical data prior to FY2017 is not used due to lack of comparability with premiums in the methodology in the latest Safe Work Australia report.

[38] Economic Insights, *Memorandum prepared for the AER on review of reports submitted by CitiPower, Powercor and United Energy on opex input price and output weights*, May 2020, p. 8

[39] CitiPower, Powercor, SA Power Networks, TasNetworks and United Energy

*Table 9 Workers' Compensation Insurance Premium OEF*

| DNSP | OEF (%) | OEF adjustment (%) |
|---|---|---|
| Evoenergy | 1.44% | 0.73% |
| Ausgrid | 1.06% | 0.35% |
| CitiPower | 0.73% | 0.02% |
| Endeavour | 1.06% | 0.35% |
| Energex | 0.49% | -0.22% |
| Ergon | 0.49% | -0.22% |
| Essential | 1.06% | 0.35% |
| Jemena | 0.73% | 0.02% |
| Powercor | 0.73% | 0.02% |
| SAPN | 0.74% | 0.03% |
| AusNet | 0.73% | 0.02% |
| TasNetworks | 0.51% | -0.20% |
| United Energy | 0.73% | 0.02% |
| **Reference DNSPs** | **0.71%** | |

Source: Evoenergy calculations using SafeWork Australia data.

# 6. Refinements to the opex roll-forward approach

## The AER's existing roll-forward methodology

As explained in section 2, if the AER determines that a DNSP is not a 'reference' DNSP, then:

1. The AER uses benchmarking analysis to estimate an efficient level of opex for the DNSP in the middle of the historical benchmarking period (i.e., the 'period average' level efficient opex).

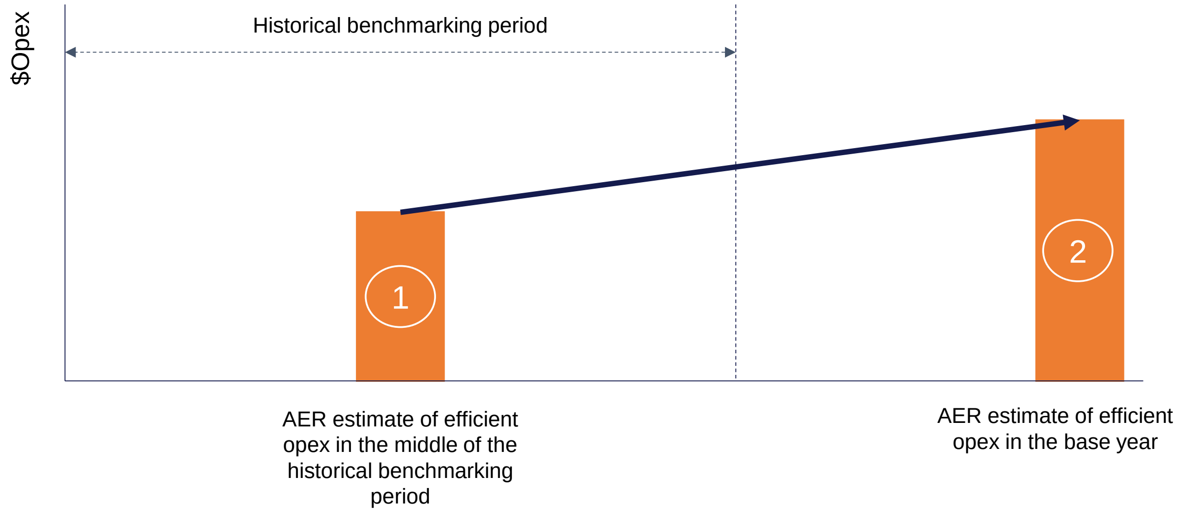
2. The AER then rolls forward the period average level efficient opex using the estimated cost functions for each DNSP (i.e., the estimated econometric benchmarking models that fit a relationship between real opex and drivers of opex) to derive an estimate of efficient opex in the base year.

This opex roll-forward process, which is summarised in Figure 4 below, accounts for (amongst other things) the estimated impact on real opex of:

- observed output growth;
- changes in real input prices; and
- productivity (i.e., technology growth and returns to scale)

over the roll-forward period (i.e., the interval between the middle of the benchmarking period and the base year).

*Figure 4 The AER's opex roll-forward process*



Source: Evoenergy.

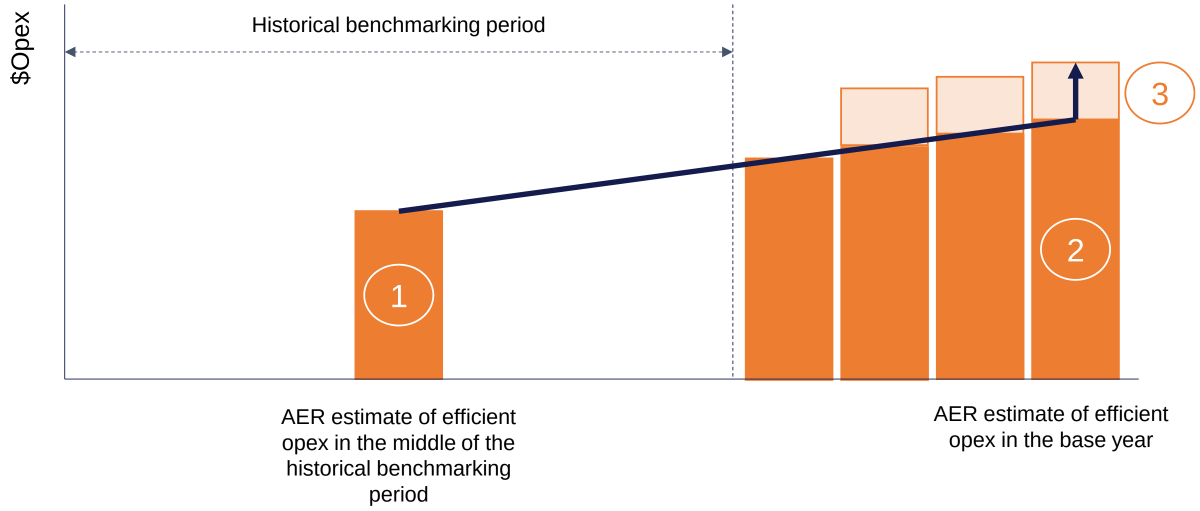
## Incorporating step changes into the opex roll-forward methodology

Importantly, the opex roll-forward process used by the AER does **not** account for **step changes** in prudent and efficient opex that the DNSP may have experienced over the roll-forward period. Evoenergy submits that if the DNSP has faced step changes in efficient costs over the roll-forward period, those step changes should be accounted for in the roll-forward process—for the same reason that the base-step-trend approach includes step changes. Failing to recognise efficient step changes in opex over the roll-forward process would result in the efficient level of opex in the base year being understated.

Figure 5 below presents a stylised example of a DNSP that has faced a step change in efficient opex in its base year, and the two immediately preceding years. As the Figure shows, these step changes could be incorporated very simply into the roll-forward process:

1. The first step would be to estimate the period average level of opex, in the same way the AER currently does.
2. The second step would be to perform the opex roll-forward between the middle of the benchmarking period to the base year — again in the same way the AER currently does; and
3. Finally, if a step change in efficient opex has occurred in the base year, add that step change amount to the rolled-forward opex in the base year.

*Figure 5 Incorporating step-changes in the opex roll-forward process*



Source: Evoenergy.

## Step changes in efficient vegetation management opex faced by Evoenergy over the 2019–24 regulatory period

Evoenergy has faced a step change in its efficient opex over the 2019— 24 regulatory period that is not reflected in the AER's opex roll-forward methodology.

Prior to 2017, Evoenergy was responsible for vegetation management in the bushfire abatement zone and rural. However, in 2017, amendments to the *Utilities (Technical Regulation) Act 2014 (ACT)* were passed, expanding Evoenergy's vegetation management obligations to urban areas.

In recognition of this expansion in Evoenergy's regulatory obligations to manage vegetation in more areas, the AER permitted a step change in Evoenergy's efficient vegetation management costs of $2.4 million ($2018-19) per annum over the 2019— 24 regulatory control period. In allowing this step change, the AER concluded:[40]

> "We are satisfied that the prudent and efficient level of expenditure required to meet Evoenergy's new vegetation management responsibilities is $2.4 million per annum ($2018–19)."

The increase in Evoenergy's opex in response to these expanded regulatory obligations is reflected in the historical data used by the AER to benchmark Evoenergy's costs, and to derive an average efficiency score over the historical benchmarking periods. However, the step change in these costs is

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[40] AER, *Evoenergy Distribution Determination 2019 to 2024, Final Decision*, April 2019, Attachment 6, p. 19.

not accounted for anywhere in opex roll-forward approach used to estimate an efficient level of opex for Evoenergy in the base year. In particular, the step change in efficient opex is not accounted for:

- When rolling forward efficient opex to reflect the observed growth in Evoenergy's outputs;
- In the growth in real input costs over the roll-forward period; or
- In the rate of productivity over the roll-forward period.

Nor does any of the OEF adjustments applied by the AER address this step change in vegetation management costs.

The estimated efficient level of opex for Evoenergy would be underestimated as a consequence of failing to take into account this step change in Evoenergy's efficient opex.

Given that the AER has already approved these costs as prudent and efficient step changes in Evoenergy's opex, we submit that these costs should be included in the estimate of Evoenergy's efficient base year opex. Evoenergy, therefore, proposes to add a step change of $2.7 million ($2022/23) to the estimate of rolled-forward efficient opex for Evoenergy in the base year (i.e., $2.4 million per annum ($2018/19), inflated to the base year).[41] Evoenergy considers that prudent and efficient costs, reflecting regulatory obligations and market conditions not accounted for in other components of the AER's base-step-trend approach, which may considerably evolve from the midpoint of the historical benchmarking period to the base year, should be adequately accounted for in the assessment of opex efficiency.

# 7. Base year efficiency assessment

The AER compares the DNSP's actual opex in the base year to estimates of efficient opex using an econometric roll-forward model. The model accounts for estimated efficiency over the historical period, as well as output growth to the base year. Evoenergy has proposed 2021/22 as the base year for the assessment.

The estimates of efficient opex use the data as used in the 2022 ABR. However, as noted above, Evoenergy has revised RMD data for years 2014/15 through 2020/21, which yields estimated efficiency scores (presented in Table 10 below) and output elasticities that differ somewhat from those presented in the AER's 2022 ABR.

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[41] Evoenergy has used a forecast inflation rate of 6.25% for the 12 months to the end of June 2023 as published by the Reserve Bank of Australia in the November 2022 Statement on Monetary Policy.

*Table 10 Estimated efficiency scores for Evoenergy using the AER's benchmarking models*

| Model | Short (2012-2021) | Long (2006-2021) |
|---|---|---|
| LSE-CD | 46.3% | 48.6% |
| LSE-TL | 44.3% | 43.3% |
| SFA-CD | 51.6% | 48.6% |
| SFA-TL | *52.3%*<br>*(excluded due to monotonicity violations)* | 51.3% |
| **Average** | **47.4% (excl SFA-TL)** | **47.9%** |

Source: Evoenergy calculations.

As shown in Table 10, Evoenergy's efficiency is below 75 per cent in all estimated models. The assessment of base year opex, therefore, proceeds to the roll-forward model. Using the OEFs proposed in the previous sections yields an efficiency target of 71.5 per cent in the short sample models and 71.4% in the long sample models .42 Applying the implied reductions for the sample average and then trending forward based on project output growth to 2021/22 yields the estimates of efficient opex in Table 11 below.

*Table 11 Estimates of Evoenergy's efficient base year opex ($2021/22, 000s)*

| Model | Short (2012-2021) | Long (2006-2021) |
|---|---|---|
| LSE-CD | $47,784 | $53,383 |
| LSE-TL | $46,245 | $48,031 |
| SFA-CD | $53,391 | $54,334 |
| SFA-TL | *$54,558*<br>*(excluded due to monotonicity violations)* | $57,065 |
| **Average** | **$49,140 (excl SFA-TL)** | **$53,203** |

Source: Evoenergy calculations.

The vegetation management step change is then applied, yielding an estimate of $51.7 million using the 2012-2021 sample and $55.7 million using the 2006-2021 sample. The average, $53.7 million, is 8 per cent below the actual 2021/22 opex, $58.6 million.[43]

Evoenergy notes that the estimate of efficient base year opex, derived using the AER's benchmarking approach, does not account for differences in capitalisation practices between DNSPs. The AER has determined that:

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[42] Based on OEF adjustments of 3.2% for both the short and long samples.

[43] Evoenergy's actual opex in 2021/22 has been adjusted to exclude movements in provisions ($0.74 million, $2022), the Demand Management Innovation Allowance approved by the AER for 2022 ($0.40 million, $2022) and the costs associated with administering the ACT Government's L-FiT scheme ($0.51, $2022).

- There are material differences in capitalisation practices between DNSPs;
- These differences can have a material impact on benchmarking results and affect the comparability between DNSPs within the benchmarking analysis; and
- Some change to account for capitalisation differences must be adopted in order to ensure that the benchmarking analysis (and therefore, the assessment of efficient base year opex) is not distorted.

The following section explains that there are many limitations associated with the AER's benchmarking approach. These limitations, combined with the fact that the results presented above do not account for differences between DNSPs in terms of capitalisation practices, means that the AER should not conclude that Evoenergy's actual base year opex was materially inefficient.

# 8. Limitations of the AER's benchmarking analysis

The AER's benchmarking analysis is used to estimate the efficient level of opex in the base year for DNSPs such as Evoenergy, which is a key input into the determination of opex allowances over the next regulatory period. Whilst the AER's benchmarking analysis is informative and important, the AER should recognise that the benchmarking models suffer from many significant limitations. These shortcomings are outlined below.

## Limited ability to account for significant heterogeneity between DNSPs

The DNSPs regulated by the AER are not homogenous. There are prodigious differences between the DNSPs in terms of their operating environments and characteristics. This makes like-for-like comparisons between DNSPs in the benchmarking analysis very challenging. In Evoenergy's view, the small number of opex drivers included within the AER's benchmarking models, and the very limited number of OEFs the AER takes into account in its benchmarking analysis, are inadequate to account properly for the vast differences between DNSPs. This makes the efficiency estimates produced by the AER's models unreliable.

## Reliance on post-modelling OEFs

The AER's use of post-modelling OEF adjustments, rather than normalisation of costs for differences in operating environments before the econometric models are estimated:

- are likely to produce unreliable estimates of efficiency for individual DNSPs. This point was recognised by the Australian Competition Tribunal in a decision that set aside the AER's opex benchmarking analysis. The Tribunal noted that:

  "…even if the OEF adjustments were properly quantified, the manner in which they have been applied is flawed. As ActewAGL submits, adjustments, where required, should be made before modelling, by normalising the data set, rather than ex post modelling…"[44]

  "… the difficulty with the AER's approach is that despite making post modelling OEF adjustments, the efficiency scores of the EI model have been affected by the inclusion of non-comparable data. Post modelling adjustments do not address the fact that the costs relationships within the model, including those DNSPs for which no OEF adjustments have been made, have been affected by the non-comparable data. Thus, those cost relationships are skewed by heterogeneous differences between the DNSPs. The output of the model is therefore skewed by flawed data. That skewed cost relationship cannot be corrected by post modelling OEF adjustments made to some only of the DNSPs (ie the three Networks NSW DNSPs and ActewAGL).";[45]

- potentially identify the wrong DNSPs as reference DNSPs. This could confound the ex-post OEF adjustments applied, since the quantum of any OEF adjustments made is determined relative to the reference DNSPs identified. If the wrong reference DNSPs are identified, then the resulting ex-post OEF adjustments could be incorrectly quantified; and
- are likely to produce unreliable estimates of the output weights used to roll-forward efficient opex to the base year.

## Failure to account for efficient opex-capex substitution choices

As the AER's econometric models benchmark opex alone, the AER's analysis fails to account for efficient opex-capex substitution choices (as distinct from differences in capitalisation rates). A DNSP that makes allocatively efficient choices to undertake more maintenance work and extend the life of its network assets, rather than replacing assets frequently and incurring more capex, will appear less

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[44] Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1, para 333.
[45] Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1, para 335.

efficient in the AER's opex benchmarking analysis than an otherwise identical DNSP that favours capex solutions over opex solutions. These differences reflect different opex-capex substitution choices rather than true differences in opex efficiency, thus distorting the AER's assessments of opex efficiency. The AER is currently consulting on approaches for taking account of differences in capitalisation practices between DNSPs. The AER's preferred approach of normalising corporate overheads using a fixed opex share does not address differences in efficient opex-capex choices that DNSPs may adopt. The benchmarking analysis presented above has not accounted for any differences in capitalisation practices or capex-opex investment options between DNSPs.

## Monotonicity violations

The AER's benchmarking models continue to suffer from monotonicity violations, even as the dataset available to conduct the analysis has expanded over time. Whilst the AER has undertaken some preliminary investigations into options for addressing this problem, the results of those investigations suggest that monotonicity violations cannot be addressed through modifications to the benchmarking models. This is because the underlying cause of the monotonicity violations are the outliers in the benchmarking dataset, and the extent to which the translog models must be 'flexed' in order to fit these outlying data well. It is striking that the monotonicity violations occur over some benchmarking periods but not others—calling into question the reliability of the models even in those periods where no monotonicity violations are apparent. Given the nature of the data available to the AER—in particular the outliers in those data—the only real solution to the problem of monotonicity violations is to view the estimates from those models with caution and scepticism.

## Estimated output weights

The estimated output weights used by the AER in the benchmarking analysis are highly sensitive to the historical benchmarking period used, vary significantly between the benchmarking models used by the AER, and are influenced more heavily by the data on Ontarian DNSPs than the data on the Australian DNSPs which the AER seeks to benchmark and set allowances for.

## Heavy reliance on overseas data

The vast majority of the data used in the AER's benchmarking analysis relate to overseas DNSPs. Over 52 per cent of the observations used in the dataset in the 2022 ABR relate to Ontarian DNSPs and over 28 percent of the observations relate to New Zealand DNSPs. Only approximately 19 per cent of the observations in the AER's dataset relate to Australian DNSPs. This means that the estimated cost function against which Australian DNSPs' efficiency is assessed is determined largely by Ontarian DNSPs. Such comparisons are unlikely to be appropriate given the vast differences in operating environments faced by DNSPs in Australia and Ontario. The AER has suggested previously that the inclusion of 'country dummy variables' in its econometric benchmarking models controls effectively for country-specific differences. However, this claim has been examined and rejected by the Australian Competition Tribunal:

> "…most of the data used within EI's models, including the EI model, comes from overseas. Australia only accounts for 19 percent of the data points used. Accordingly, even with the use of a "dummy variable", the slopes (coefficients) estimated by the regression models will closely follow the overseas DNSPs, rather than the Australian DNSPs, because of the sheer volume of data that comes from overseas. That is, the model will reflect cost relationships between opex and drivers of opex that exist in the overseas DNSPs, rather than modelling relationships that exist in Australia."[46]
>
> "The Tribunal is not of the view that the country dummy variables, in the present circumstances, correct for systematic reporting differences. As Networks NSW rightly submits, the type of country dummy used by EI assumes the relevant relationships between cost drivers and opex is the same across the three jurisdictions and cannot control for the situation where one of the relevant cost drivers has been defined differently in one jurisdiction, thereby altering the relationship between it and opex for that jurisdiction. Thus, for the same

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[46] Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1, para 299.

> reason, the country dummy variables do not “correct” for the differences in the examples provided by the AER relying on the Second EI Report, as outlined above.”[47]

The extent to which the results of the AER’s benchmarking analysis is driven by the overseas data makes conclusions about the efficiency of individual Australian DNSPs derived from that analysis unreliable.

All of these limitations, and others, mean that the AER should not view the estimates of efficient opex produced by its benchmarking models as highly precise or determinative. Rather, the AER should consider its estimates of efficient opex as indicative at best.

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[47] Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1, para 296.