

Benchmarking Ergon Energy's operating expenditure

A study of the relevance of the NSW Draft Decision outcome on Ergon Energy's benchmarking results

huegin

Ref: 150129_Ergon Energy_AER Method

Date: 29/01/2015

Version: 1

www.huegin.com.au

Level 10, 2 Elizabeth Plaza, North Sydney, NSW 2060

02 9409 2400

Executive summary

Ergon Energy's historic opex will not be considered efficient under the current AER approach

The Current Approach

The most recent information regarding the Australian Energy Regulator's (AER) benchmarking approach and associated models is drawn from the current NSW and ACT draft decision.

Econometric modelling is the primary mechanism relied upon by the AER. If the model and approach are applied in QLD as they were in NSW, Ergon Energy can expect a significant reduction in their proposed base year opex.

The current benchmarking approach of the AER is under question by the NSW and ACT businesses through their revised regulatory proposals. The outcome in NSW and ACT will be revealed in the final decision by the AER in April 2015. Only then will the extent of the consequences for Ergon Energy be known, however in the meantime there are several issues Ergon Energy must be aware of in its preparation for its own draft determination.

In this report Huegin have applied the benchmarking framework and models currently favoured by the AER (provided by their consultant, Economic Insights) to the most recent Ergon Energy data.

The results are indicative and remain subject to changes that may occur in the AER's approach (as both a function of the challenge from the NSW and ACT businesses and/or evolution of the approach with repeated application). Notwithstanding the potential for future changes to the approach or models, Ergon Energy can expect to occupy an unfavourable position in the benchmarking results.

Allowances and adjustments by the AER to account for inaccuracies in its models and heterogeneity in the conditions of the businesses are unlikely to be sufficient to prevent the AER from assuming significant reductions in Ergon Energy's base year expenditure.

The NSW and ACT draft decision has also shown that the AER intends to use its benchmarking results deterministically and with immediate effect (no time allowance for catch up). This is despite the issues inherent in such modelling and the infancy of the approach in the Australian context.

Throughout this report, Huegin illustrates many of the issues with the AER's model and approach. We also provide examples of important differences in Ergon Energy's network and cost structures that simultaneously cast doubt on the AER approach and demonstrate the lack of veracity in its estimate of efficient opex.

Contents

1	Benchmarking techniques relied upon by the AER	4
	Stochastic Frontier Analysis	5
	Opex Partial Factor Productivity	5
	Category Analysis (ratio analysis)	5
	The approaches have advantages and disadvantages	6

2	The AER view of opex efficiency	7
	The SFA model adopted by the AER presents the NSW, QLD & ACT DNSPs as inefficient.8	
	Ergon Energy will face base year opex reductions under the current AER approach	9

3	Unsuitability of the AER model for Ergon Energy	10
	Consultants to the AER cannot agree on the relative efficiency of network businesses	11
	Consistency testing illustrates the level of uncertainty and inaccuracy of results	12
	Sensitivity is compounded for networks such as Ergon Energy	13
	Ergon Energy is an outlier	14
	Econometric modelling is unsuitable for developing an alternative forecast	15

4	Alternative analysis of the efficiency gap	16
	Consideration of environmental variables is important.....	17
	Ergon Energy has more environmental disadvantages than advantages	18
	Geospatial differences are the primary difference between Ergon and the frontier	19

Adjusted index models are more suitable for Ergon Energy20

5 A more appropriate efficiency target.....21

SA Power Networks as a benchmark for Ergon Energy22

A bottom-up assessment of Ergon Energy against SA Power Networks23

Ergon Energy is closer to the frontier opex than the AER has assumed24

DISCLAIMER:

The data relied upon for the analysis within this report has been sourced from the Australian Energy Regulator's website. The data source is the Regulatory Information Notices and the data files included in the documentation of the recent NSW and ACT draft decision for electricity distribution. Other data has been sourced directly from Ergon Energy. Huegin takes no responsibility for the accuracy or provenance of the data as supplied.

Huegin Consulting is ISO 9001, Quality Management Systems certified. ISO 9001 which specifies the requirements for a QMS where the capability to provide a product and or service that meets customer and regulatory mandates needs to be demonstrated.



1

Benchmarking techniques relied upon by the AER

In its recent Draft Revenue Determination for the NSW and ACT electricity distributors, the Australian Energy Regulator (AER) used a number of different economic benchmarking techniques to consider the efficiency of DNSP operating expenditure. The techniques relied upon by the AER included:

- Stochastic Frontier Analysis (SFA)
- Opex partial factor productivity (OPFP)
- Category analysis

Each technique has its own advantages and disadvantages. None is adequate to use to determine the efficient level of expenditure of a DNSP in isolation of other considerations.

The AER claim that each of the techniques relied upon by them in their determination support its overall conclusions of NSW and ACT efficiency and alternative forecasts. Huegin and others have, through the revised regulatory proposal of the NSW and ACT businesses, demonstrated that this is not the case. Some of the issues raised through that process are included within this report.

Stochastic Frontier Analysis

Stochastic Frontier Analysis (SFA) uses maximum likelihood estimation to model the relationship between costs, outputs, inputs and environmental differences. A key assumption made using this technique is the structure of the error term which is split into an inefficiency term and a random error term. This structure imposed on the error term is a fundamental difference between Stochastic Frontier Analysis and other techniques such as Ordinary Least Squares which assumes the error term is normally distributed.

The estimated model used by Economic Insights and adopted by the AER in the recent ACT and NSW Draft Revenue Determination is as follows:

$$\ln Opex = 0.667 \ln customers + 0.106 \ln CircuitLength + 0.214 \ln RatchetedPeakDemand - 0.131 \ln ShareUnderground + 0.018 Year + 0.050 NZ + 0.157 Ontario$$

Natural logs indicate the proportionate change in variables, therefore a value of 0.667 for customers indicates that a 1% increase in customer numbers results in a .667% increase in opex. Year is not included in log form and therefore is interpreted as a 1.8% increase in opex each year between 2006 and 2013 (this was included to represent the change in opex due to changes in technology).

Having estimated the model, efficiency estimates can then be obtained for each DNSP. The SFA model used by the AER assumes that there is one efficiency score for each DNSP for the whole period.

Opex Partial Factor Productivity

Opex partial factor productivity is the ratio between an index of outputs and the annual opex for each DNSP. The output index has been constructed using the following outputs with their respective weightings in brackets;

- Customer numbers (.458)
- Ratcheted maximum demand (0.176)
- Circuit line length (0.24)
- Energy throughput (0.128)
- Total customer minutes off supply (Value of customer reliability)

Note that total customer minutes is included as a negative output with weight determined using the following relationship:

$$\text{(Value of customer minute * Total customer minutes)/Total revenue}$$

An Opex partial factor productivity (OPFP) score is then obtained using the following equation:

$$\text{OPFP} = \text{Output index/Opex}$$

Category Analysis (ratio analysis)

Category analysis is the least complex of the three techniques and involves finding the ratio of a single input to output. Metrics used by the AER in the recent NSW and ACT Draft Revenue Determination include the following;

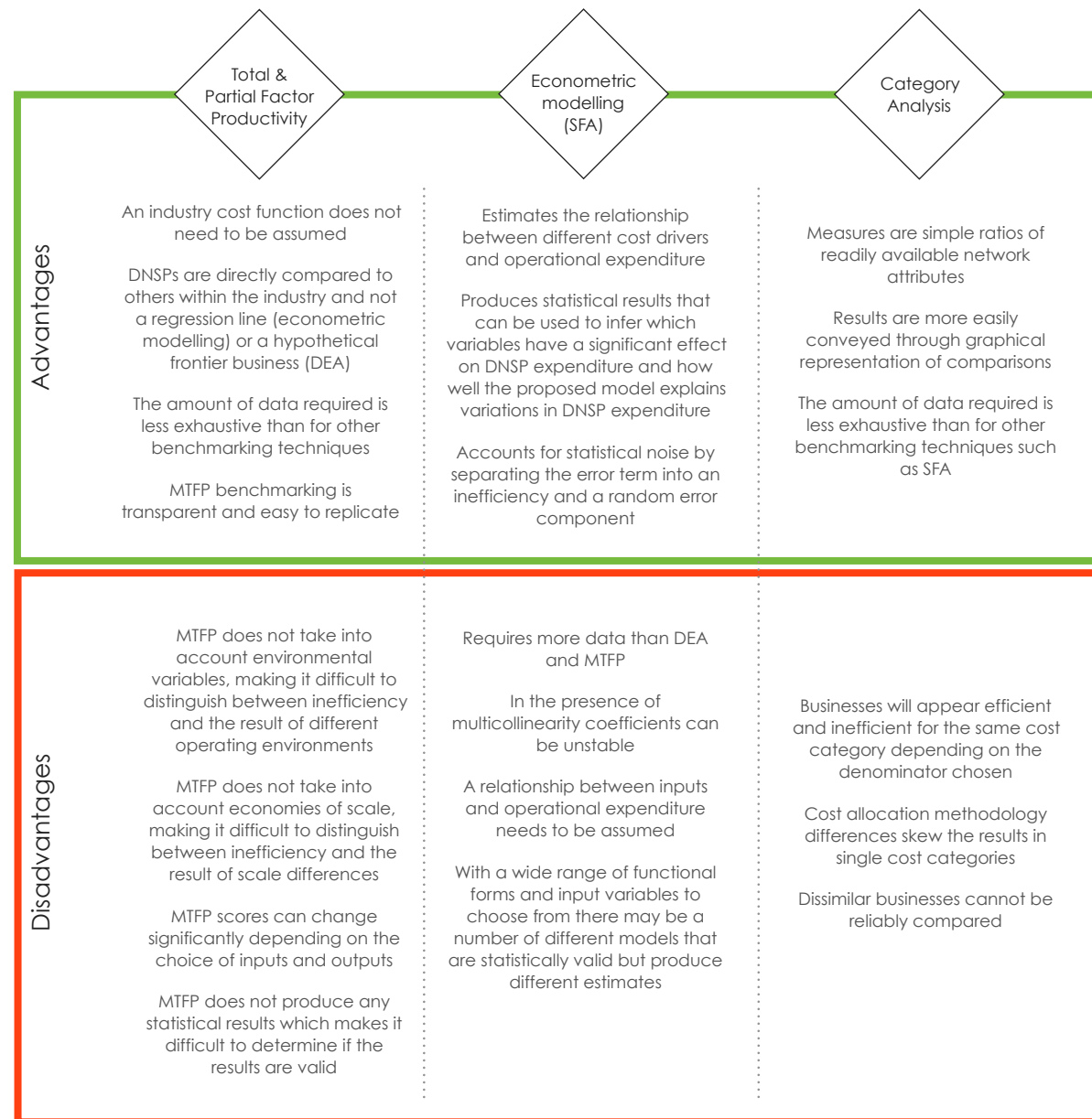
- Opex/customer
- Network overheads/customer
- Corporate overheads/customer
- Total overheads/customer
- Vegetation management expenditure/overhead km
- Emergency response expenditure/interruption
- Maintenance expenditure/km

The approaches have advantages and disadvantages

The advantages and disadvantages of the techniques relied upon by the AER are summarised in figure 1. Most significantly:

- Productivity index methods (TFP and PFP) cannot account for environmental variables.
- There are no statistical tests to determine the efficacy of a model in TFP and PFP techniques.
- SFA models require vast amounts of data - and where that data is sourced from other jurisdictions, issues of comparability and heterogeneity are introduced. We note that the AER has relied upon data from Ontario and New Zealand for their SFA model. This not only casts doubt on the veracity of the model, but also restricts the flexibility in variable choice and environmental variable consideration.
- Category (or ratio) analysis cannot separate inefficiency observations from cost allocation methodology differences.

Figure 1: Benchmarking technique advantages and disadvantages



2

The AER view of opex efficiency

The AER placed significant reliance upon the Stochastic Frontier Analysis (SFA) model for its assumptions of opex efficiency and subsequent changes to base year opex for the NSW and ACT businesses.

If the AER were to continue to rely upon the SFA model and the associated dataset of Australian, New Zealand and Ontarian networks, the consequences for Ergon Energy's base year opex would be significant.

Huegin's view is that the model relied upon by the AER is not an appropriate representation on an industry cost

function for opex of Australian distribution networks. We believe that the SFA model relied upon by the AER:

- Relies upon international data that cannot be validated and "skews" the model coefficients away from what might be considered appropriate.
- Is subject to bias through unobserved heterogeneity - where important differences that effect costs have not been accounted for.
- Is sensitive to small adjustments in the assumptions - a signal that the results cannot be relied upon.

The adjustments made by the AER in the NSW and ACT draft decision are unreasonable when the significance of these factors are taken into account. Chapter 3 looks at the issues in more detail.

The materiality of such matters for Ergon Energy is that if the AER continues to apply its benchmarking models in the manner that it has in NSW and ACT, the QLD businesses can expect similar outcomes to the NSW counterparts.

The SFA model adopted by the AER presents the NSW, QLD & ACT DNSPs as inefficient

The AER relied upon a Stochastic Frontier Analysis (SFA) model of operating expenditure (opex) using a Cobb Douglas functional form in the recent NSW and ACT draft decision for distribution determination.

The results from the stochastic frontier analysis (SFA) give an average efficiency score for each DNSP over the benchmarked period (2006-2013). A frontier has then been created using a weighted average for the DNSPs with a score above 0.75. For each DNSP, the opex reduction required is the distance between the efficiency score and frontier line.

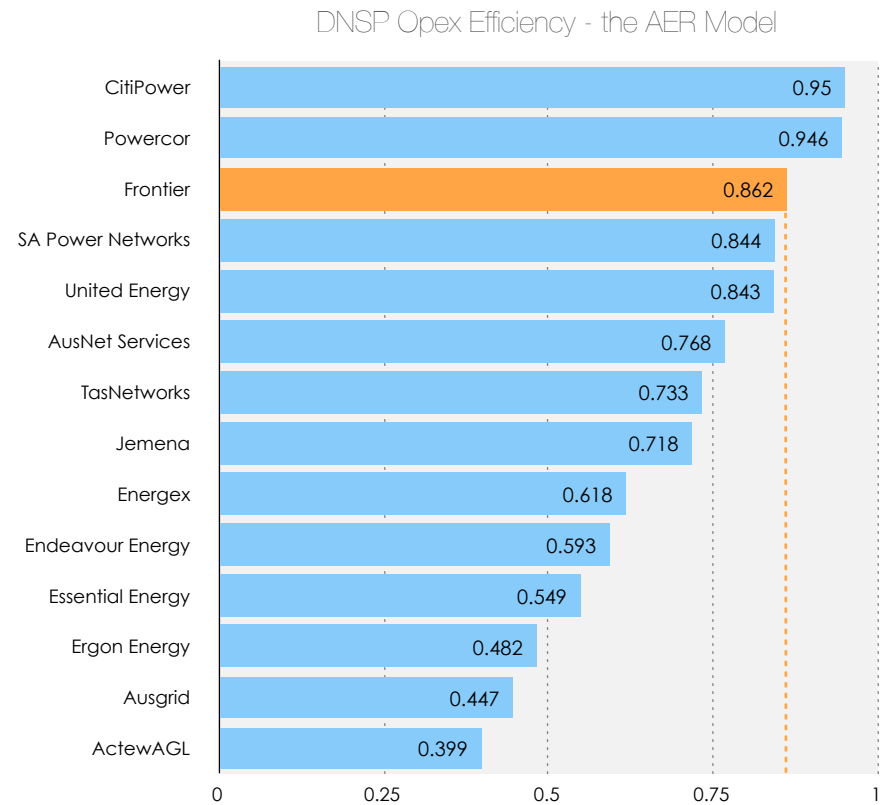
The AER presented its results in the NSW and ACT draft decision for distribution determination. As shown on the right, the raw opex efficiency scores from the AER's SFA model suggest that the networks of NSW, QLD and ACT perform poorly compared to the Victorian and SA businesses.

Based on these results, the AER would consider Ergon Energy to be **44% below the efficient frontier for opex** ($1 - 0.482/0.862$) prior to considering any adjustments. Based on these results, Ergon Energy is also:

- 49% below the efficient frontier firm (CitiPower);
- 49% below Powercor - a firm the AER considers rural and on the upper quartile
- 43% below SA Power Networks - a firm the AER considers rural and on the upper quartile
- 37% below AusNet Services - a firm the AER considers rural and on the upper quartile

The AER will consider the fact that three so-called large rural businesses are on the frontier in their model demonstrates that it is free of bias and that networks such as Ergon Energy should be able to reach the frontier.

Figure 2: Opex efficiency scores from the AER model



Ergon Energy will face base year opex reductions under the current AER approach

Huegin has replicated the process for determining a substitute base year opex undertaken by the AER for the NSW and ACT businesses in the draft decision. We have used the same models and approach to investigate the likely outcome for Ergon Energy's opex in 2013 if the AER were to use the same approach. The results are in figure 3 below. The adjustments made by the AER were:

1. Adjustment 1 was to change the frontier from a single firm to the weighted average of all firms with efficiency scores above 0.75;
2. Adjustment 2 was a 10% reduction of the efficient target (not opex) to account for the collective impact of 33 operating environment factors considered by the AER - note that this 10% was an arbitrary estimate, we believe the AER will attempt to quantify such impacts in future decisions; and
3. Adjustment 3 was to adjust to 2013 opex, realising that some businesses have reduced opex below the period average. Note that the frontier measurement point is still based on the average - it too has moved (declined by 9%), but the businesses have not been afforded an allowance for this.

Figure 3: The AER approach applied to Ergon Energy

Stage of Estimate	Ergon Energy opex (\$12/13)
Starting Point - 'Raw' CD SFA forecast with frontier DNSP as benchmark	\$166.0
Adjustment 1: Change to weighted average of top efficiency scores	\$17.0
Adjustment 2: Adjust to account for operating environment factors	\$19.2
Adjustment 3: Adjust to move from average results to 2013 results	\$12.6
AER's potential substitute base opex for Ergon Energy	\$214.80

NOTE: This is Huegin analysis of the AER approach. It in no way reflects the opinion of Huegin of an appropriate base year opex for Ergon Energy.

“

Our findings are consistent with the view that material inefficiency exists in each of the NSW service provider's historic opex. Accordingly, we do not accept their proposed base year opex amounts as the starting point for estimating required total forecast opex in the forthcoming period.

- AER, p7-27, Draft Decision, Essential Energy Distribution Determination, Attachment 7: Operating Expenditure, November 2014

3

Unsuitability of the AER model for Ergon Energy

The AER considers their benchmarking to be robust, sufficiently tested and appropriately suited to determining the efficient level of opex for an individual DNSP. However analysis of the significance of the influence of subjective modelling assumptions by the consultant or analyst running the models demonstrates quite the opposite.

A deeper exploration of model specification sensitivity, lack of data similarity and the unsuitability of the variables chosen to include in the cost models

illustrates the extent of the bias and error in the AER's analysis. Such bias is compounded for outlier businesses such as Ergon Energy.

The AER considers that the presence of networks such as SA Power Networks and Powercor on the efficient frontier is evidence of the lack of bias in its models. However this view relies upon the *a priori* assumption that its selection of model variables is appropriate and that there are no other variables of difference between the networks that invoke bias in the results.



Consultants to the AER cannot agree on the relative efficiency of network businesses

There is perhaps no greater demonstration of the sensitivity of economic benchmarking models to the assumptions of individual consultants or practitioners than the comparison of results from separate studies of the same group of businesses.

Figure 4 below shows the difference in efficiency rankings between the two benchmarking reports associated with the AER's draft decision in NSW and ACT - a report presented to it by Pacific Economics Group (PEG) and the report relied upon by the AER from Economic Insights. The AER relied upon the Economic Insights model rather than the PEG model based on its view that the PEG model used U.S. data which it deemed to be incompatible. We note, however, that the Ontario Energy Board (the networks of which the AER considers to be compatible) uses U.S. data itself.

Figure 4: Rankings of Australian businesses from the two reports available to the AER

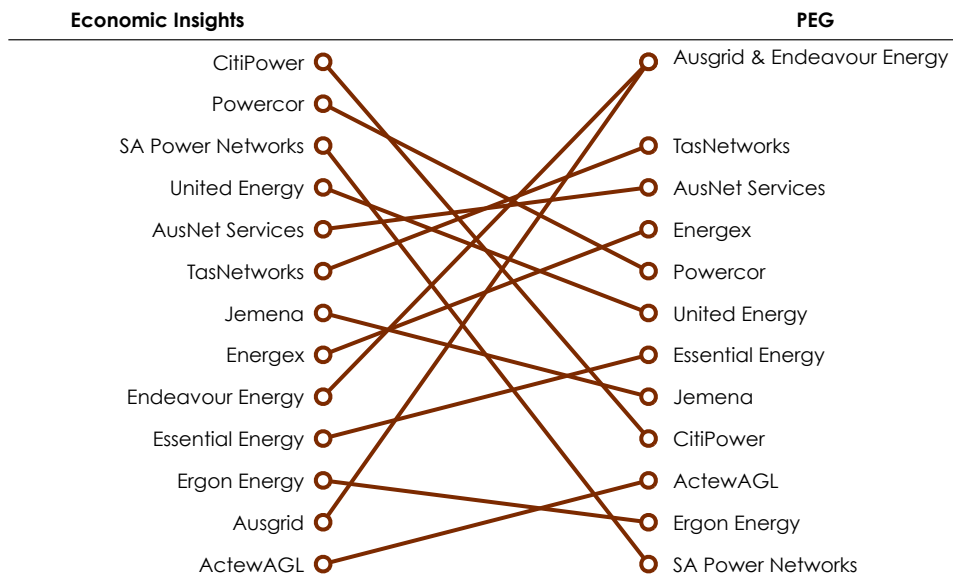
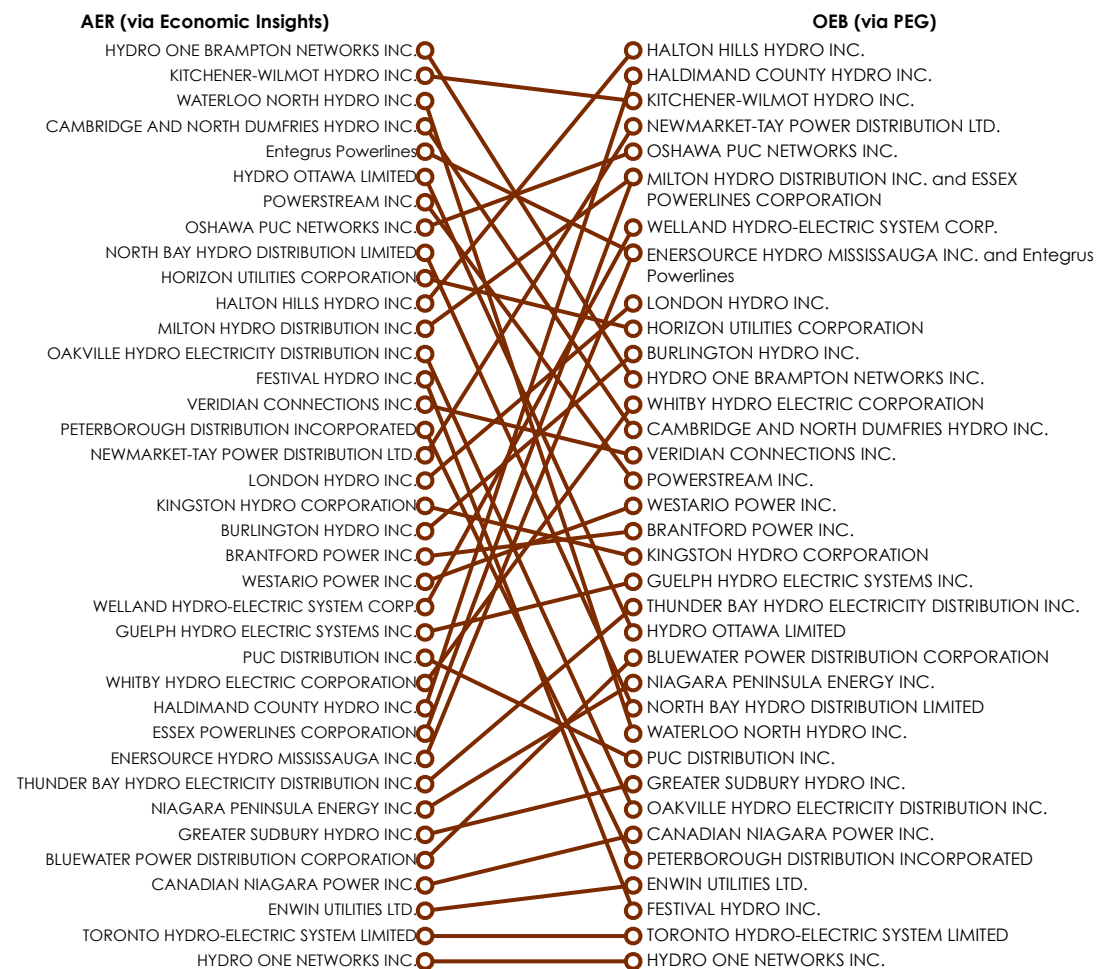


Figure 5 below shows the rankings produced by the Economic Insights SFA model for the Ontario networks compared to the rankings published by the Ontario Energy Board. We note that the Ontario Energy Board used PEG for its decision. This considerable difference of opinion illustrates the nature of the "lottery" that the businesses face when regulators rely upon a particular consultants view. The mass of technical analysis, and sometimes jargon, that accompany economic benchmarking model reports cannot mask the level of influence that subjective assumptions have on the results.

Figure 5: Rankings of Ontario businesses according to the AER and OEB



Consistency testing illustrates the level of uncertainty and inaccuracy of results

To further highlight the sensitivity of the results to the model assumptions Huegin tested a range of models using the DNSP data.

Figure 6 (Ergon Energy is highlighted in orange) shows the efficiency scores for the 13 DNSPs across 18 different models - some of which were available to the AER, some of which they discarded and others that were considered by Economic Insights. In figure 6:

- The first two models (shown in the first two columns) show the range of efficiency scores (normalised to 100%) of the PEG model provided to the AER;
- The third and fourth models are the Economic Insights OPFF and SFA models that the AER relied upon;
- The next 14 models are variations in the assumptions (input/output specification and technique) tested by Huegin to illustrate the range of results possible.

Figure 7 shows the range of efficiency scores and rankings by individual DNSP for each of the 18 models tested.

Practitioners of economic benchmarking often cite the Bauer consistency criteria as a useful framework for evaluating whether economic benchmarking is sound enough to rely upon the results. The philosophy is that scores, or at least rankings, should not change dramatically with small changes in assumptions if the model is to be considered meaningful. As shown in figure 7, scores and rankings change considerably.

Figure 6: Analysis of 18 similar models shows the variation in the results

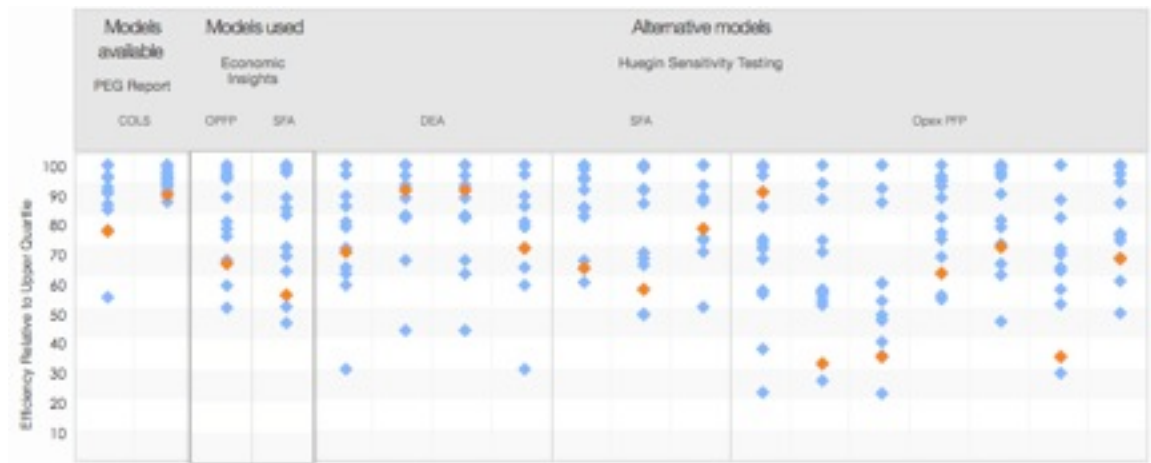
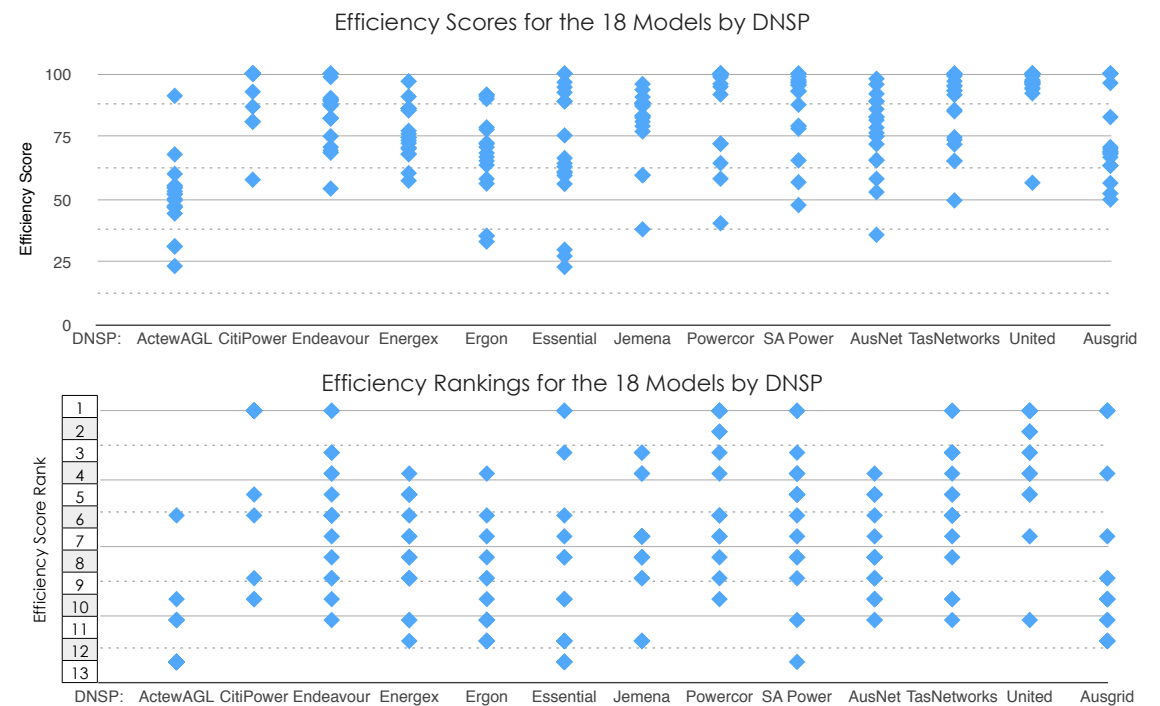


Figure 7: The models tested show significant variation in both score and ranking



Sensitivity is compounded for networks such as Ergon Energy

Apart from the sensitivity of the models to changes in assumptions, and therefore a reliance on the subjective choices of the analyst, the inclusion of international data casts further doubt on the efficacy of the AER's SFA model.

An SFA econometric model requires assumptions about the cost function based on selected variables and coefficients that are derived from the data. The coefficients on each variable are calculated through statistical analysis of the data in the sample. With 37 Ontario networks and 28 New Zealand Networks in the dataset used for the SFA model, the cost function is heavily dependent upon the data from those jurisdictions. This reliance on the international data raises many concerns, including:

- With so many networks from these international jurisdictions, the cost function is more reflective of the relationship between opex and the variables in the Ontario and New Zealand environments;
- Reliance on these international jurisdictions limits the consideration of appropriate variables to what is available from both Ontario and New Zealand. The commonality of data available from each of the three jurisdictions is very low, with only nine or ten common variables available. There is no means of testing the basis of comparability of the international data, and the reliance on overseas data renders much of the data collection through Category Analysis and Economic Benchmarking RINs in Australia pointless (as it cannot be used);
- The majority of networks in Ontario, and to an extent New Zealand are small, higher density networks that service a small number of customers at a lower voltage than Ergon Energy's networks.

These issues raise concerns with the SFA model and its ability to represent the cost function in Australia, let alone for Ergon Energy. As shown in figure 8, testing the relationship between the variables and opex for:

- the full dataset relied upon by Economic Insights for all three jurisdictions,
- Australia only, and

- large area, rural networks (Ergon Energy, Essential Energy and Hydro One in Ontario),

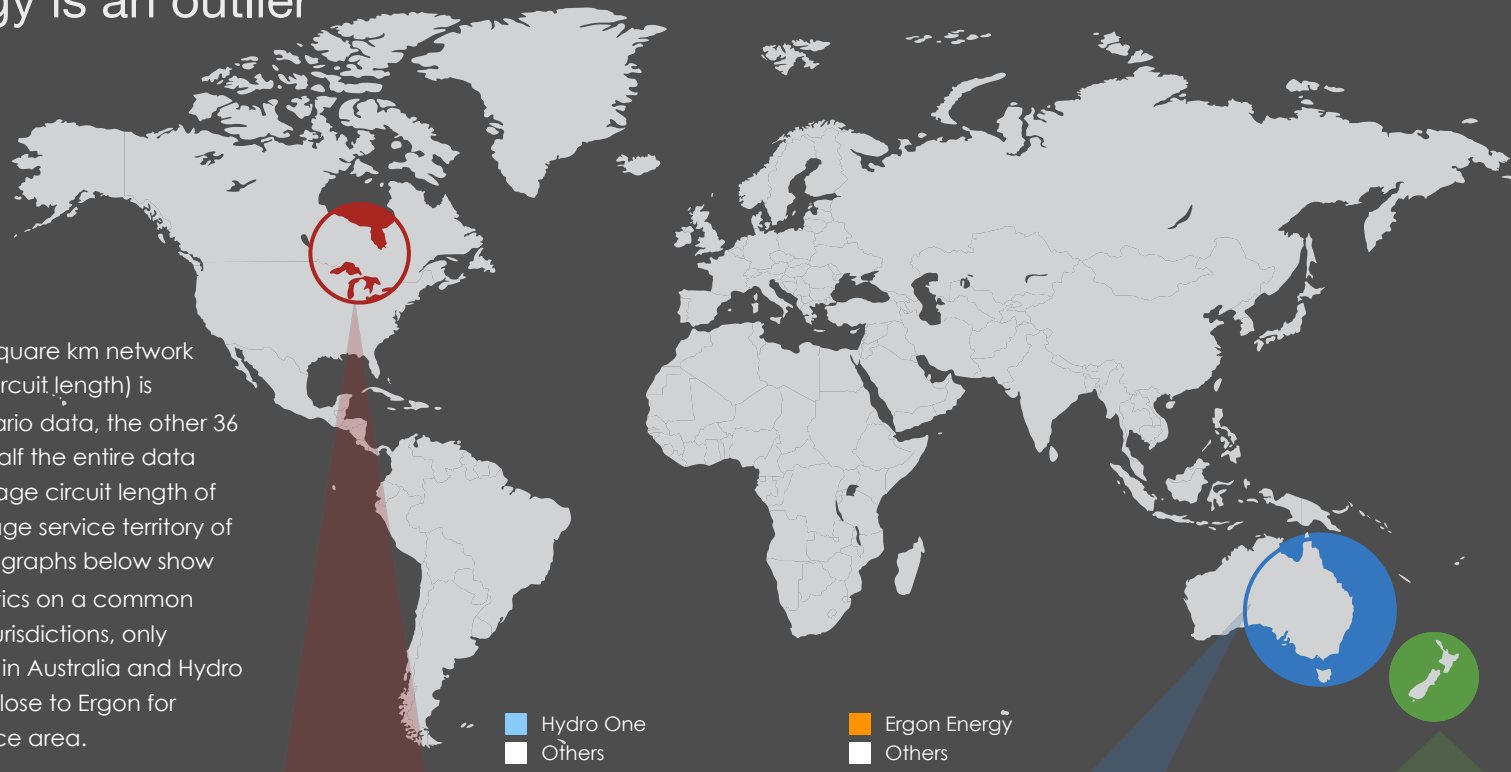
shows a very different set of variable coefficients (and therefore very different relationship between cost and the variables) than the model relied upon by the AER. The significance of this for Ergon Energy is the AER is calculating the efficient level of opex for Ergon Energy based on a cost function that is not representative of Ergon Energy's circumstances at all. The next page further highlights the differences between Ergon Energy and the majority of networks used to derive the AER's opex prediction model.

Figure 8: The coefficients change markedly based on the sample

Variable	Full Dataset	Australia Only	Large Rural Only
<i>Customer numbers</i>	0.610	0.514	1.095
<i>Circuit length</i>	0.126	0.404	-1.655
<i>Ratcheted Max Demand</i>	0.261	0.065	-0.792
<i>Share of Underground</i>	-0.167	0.176	-0.252

Ergon Energy is an outlier

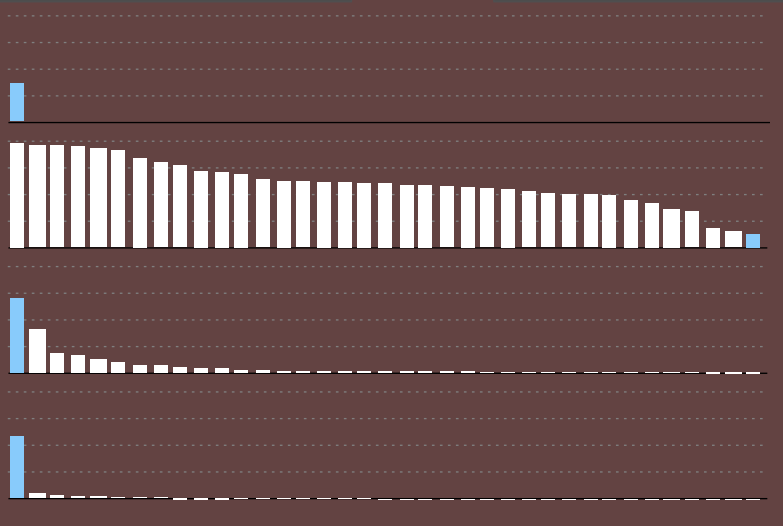
If Hydro One (650,000 square km network area and 117,000 km circuit length) is removed from the Ontario data, the other 36 networks - more than half the entire data sample - have an average circuit length of 1,900 km over an average service territory of just 340 square km. The graphs below show selected network statistics on a common scale; across all three jurisdictions, only Essential and SA Power in Australia and Hydro One in Ontario come close to Ergon for circuit length and service area.



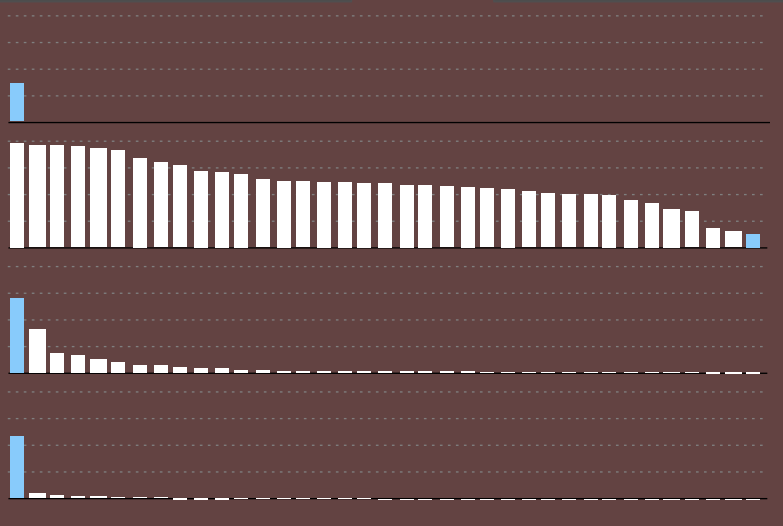
■ Hydro One
■ Others

■ Ergon Energy
■ Others

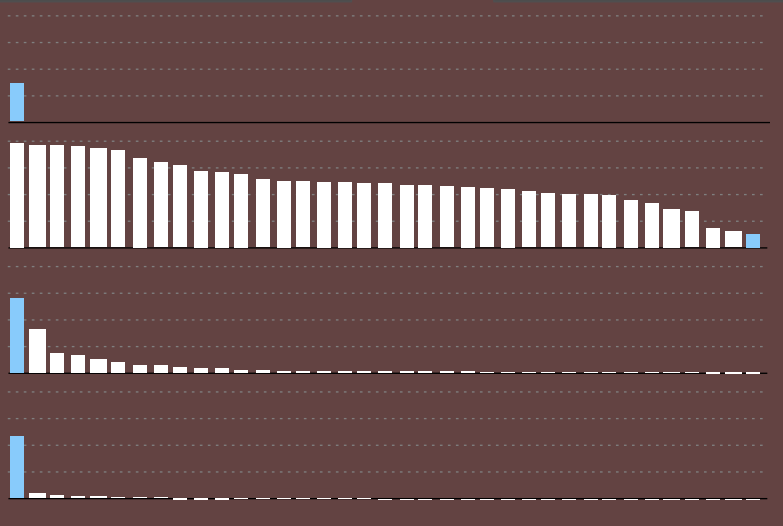
Network area:



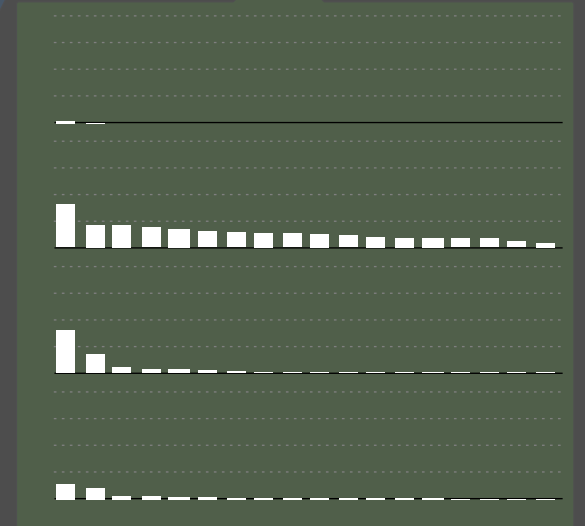
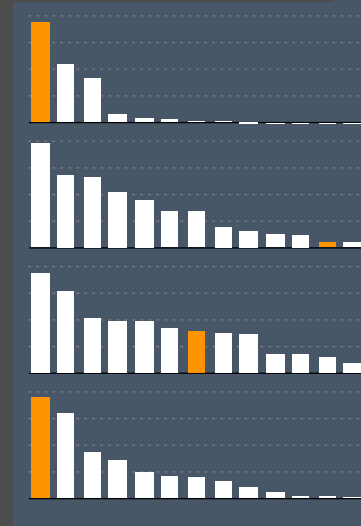
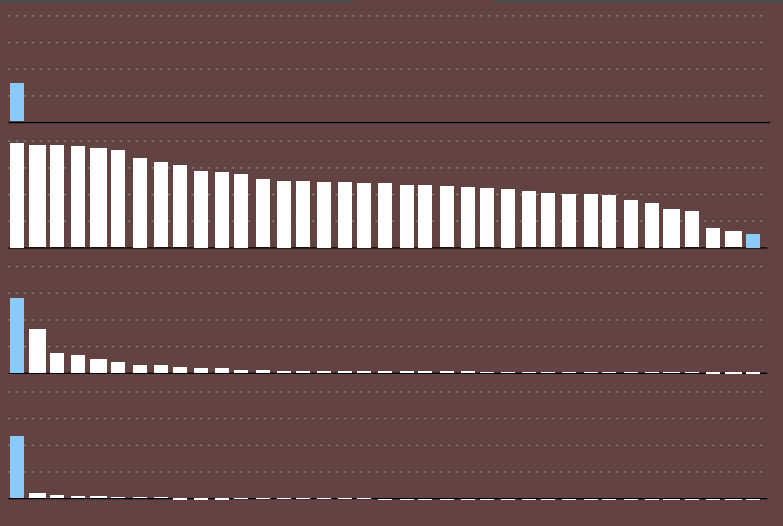
Customer density:



Customer numbers:



Circuit length:



Econometric modelling is unsuitable for developing an alternative forecast

Econometric models such as the SFA model relied upon by the AER require large amounts of data and produce estimates of opex based on an assumed relationship between the selected variables and cost. This cost function is assumed to be common across all observations in the sample. The existence of a common, reliable cost function for all networks in Australia is unlikely, let alone one which accords with the prediction of cost for New Zealand and Ontarian networks.

We believe there is sufficient doubt associated with the efficacy of the AER's SFA model for opex prediction that it should not be used to provide a substitute base year opex forecast, particularly for outlier networks such as Ergon Energy. We base this opinion on the following facts and observations:

- The variables selected for the opex cost function are those that fit the majority of businesses (small New Zealand and Ontario networks) and other important variables that actually drive cost have not been considered.
- The opex cost function is fitted to the data, which is dominated by small Ontario networks. The likelihood that it holds for a network such as Ergon Energy is unlikely.
- The model itself can be demonstrated to be subject to material sensitivity and uncertainty. It cannot be considered sufficiently robust as a deterministic mechanism for identifying efficient opex for an individual network.

The AER have (in the NSW and ACT draft decision) claimed to have demonstrated validity of its model and results through other, complementary means. This is not the case. The AER have discarded models and results that do not align with its preferred model and results, rather than acknowledge the sensitivity of the models to bias. It has done so on the basis of what it itself has determined to be signals of bias in models which do not fit its expectations.

4

Alternative analysis of the efficiency gap

Given that the econometric model used by the AER is unsuitable for predicting efficient historic opex for Ergon Energy (although the AER used it to predict Essential Energy's expenditure, despite many of the same problems), alternative means of opex efficiency analysis are required.

Huegin has presented submissions to the AER and represented the DNSPs in highlighting the inherent issues with many of the techniques relied upon by the AER. Our view remains unchanged, and is in fact

reinforced by the recent NSW and ACT draft decision. However, given that the approach is now set through the Rules and Guideline, we believe that appropriate considerations must be given to the economic benchmarking if the analysis is to have any meaning or use at all.

We do not advocate the use of the techniques in the manner employed by the AER in the NSW and ACT decision, but in the interest of avoiding bias in the upcoming regulatory determination for QLD and SA, we consider appropriate allowances and adjustments to the AER's approach.

Consideration of environmental variables is important

In the NSW and ACT draft decision, the AER (in lieu of more adequate data), made adjustments to the benchmark target for each business of:

- 30% for ActewAGL; and
- 10% for each of the NSW businesses.

Importantly, these adjustments were made to the AER SFA model benchmark, not opex. As such, the equivalent opex adjustment was less than these percentages.

Our analysis of the NSW and ACT costs demonstrated that the adjustments made were inadequate when compared with the opex associated with several material differences between the networks. Figure 9 highlights the discrepancy between what the AER allowed for environmental variables in NSW/ACT and the actual opex associated with some of these factors. A more appropriate treatment in the AER's model would be to exclude these costs from the input data. ActewAGL was particularly disadvantaged. The AER allowed a 30% reduction of the target, however this only reduced ActewAGL's opex by \$8.6m. The opex impact of two of the variables acknowledged as legitimate factors by the AER (the existence of transmission assets and a Cost Allocation Methodology (CAM) that had historically diverted disproportionate expenditure to opex) are greater than the AER's allowance for all 33 environmental variables that they considered.

We understand that the AER is currently requesting environmental variable data from each of the businesses. We expect that this request is to mitigate the need to make arbitrary adjustments for the net impact of all environmental variables as they have done for NSW and ACT. In any case, our view is that the AER systematically underestimates the impact of differences between networks in different jurisdictions. We believe that this is illustrated through figure 9. The next page also highlights some of the more material differences between Ergon Energy's network and other businesses - particularly the southern state networks that are on the frontier in the AER model. Our view is that network design and spatial location of customers are the most material and most underestimated differences between networks in NSW and QLD versus Vic and SA.

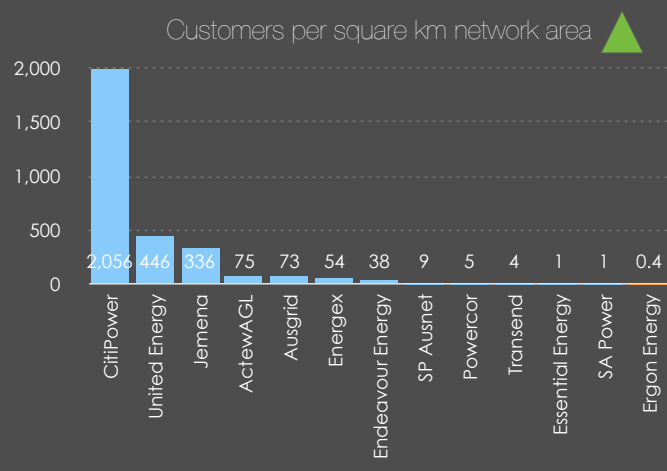
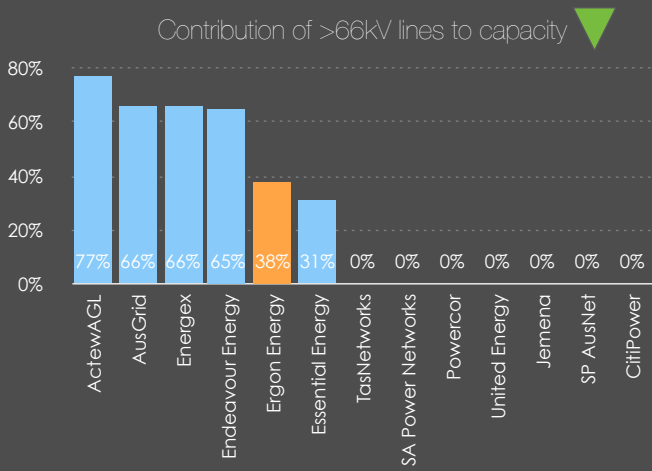
Figure 9: AER environmental variable adjustments and actual costs - NSW and ACT



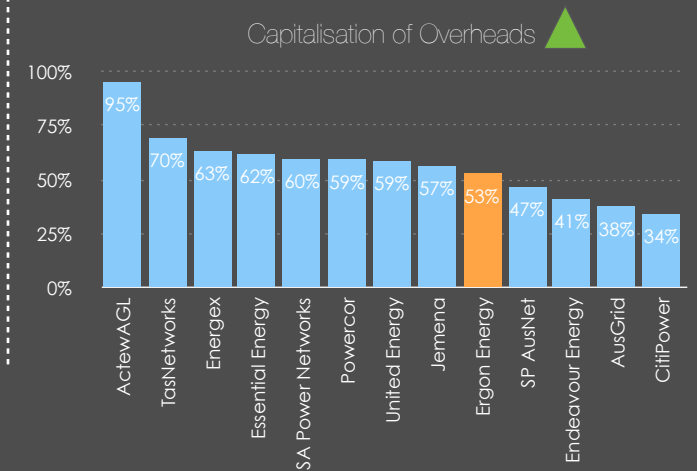
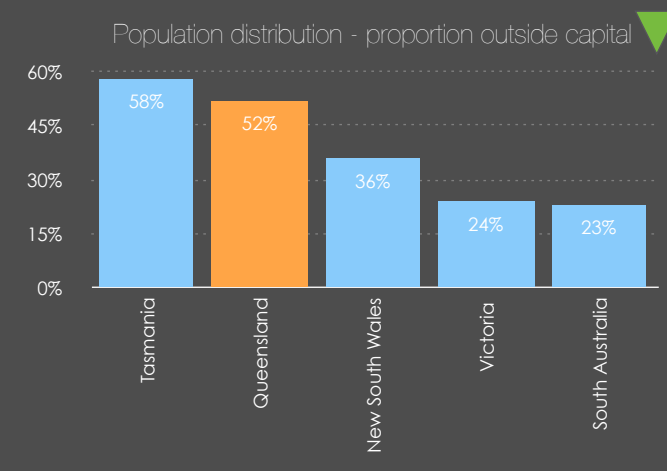
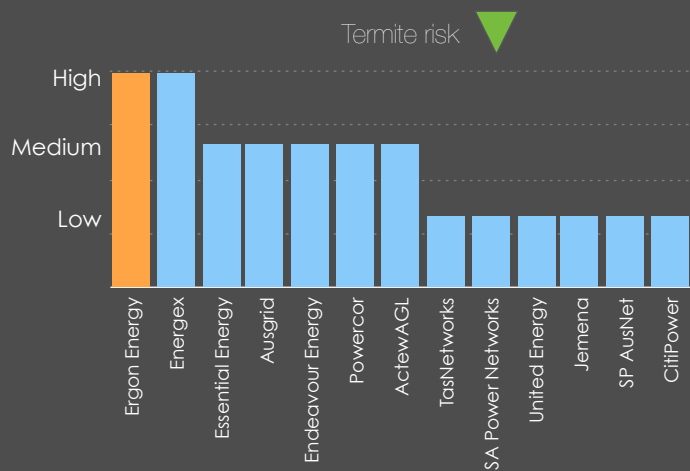
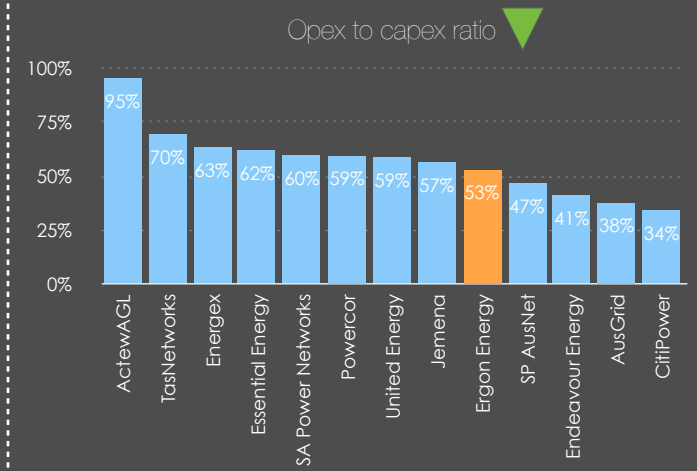
Ergon Energy has more environmental disadvantages than advantages

Environmental variables have often been dismissed by the AER as either overstated or insignificant when considering the net effect of advantageous and disadvantageous influences on cost. Whilst more recently the AER has acknowledged the existence of legitimate differences in operating conditions between networks, their prevailing view is still that the NSW and QLD networks are more inefficient, rather than different to counterparts in Victoria and SA. Networks such as Ergon Energy, however, generally have more negative influences on cost than positive. Some of the more influential environmental cost drivers are shown below.

Detrimental Environmental Variables



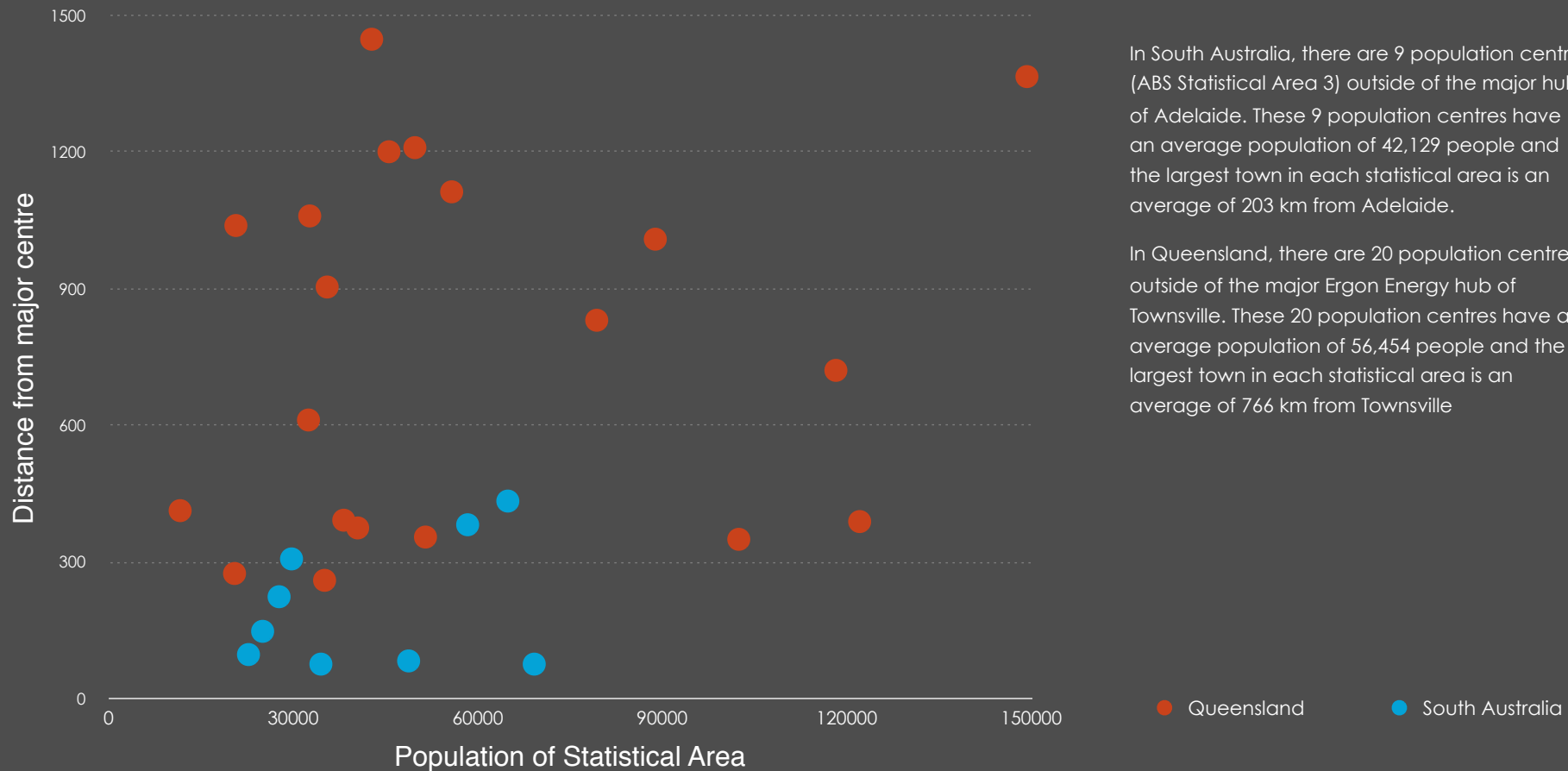
Neutral or Beneficial Environmental Variables



Geospatial differences are the primary difference between Ergon and the frontier

The AER has dismissed the influence of the various service territories of the networks as an unsubstantiated influence on cost. It argues that large service areas have large areas within them that are unserved, and so customer density is a reasonable indicator of distance between customers. This is not the case. In Victoria, the lowest customer density networks still have significantly higher population densities due to the shorter distances between towns. In South Australia, only a small percentage of the population live outside of Adelaide, and most of those are within close proximity to the capital - this is the only state where one could argue the service area includes large unserved regions. In Queensland and New South Wales, customers are spread over larger distances requiring many more assets per customer, many more depots and other infrastructure across a greater area.

Size of Statistical Area Level 3 regions and distance from major centre



In South Australia, there are 9 population centres (ABS Statistical Area 3) outside of the major hub of Adelaide. These 9 population centres have an average population of 42,129 people and the largest town in each statistical area is an average of 203 km from Adelaide.

In Queensland, there are 20 population centres outside of the major Ergon Energy hub of Townsville. These 20 population centres have an average population of 56,454 people and the largest town in each statistical area is an average of 766 km from Townsville

Data Source: Australian Bureau of Statistics and Huegin analysis

Adjusted index models are more suitable for Ergon Energy

Given the inadequacy of econometric models to represent an appropriate cost function for Ergon Energy, we believe that index models (TFP and PFP) models are most appropriate for comparison of Ergon Energy against other networks. Whilst we do not advocate such methods for the prediction of a substitute level of base year opex, the method is at least more suitable to comparison of Ergon Energy to peers.

Index models cannot account for environmental variable differences. As such, the input data must be adjusted to account for these differences, or the results must be regressed against a specific variable of interest and adjusted for the residual.

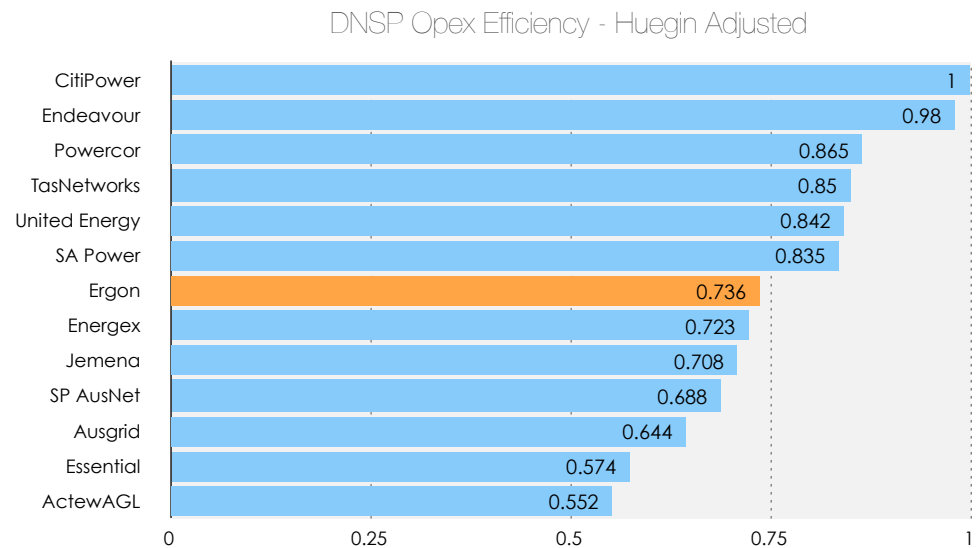
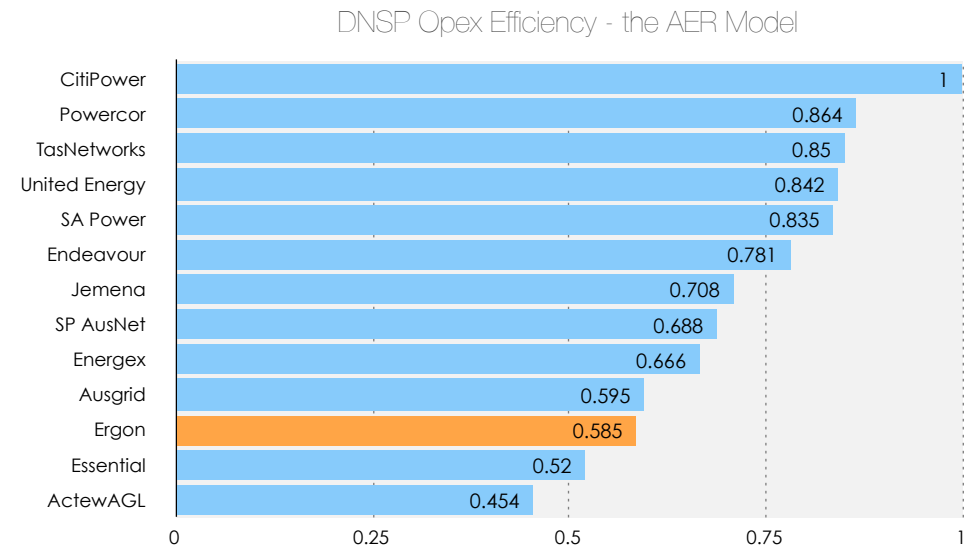
We considered that the most significant differences in the input data for Ergon Energy compared to the other Australian businesses was the vast amount of 132kV assets in Ergon Energy's network (which do not exist in the Vic and SA networks) and the asset service fee charged to Ergon Energy's opex accounts by its IT provider, SPARQ. These costs would otherwise be recorded as capex by other businesses.

Figure 10 shows the comparison of the AER's opex partial factor productivity model (it's MTFP model with the capital inputs omitted) and our analysis of the same model, but with:

- Assets above 110kV removed from capacity measures; and
- Opex associated with assets above 110kV removed from cost inputs; and
- The asset service fee for IT charged by SPARQ to Ergon Energy's opex removed.

As the results show, consideration of these two environmental variables for the index model preferred by the AER move Ergon Energy from an efficiency score of **58%** to **74%**. Importantly, this represents a shift from 17% from a frontier score (upper quartile) to just 1% from the frontier score. We do not suggest that these scores are definitive indications of relative efficiency for all DNSPs (as we have not allowed for environmental variables specific to others), however they do show the magnitude of bias in the AER's model against Ergon Energy's high voltage assets and IT cost allocation method.

Figure 10: Opex PFP scores - AER and Huegin adjusted



5

A more appropriate efficiency target

The previous chapters in this report have demonstrated the significant uncertainty and sensitivity inherent in the AER's approach to measuring relative opex efficiency and also to calculating a substitute base year opex for individual DNSPs.

Our opinion is that the model relied upon by the AER to set base year opex in the NSW and ACT draft decision is an unreasonable basis for such a consequential decision.

Ergon Energy faces similar risks to Essential Energy, if the approach and model specification of the AER endures beyond the NSW and ACT decision. We have demonstrated the inadequacy of the econometric model and the change in the index model if environmental variables are given sufficient consideration.

The AER have repeatedly referenced the position of SA Power Networks and Powercor on the frontier as evidence that its models are robust and that rural businesses such as Essential Energy and Ergon Energy can be evaluated by its SFA model. Notwithstanding the significant difference in customer density between Ergon Energy and these so-called rural networks on the frontier, deeper analysis of the differences between the networks shows that the efficiency gaps assumed by the AER are overstated.

SA Power Networks as a benchmark for Ergon Energy

If we were to select an appropriate network to compare to Ergon Energy, it would be Essential Energy. Choices of peers are often reduced to simple comparisons of customer density (customers divided by circuit length). As illustrated in this report, there are many more important network characteristics to consider when evaluating comparability. Essential Energy shares some of these characteristics with Ergon Energy, however for the purposes of simple evaluation of Ergon Energy's base year opex we have selected SA Power Networks as a reference point.

SA Power Networks are on the frontier in the AER SFA model; they also:

- Service large, remote parts of the state, like Ergon Energy and Essential Energy;
- Has reasonably similar consumption and demand statistics; and
- Has moderately more customers, but much less circuit length (Essential Energy are the only peer to Ergon Energy in circuit length).

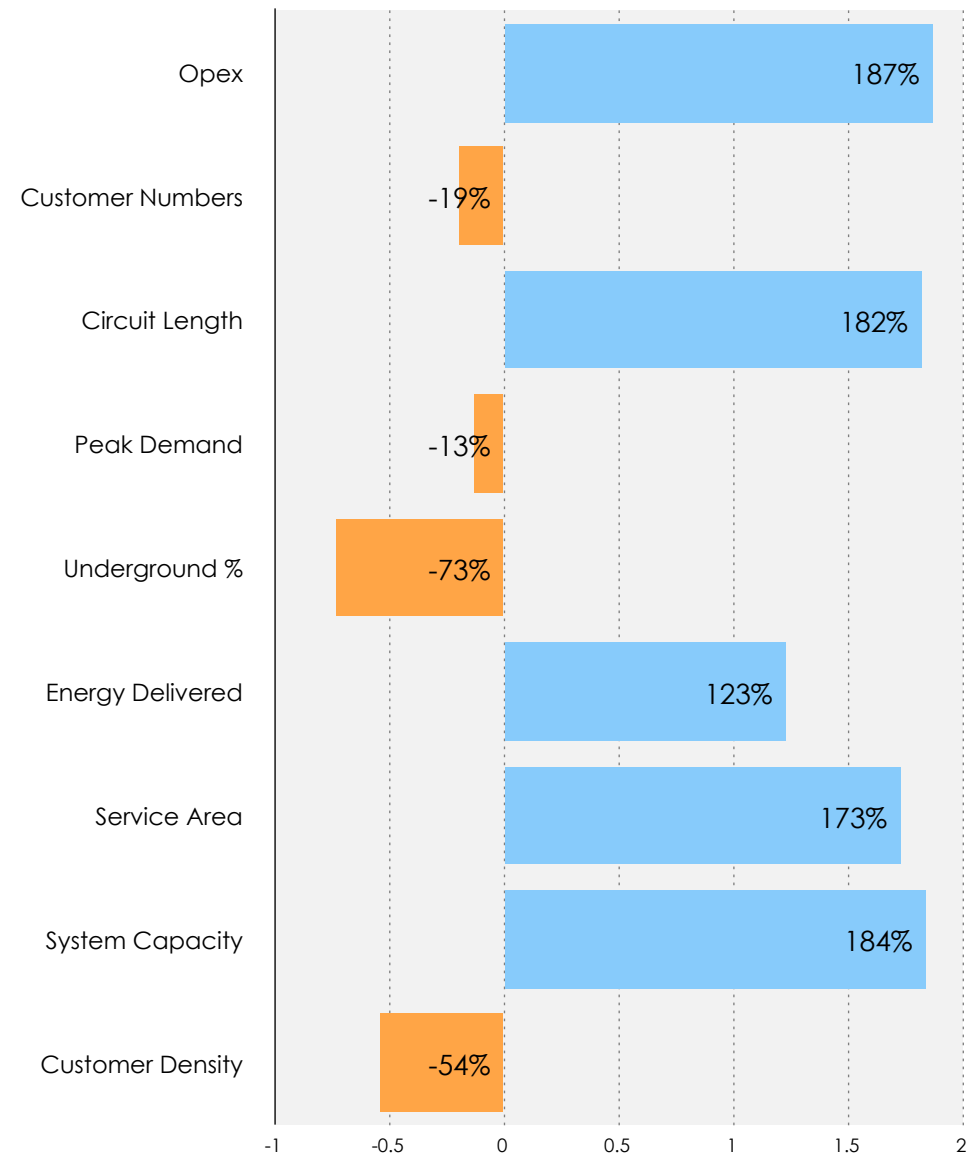
Whilst Powercor have customer numbers closer to Ergon Energy, they have less network circuit km than SA Power Networks and considerably less service territory and energy consumption statistics.

Figure 11 shows a comparison of network attributes between Ergon Energy and SA Power Networks. On the balance of the characteristic differences, one would expect Ergon Energy to have higher opex due to the significantly larger network and service area. The AER's model, however, places greatest weight on customer numbers. It also:

- Does not recognise service territory as a legitimate cost driver;
- Fails to adequately recognise cost differences due to network design attributes;
- Considers customer density differences have been accounted for in its model specification; and
- Does not recognise energy use as a cost driver.

Despite having almost twice the circuit length, area and capacity as SA Power Networks, the AER believes that Ergon Energy is only half as efficient.

Figure 11: Ergon Energy compared to SA Power Networks



A bottom-up assessment of Ergon Energy against SA Power Networks

Putting aside the index and econometric modelling of networks conducted by the AER, Ergon Energy's base year opex can be compared to that of a network the AER considers to be a frontier firm - SA Power Networks. A direct comparison shows Ergon Energy's opex at almost twice that of SA Power Networks, similar to the assumptions of the AER in its econometric modelling. Whilst the AER considers this evidence that its models are robust and conclusions sound, figures 12 illustrates the legitimate circumstantial differences that must be considered.

Figure 12: Ergon Energy and SA Power Networks Circumstantial Cost Differences

Factor	SA Power Networks	Ergon Energy	Cost Impact in 2013
<i>Line length above 66kV</i>	0 km	3,059 km	\$23.22M
<i>IT asset service fee in opex</i>	No	Yes	\$30.6M
<i>Pole inspection period</i>	8 years	4 years	\$14.09M
<i>Control centres</i>	1	2	\$11.5M
<i>Fleet and Property</i>	\$25k per FTE	\$30k per FTE	\$16.6M
<i>Termite treatment</i>	No	Yes	\$8M
Total opex impact in 2013:			\$104.01M

Notes:

1. The operating and maintenance costs for assets above 66kV has been calculated as the average cost for those networks that have these assets and report costs by voltage level. A factor of 0.33 has also been applied to the average cost per km of these assets to adjust for Ergon Energy's lower maintenance costs per km compared with other businesses with these assets.
2. The IT asset service fee is the opex charge to Ergon Energy from SPARQ, supplied by Ergon Energy.
3. The pole inspection period amount is calculated as the difference in cost for Ergon Energy to inspect poles under the current regime and the cost if it could extend pole inspections to 8 years (which is possible in SA due to the existence of Stobie Poles).
4. Control centre cost impact is calculated on the assumption that Ergon Energy would have its network control costs if it were able to operate with one control centre.
5. The termite treatment cost impact is the total cost of Ergon Energy's termite treatment program - the data was supplied by Ergon Energy.
6. Fleet and property costs are based on the extra vehicles and properties required over Ergon Energy's service area per full time equivalent.
7. These cost impacts are based on material differences between Ergon Energy and SA Power Networks operating environments only. They do not constitute the full range of operating environment differences. They also do not include consideration of other drivers such as scale and density.

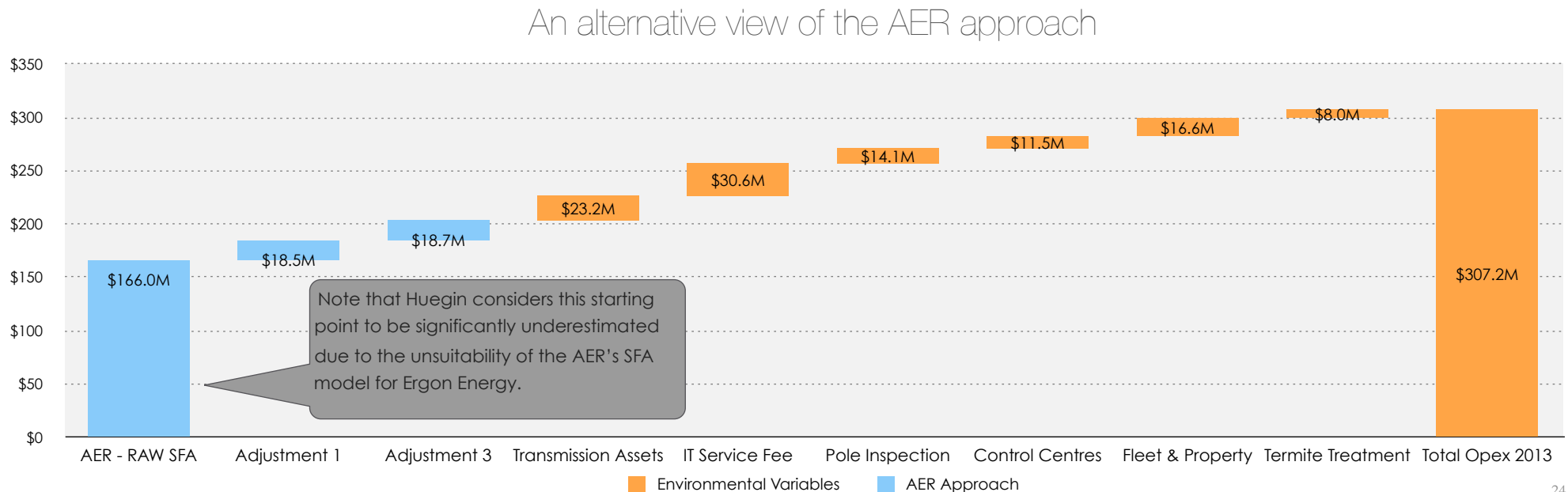
Ergon Energy is closer to the frontier opex than the AER has assumed

To illustrate the level of error inherent in the AER approach for NSW and ACT, we conducted an alternative analysis of Ergon Energy's opex. We used the AER's SFA model as a starting point (despite our opinion that it is unsuitable for Ergon Energy). We used a similar approach to the AER (outlined in figure 3) with the following exceptions:

1. For the AER's Adjustment 1 (the change to the weighted average of the frontier businesses) we used a single business, SA Power Networks, as the benchmark as this is the only business on the frontier anywhere near similar to Ergon Energy. This results in an adjustment of \$18.5M, compared to the AER method which would result in an adjustment of \$17M.
2. For the AER's Adjustment 2 (environmental variables), instead of adjusting by a percentage (10% was used for Essential Energy in the NSW draft decision) we have added individual adjustments for those differences between Ergon Energy and SA Power Networks that we consider material (note that this is indicative, we have not considered the environmental variables of SA Power Networks, which may be positive or negative).
3. For the AER's Adjustment 3 (adjusting the individual DNSP opex for the most recent opex rather than the historical average used in the SFA model) we rolled forward both the Ergon Energy opex **and** the SA Power Networks opex to 2013 so that the comparison is in the most recent year available. The result is an \$18.7M adjustment compared to the \$12.6M in figure 3, which is the result of only rolling forward the DNSP opex, not the target (frontier).

The result in figure 13 below demonstrates the considerable difference to the AER's general approach (shown in figure 3 of this report). Huegin do not consider the resultant figure representative of Ergon Energy's efficient level of opex in 2013, particularly due to the unsuitability of the AER SFA model for Ergon Energy's opex, however it does illustrate the importance of detailed consideration of the circumstances of a DNSP. We note that this result is also closer to the analysis we conducted in figure 10 of this report (using MTFP adjusted for the transmission assets and IT service fee).

Figure 13: Ergon Energy and SA Power Networks - Adjusted Cost Comparison





Contact Details

Jamie Blair

Level 10, 2 Elizabeth Plaza, North Sydney, NSW 2060

t: +612 9409 2400

e: info@huegin.com.au

huegin