Advisian
WorleyParsons Group

Opex Cost Drivers

ActewAGL Distribution Electricity (ACT)

16 January 2015

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Declaration

I have read, understood and complied with the Federal Court of Australia's Practice Note CM 7 – Expert Witness in Proceedings in the Federal Court of Australia.

The opinions contained in this report are based wholly or substantially on the specialised knowledge gained through the training, study and experience outlined in the Curriculum Vitae that is attached in Appendix B.

Signature:

Bill Glyde, Principal, Advisian Pty Ltd   Evan Mudge, Associate, Advisian Pty Ltd

Executive Summary

Advisian (formerly Evans & Peck) was engaged by ActewAGL Distribution (AAD) to provide an independent expert report into the cost drivers for the ACT electricity distribution network to inform AAD's response to the Australian Energy Regulator's (AER's) Draft Decision for AAD covering the 2014/15 to 2018/19 regulatory control period. A key component of the Draft Decision is a proposal to reduce AAD's proposed operating expenditure by approximately 42% over the 5 year period covered by the Draft Decision.

In undertaking our assessment, Advisian has taken account of the requirements of the National Electricity Rules (NER) in relation to preparation and assessment of DNSP Opex forecasts, as well as the findings of the AER's Annual Benchmarking Report. Our approach firstly reviewed the AER's application of the Economic Insights productivity benchmarking analysis to identify our key areas of concern. These mainly relate to the lack of evidence used to derive the benchmarks (and that the reported figures that have been used in the analysis) are genuinely comparable as contemplated by the Australian Energy Market Commission (AEMC) determination setting out the policy intent behind the 2012 rule change.

> *"In addition, the AER can conduct its own analysis, including using objective evidence drawn from history, and the performance and experience of **comparable NSPs**."* [1]

Advisian is highly concerned that the AER has effectively conducted an analysis designed to provide one measure of relative productivity and then inferred that the productivity score assessed under this analysis is an appropriate basis to determine the efficient opex of Australian DNSPs. The clear flaw in this approach is that it measures one parameter (productivity) and arbitrarily applies it to determine another variable (efficient opex), without appropriate consideration of the pitfalls in doing so.

Advisian's main concern in relation to the AER's benchmarking approach is that it does not fully account for the technical and reporting differences between AAD and the frontier businesses, and limited effort has been placed into ensuring that the cohort DNSPs used for benchmarking purposes are truly *comparable*. In the context of the magnitude of the reduction in Opex proposed (of the order of 40%), in the Draft Decision, it is essential that the benchmarking, and any necessary adjustments to account for technical and reporting differences, be of sufficient rigour to ensure that the remaining Opex is sufficient to enable AAD to safely and reliably operate their asset base over an extended period of time. In our view, this rigour is currently lacking.

The specific concerns addressed in the report, along with Advisian's conclusions are summarised below:

Technical Differences

1) **The AER's benchmarking approach does not appropriately account for the technical differences between AAD and the frontier businesses**. These are detailed in Section 4 of the report. In particular Advisian has identified issues with the AER's benchmarking relating to:

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[1] AEMC, *Rule Determination – National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 29 November 2012, p. 112.

(a)   Comparability of the DNSPs used for benchmarking purposes;

(b)   The inadequacy of the AER's benchmarking model to appropriately capture the variability in opex drivers between Australian DNSPs;

(c)   The failure to appropriately consider the effect of spatial density (customers/km^2) in addition to linear density (customers/km) on efficient Opex;

(d)   The need for DNSPs to operate and maintain the assets they actually have, rather than the assets they might have had (if they had been subject to the same operating environment and historical development as the notional frontier DNSP), in a safe and reliable manner;

(e)   Differences in reliability and safety performance over the analysis period; and,

(f)   The application of the AER's adjustment for additional costs relating to backyard reticulation in the ACT.

As a result, Advisian considers that the use of the DNSP's revealed base year as the starting point represents the most appropriate and robust means of accounting for the difference in spatial density <u>and all other network specific factors</u>. This removes the substantial regulatory risk that the AER has incorrectly attributed inherent productivity differences to inefficiency in Opex expenditure. We note that if this is not addressed in the final decision, Advisian is concerned that it will lead to:

- material under-expenditure on operating and maintaining the 'non-frontier' networks in a safe and reliable manner which is not in the long term interest of AAD customers[2];
- inefficient investment or operations in the NEM or AAD's network[3]; and,
- failure of AAD to recover the efficient cost of achieving the operating expenditure objectives[4] for its networks.

In the case that the AER chooses to retain a substantive reliance on its benchmarking analysis (and given the materiality of the adjustments), the benchmarking approach must robustly and transparently demonstrate that all cohort DNSPs and variables are genuinely comparable and reported on a consistent basis.

Advisian reiterates that it does not consider the AER's SFA CD productivity model to be an appropriate basis for determining efficient opex. However if the AER's SFA model is to be retained, our review of technical differences considers that, at a minimum the following adjustments must be made.

Table 1 Advisian Recommendations – Technical Factors

Issue	Adjustment to Total Opex $m (% of efficient base)
SWER Circuit Length	**+$0.38m** (1.2%)
Linear v Spatial Density	Adjustment to model **or** As revealed in the audited base year
Installed Transformer Capacity v Ratcheted	Adjustment to model **or** As revealed in the audited base year

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[2] *In accordance with the National Electricity Objective*

[3] *In accordance with the National Electricity Objective*

[4] *In accordance with Opex Criteria under the NER*

Issue	Adjustment to Total Opex $m (% of efficient base)
Maximum Demand	
Reliability	**+$1.26m** (4.1%)
Backyard Reticulation	**+$2.0m** (6.5%)

Source: Advisian Analysis

Business Practices

2) **The AER's benchmarking approach does not appropriately correct for the differences in business practices between AAD and the frontier businesses**. These are detailed in Section 5 of the report. In particular Advisian has identified issues with the AER's benchmarking relating to:

(a) The AER's reliance on an erroneous and inconsistent assessment of vegetation management expenditure to support its conclusion that AAD is inefficient;

(b) The AER's reliance on an incomplete category analysis (considering only circuit km, and not corrected for reporting differences) to infer that AAD's maintenance expenditure on line and substation assets is inefficient;

(c) The failure to appropriately correct for differences in cost allocation practices, including inconsistencies in the calculation and application of the AER's own ex-post model adjustments;

(d) The failure to appropriately correct the frontier businesses as well as AAD for differences in the allocation of corporate overheads in relation to the Victorian AMI Program;

(e) The failure to appropriately correct the frontier businesses to account for the realisation of specific operational synergies (i.e. shared management and shared control rooms) that are not transparently available to AAD due to its geographical isolation from other DNSPs.

To correct these issues, Advisian has calculated the following adjustments to the AER's efficient base opex to account for differences in business practices between NEM DNSPs. In addition, we consider that given the shortcomings of the AER's Category Analysis for vegetation management and maintenance expenses, the basis for rejecting AAD's proposal or revealed base opex as the starting point for the analysis must be reconsidered.

Table 2 Advisian Recommendations – Business Practices

Issue	Adjustment $m (% of efficient base)
AER Jurisdictional Taxes	**+$0.71m** (2.3%)
AER Standard Control Services Connections	**+$1.40m** (4.5%)
AER OH&S	**+$0.15m** (0.5%)
AER Miscellaneous Factors	**+$0.74m** (2.4%)
Backyard Reticulation[5]	**+$2.00m** (6.5%)

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[5] *Inclusive of the component included in the AER's Draft Decision (refer to section 5.1)*

Issue	Adjustment $m (% of efficient base)
Vegetation Management	Review the basis for rejection of AAD's revealed costs
Maintenance	Review the basis for rejection of AAD's revealed costs
Operating Leases[6]	**+$3.00m** (9.7%)
Cost Allocation ('Capitalisation) Policy[7]	**+$9.90m** (32.0%)
Pole Top Structures	**+$3.32m** (10.7%)
Network 'Overheads'	**+$4.64m** (15.0%)
AMI Corporate OH Allocation	**+$0.85m** (2.8%)
Realised Synergies CitiPower/Powercor Corp OH	**+$1.08m** (3.5%)
Realised Synergies Victorian Network Operations	**+$0.80m** (2.6%)

Source: Advisian Analysis

Factors Affecting the ACT

3)   **The AER's benchmarking approach does not appropriately take into account the unique market factors that affect the ACT**. These issues are detailed in Section 6 of the report. In particular Advisian has identified issues with the AER's assessment relating to:

(a)   The failure to consider whether benchmarking against the outsourcing approaches adopted by other businesses is achievable in the context of the existing ACT contractor market;

(b)   The failure to consider the extent to which AAD's relative isolation limits its ability to realise greater labour and equipment utilisation due through the provision of unregulated contestable services.

As a result, Advisian noted that the AER's Category Analysis conclusions on labour costs are heavily influenced by the degree to which a DNSP outsources opex activities[8]. Therefore we urge caution in applying the AER's benchmarking approach without appropriate consideration of the specific market environment of each DNSP, noting that efficient approaches will also change over time. Based on the model specification used by Economic insights and the relative homogeneity within the individual New Zealand and Ontario data sets[9], it is not apparent to Advisian how these ACT specific factors can be appropriately taken into account in the model.

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[6] *Inclusive of the component included in the AER's Draft Decision*

[7] *Inclusive of the component included in the AER's Draft Decision*

[8] *For example, United Energy appears favourably in the Category Analysis due to the exclusion of the labour component of contract costs from the AER's assessment.*

[9] *both the New Zealand and Ontario businesses essentially provide a large number of data points for businesses that are spread across a total area that is comparable in size to Victoria and subject to the same jurisdictional regulations. Therefore variation in environmental factors and compliance requirements between businesses within each dataset is of marginal significance.*

AER's Application of Benchmarking Findings

4) **The application of the AER's benchmarking approach is inconsistent with productivity trends over the analysis period and the findings of other independent analysis of the data sets used for benchmarking**. These issues are detailed in Section 7 of the report. In particular Advisian has identified issues with the AER's assessment relating to:

   (a) The inadequate consideration of AAD circumstances, and apparent inconsistency of the AER's interpretation of the revised NER's when compared to the AEMC guidance;

   (b) The failure of the methodology used to 'roll forward' productivity scores to account for the significant decline in the assessed productivity of the frontier businesses over the analysis period;

   (c) The inability of the SFA CD model and resulting opex cost function to take account of differences in reliability and safety[10] performance between DNSPs resulting in an inconsistency between the reduced opex allowance and the NER requirements and STPIS incentives to maintain reliability at current levels.

   (d) The clear contradictory evidence from the Ontario Government's advisory panel with regard to Economic Insights conclusion that statistically, there are no apparent scale economies for DNSPs in the combined Ontario, Australian and New Zealand data set.

Therefore Advisian is of the view that the Economic Insights models, the AER's ex-post adjustments for operating environment factors and the averaging and roll forward methodologies each lack the robustness and credibility necessary to support recommendations of the magnitude contained in the ACT and NSW Draft Decisions.

Furthermore, given that the Economic Insights models have intentionally be specified to provide a measure of relative productivity and not of efficient Opex, it is unreasonable for the AER to attempt to use them for this purpose.

When the percentage adjustments to bring the productivity scores for each DNSP from a period average to a 2013 basis are applied, the net effect for AAD is a modest $0.18m reduction in Opex due to a decline in in annual Opex PFP that is of a similar magnitude to the frontier DNSPs.

Conclusion

The AER's Draft Decision for AAD's Opex is largely based on the analysis contained in the Economic Insights report and associated SFA CD model for Opex productivity benchmarking. Whilst benchmarking represents one of the operating expenditure factors, the overarching operating expenditure criteria and objectives must also be taken into account. In our view, the AER's proposed adjustment to AAD's forecast Opex does not satisfy the operating expenditure criteria insofar as it does not represent:

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[10] In particular, Advisian notes the significant safety improvements that were required following the 2009 Victorian bushfire activity.

(a) *"the costs that a prudent operator would require to achieve the operating expenditure objectives"* [11]; or

(b) *"a realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives"* [12]

Whilst the AER's proposed adjustment represents a lower cost, and apparently 'more efficient' forecast than the AAD proposal, the first operating expenditure criterion is that the forecast Opex must reasonably reflect *"the efficient costs of achieving the operating expenditure objectives"* [13].

In our opinion, the AER's alternative forecast is insufficient for AAD to achieve the operating expenditure objectives over the 2014/15 to 2018/19 period as the underlying benchmarking approaches do not adequately take into account:

- the technical differences between DNSPs;
- the differences in cost categorisation between DNSPs;
- the actual productivity achieved by the 'frontier' businesses in the base year; and,
- the circumstances that are unique to the ACT electricity distribution network.

As the impact of these factors are not reflected in the AER's alternative Opex forecast, the alternative forecast does not reflect the efficient costs of achieving the operating expenditure objectives for the ACT network.

Therefore Advisian concludes that the AER's benchmarking analysis, comparisons between businesses and selection of the notional efficiency "frontier" is not a reasonable basis for an alternative Opex forecast without a fundamental engineering and commercial assessment of the components of AAD's forecast Opex or otherwise, the transparent normalisation for differences in reporting factors and ability of the businesses to realise synergies through cost sharing arrangements with other DNSPs.

On this basis, Advisian cautions against the use of the AER's benchmarking analysis results as the basis for alternative Opex forecasts for AAD until such time as these factors can be transparently and robustly accounted for in the benchmarking methodology. Instead, Advisian considers that any alternative forecast based on the Opex benchmarking approach should be reconciled to the AAD revealed base year, whether by the AERs historical approach or by demonstration that the AAD business can be operated at the level of Opex determined by the AER. Should the Opex benchmarking approach be used to set AAD's total Opex in the AER's final decision, the inputs for other DNSPs must in any case be normalised to be reported on a demonstrably consistent basis with AAD's Opex, taking account of the impact of the issues identified by Advisian on both AAD <u>and the frontier DNSPs.</u>

The total adjustment calculated by Advisian using the AER's analysis spreadsheets and ex-post adjustments to productivity scores are summarised in Section 8 of the report and in Table 3 below.

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[11] *NER 6.5.6 (c) criterion 2*

[12] *NER 6.5.6 (c) criterion 3*

[13] *NER 6.5.6 (c) criterion 1*

This table:

(a)   quantifies the effect of calculating each adjustment individually based on the assessed change in *comparable* total opex for AAD and the frontier DNSPs;

(b)   quantifies the cumulative effect of making multiple adjustments to the productivity scores of both AAD and each of the frontier DNSPs[14];

(c)   removes the value associated with ex-post adjustments made in the draft decision that are also specifically considered in our analysis (to avoid the potential for double counting).

This results in a total base opex in the range of $50.36m to $65.42m for AAD. The total effect of our adjustments on the relative productivity scores for AAD and the Frontier DNSPs is illustrated in Figure 1 (noting that the results have been normalised relative to the new highest scoring business).

Table 3 Advisian Recommended Adjustments

Issue	Adjustment $m (% of efficient base)
Advisian Calculated Base Opex[15]	**$30.93** (100.0%)
Issues Identified by the AER in the Draft Decision	
AER Jurisdictional Taxes	**+$0.71m** (2.3%)
AER Standard Control Services Connections	**+$1.40m** (4.5%)
AER OH&S	**+$0.15m** (0.5%)
AER Miscellaneous Factors	**+$0.74m** (2.4%)
Backyard Reticulation[16]	**+$2.00m** (6.5%)
Technical Factors	
SWER Circuit Length	**+$0.38m** (1.2%)
Linear v Spatial Density	Adjustment to model **or** As revealed in the audited base year
Installed Transformer Capacity v Ratcheted	Adjustment to model **or** As revealed in the audited base year

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[14]   As the individual adjustments don't take into account the impact of any preceding adjustment to relative productivity scores, the sum of individual adjustments will tend to understate the total value when multiple adjustments are applied. This arises because, under the AER's analysis approach for AAD, applying a 10% upward adjustment to the 'frontier' productivity score is not equivalent to a 10% increase in AAD's score. For example, increasing the 'frontier' score by 10% (0.86 x 1.1) whilst keeping AAD's score (0.399) constant results in a 9% reduction in AAD's 'efficient' opex, whilst applying a 10% upward adjustment to AAD's score results in a 10% increase in AAD's 'efficient' opex.

As the scale of the adjustment percentage increases, the difference between whether the percentage is applied to the frontier or to AAD increases such that a 30% increase in the 'frontier' score equates to a 23% reduction in AAD's opex, whilst a 30% increase to AAD's score results in a 33% increase. The 'cumulative effect' adjustment included in the table quantifies the magnitude of this issue for the purpose of determining the upper bound of the range arising from our adjustments. (which in turn highlights the inherent imprecision in the AER's approach).

[15]   Advisian notes that this differs from the 'base' opex determined from the Economic Insights model. This is because the Economic Insights model determines base opex for the midpoint of the analysis period and then 'rolls forward' the figure to account escalation to a 2012/13 base and to allow for growth in the factors taken into account in the opex cost function determined from the SFA CD results. Advisian's calculation is based on the AER's spreadsheets used for AAD's draft decision, an electronic copy of the spreadsheet has been provided to AAD. *(refer to section 3.4.1 of this report)*

[16] *Inclusive of the component included in the AER's Draft Decision (refer to section 5.1 of this report)*

Issue	Adjustment $m (% of efficient base)
Maximum Demand	
Reliability	**+$1.26m** (4.1%)
Backyard Reticulation	**+$2.0m** (6.5%)
Business Practices	
Vegetation Management	Review the basis for rejection of AAD's revealed costs
Maintenance	Review the basis for rejection of AAD's revealed costs
Operating Leases[17]	**+$3.00m** (9.7%)
'Capitalisation Policy'[18]	**+$9.90m** (32.0%)
Pole Top Structures	**+$3.32m** (10.7%)
Network 'Overheads'	**+$4.64m** (15.0%)
AMI Corporate OH Allocation	**+$0.85m** (2.8%)
Realised Synergies CitiPower/Powercor Corp OH	**+$1.08m** (3.5%)
Realised Synergies Victorian Network Operations	**+$0.80m** (2.6%)
AER Application Factors	
2013 Basis Productivity Scores	**-$0.18m** (0.6%)
Remove Potential for Double Counting	
Less AER 'Capitalisation Policy' and 'Miscellaneous' adjustment	**-$10.64m** (34.4%)
Total (Sum)	**$50.36m** (62.8%)
Cumulative effect	**+$15.06m** (48.7%)
Total (Cumulative)	**$65.42m** (111.5%)

Source: Advisian Analysis

As our total adjustment:

(a)   does not take into account factors that are best addressed through improvements to the model specification;

(b)   has been calculated with the intention of replicating the AER's approach to demonstrate the materiality of factors that have not appropriately been considered within the AER's own analysis framework; and,

(c)   the resulting productivity scores, even after all of our adjustments have been applied, still include identifiable factors that have not been accounted for (such as the exclusive use of concrete/steel Stobie poles by SA Power Networks in preference to wood poles and the

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[17] *Inclusive of the component included in the AER's Draft Decision*

[18] *Inclusive of the component included in the AER's Draft Decision*

adjustment required to bring United Energy's reported overheads to a comparable basis due to the outsourced nature of its business).

Advisian highlights that our total adjustment to productivity scores (the results of which are shown in Figure 1) are still likely to understate the relative productivity, *in comparable terms*, between AAD and the frontier businesses for the purpose of determining the efficient opex for AAD. Notwithstanding this, our adjustments result in a substantial reduction in the 0.46 index point[19] 'productivity gap' that was identified as the basis for the AER's draft decision to a much lower 0.22 index point gap[20]. AAD is also shown to achieve a productivity level that is within the range of the 'frontier' DNSPs when assessed on a *more comparable* basis.

It is for this reason (and the sheer number and scale of adjustments that are required to achieve a comparable basis for benchmarking) that we consider it to be preferable to use the revealed base year opex as the efficient base.
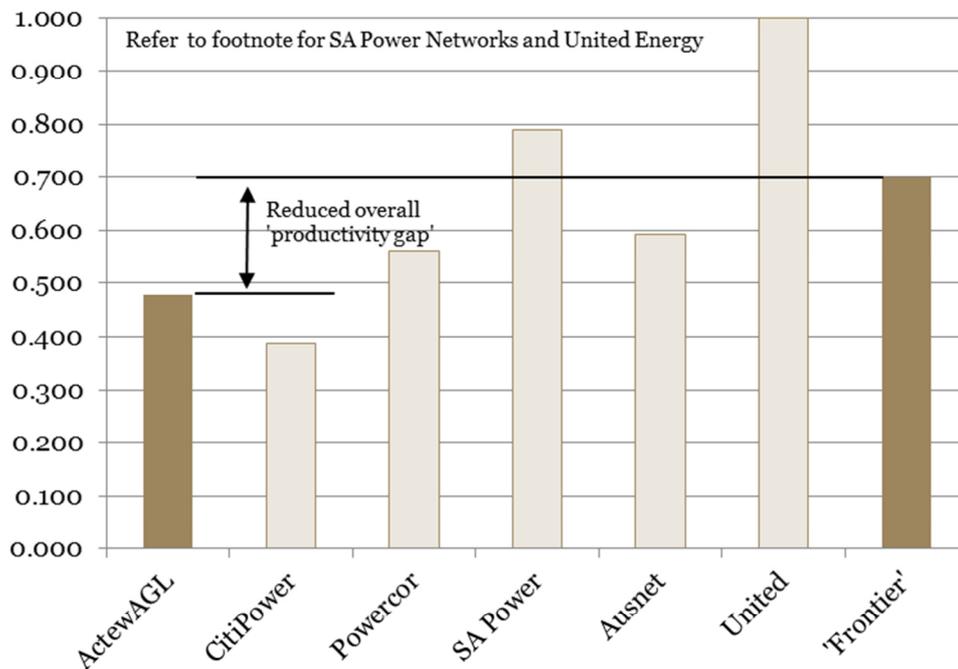
Figure 1 Advisian Adjusted Relative Productivity Scores, Inclusive of All Adjustments and Rebased Against the Highest Scoring DNSP[21]
Source: Advisian Analysis

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[19] *Economic Insights Frontier Score (0.86) – Economic Insights AAD Score (0.40)*

[20] *Advisian Adjusted Frontier Score (0.70) – Advisian Adjusted AAD Score (0.48).*

[21]   Advisian notes that both SA Power Networks and United Energy (the two highest scoring businesses following our adjustments) are affected by unique factors that have not been able to be taken into account in our analysis.   **SA Power Networks** almost exclusively uses 'Stobie Poles' for its network. These are constructed from steel and concrete and are not susceptible to rot or termite attack (but are subject to different modes of deterioration). With a population of around 700,000 poles, these represent a substantial Opex benefit due to reduced inspection requirements/frequency. **United Energy** does not report the capitalisation of any network overheads, as these were typically delivered as part of the contract cost with its asset management and operation and maintenance contracts with Jemena Asset Management (now Zinfra) over the analysis period. Therefore it was not possible to determine the proportion of capitalised 'network overheads' from the publically available RIN information.

1 Introduction

Advisian (formerly Evans & Peck) was engaged by ActewAGL Distribution (AAD) to provide an independent expert report into the cost drivers for the ACT electricity distribution network to inform AAD's response to the Draft Decision. The purpose of the engagement was to inform AAD's preparation of their response to the Australian Energy Regulator (AER) Draft Decision for AAD covering the 2014/15 to 2018/19 regulatory control period. A key component of the AER Draft Decision is a proposal to reduce AAD's proposed operating expenditure by approximately 42% over the 5 year period covered by the Draft Decision[22].

In making their assessment the AER has adopted a two stage process. A series of benchmarking models have been created to form a view of AAD's efficiency in comparison to a number of other Australian Distributors (notably CitiPower, Powercor, United Energy, Ausnet (all Victorian) and SA Power Networks). Having determined a base level of efficient expenditure from the benchmarking exercise, the AER has made a series of "adjustments" that it believes reasonably reflects "circumstances" pertinent to AAD.

1.1 Advisian's Experience

This report has been prepared by William (Bill) Glyde and Evan Mudge.

Bill Glyde has 43 years' experience in the electricity industry. He holds a Bachelor of Electrical Engineering and a Master of Commerce. He has held senior positions with distributors, retailers and generator trading companies. As a consultant Bill has provided advice on regulatory issues and network performance to industry, government and regulators.

In 2004 he was engaged as the technical advisor to the Independent Review of Electricity Distribution and Service Delivery for the 21st Century (Queensland). Following release of the associated report in July 2004, Bill has spent almost 9 years assisting the Queensland Government and Queensland Competition Authority overseeing the implementation of the findings from that Review. [23]

Evan Mudge has over 10 years of experience in the energy sector. He holds a Bachelor of Engineering and a Master of Applied Finance. Evan has worked as a consultant on a broad range of matters in relation to more than 25 Australian regulatory decisions for electricity and gas network service providers.

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[22] AER, *Draft Decision - ActewAGL distribution determination 2015–16 to 2018–19, Overview,* November 2014, p.12.

[23] The resulting independent panel report summarises the outcomes of the review as follows:

"The Review was established by the Queensland Government in response to concerns expressed about the performance of distribution networks during a series of storms and hot weather in January and February 2004.

Whilst the Review came about as a result of the storms, the Terms of Reference required the Panel to look at the distributor's network performance, expenditure programs and systems and processes. In view of the findings of the Panel outlined in this Report, it was timely that this Review took place when it did "

Qld Department of Natural Resources, Mines and Energy, *Detailed Report of the Independent Panel – Electricity Distribution and Service Delivery for the 21st Century*, July 2004, p.5.

His experience includes engagements with the vast majority of Australian network service providers as well as with the AER for the previous TransGrid, ETSA Utilities, Ergon Energy and Energex decisions, the Economic Regulation Authority of WA in relation to Horizon Power's funding arrangements and the Independent Public Business Corporation of Papua New Guinea in relation to a review of reliability and investment in PNG Power.

1.2　　Letter of Instruction

Advisian was engaged to provide an independent report responding to the following questions in relation to the AER's Draft Decision on AAD's Opex:

1)　*What are the fundamental technical differences between the ACT electricity distribution network and distribution networks in other states that form the top quartile of the AER's reported "efficiency frontier"? Comment on the impact of these technical differences on ActewAGL's Opex relative to the "top quartile" distribution networks.*

2)　*What differences in business practices exist between ActewAGL and other Australian DNSPs that affect how the reported Opex and Capex figures should be interpreted for benchmarking purposes? What is the impact of these differences in business practices on ActewAGL's Opex relative to the "top quartile" DNSPs that form the AER's efficiency frontier?*

3)　*What unique factors affect ActewAGL's distribution network relative to other Australian DNSPs which impact on the amount of forecast Opex necessary to reasonably reflect the Opex criteria in clause 6.5.6(c) of the NER? What is the impact of these factors on ActewAGL's Opex relative to the "top quartile" DNSPs that form the AER's efficiency frontier?*

4)　*What adjustments to base year operating costs does Advisian consider are relevant and necessary to reflect differences in technical characteristics, business practices and other circumstances and what is the value of these adjustments?*

5)　*Provide an opinion on whether the approach taken by the AER for its proposed reduction to the regulatory Opex allowance is reasonable in the context of the NER requirement that forecast Opex for the regulatory control period reasonably reflect the Opex criteria in clause 6.5.6(c) of the NER.*

6)　*Any other matters Advisian considers relevant.*

The Letter of Instruction are included in Appendix A.

1.3　　Report Structure

To address the questions raised in the Letter of Instruction, Advisian has first considered the requirements of the National Electricity Rules (NER) as applicable to AAD's Opex. We have then summarised the relevant background information provided to the AER with AAD's regulatory

proposal[24] and the AER's Draft Benchmarking Report[25] and Category Analysis information[26], as provided to AAD.

This **Section 1** introduces the report, outlines the scope of our engagement and provides a summary of the report structure. We have then outlined our assessment approach and detailed the basis for our opinion through the remainder of the report, as follows:

Section 2: Provides a background to the NER requirements, AER analysis and findings as published in the AER's Draft Decision.

Section 3: Outlines Advisian's approach to the analysis.

Section 4: Considers the core technical differences between the AAD network and other DNSPs. This addresses the first question of the Letter of Instruction.

Section 5: Considers the core differences in business practices that affect the reported Opex for AAD relative to other DNSPs. This addresses the second question of the Letter of Instruction.

Section 6: Considers the influence and materiality of the factors that are unique to the ACT electricity distribution network. This addresses the third question of the Letter of Instruction.

Section 7: Provides Advisian's opinion on the reasonableness or otherwise of the AER's Draft Decision findings for AAD's Opex. This addresses the fifth question of the Letter of Instruction.

Section 8: summarises the adjustments that we consider are necessary to take account of our findings in the preceding sections. This addresses the fourth question of the Letter of Instruction.

Section 9: Concludes the report

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[24] ActewAGL Distribution, *Regulatory Proposal 2015-19 Subsequent Regulatory Control Period*, 2 June 2014 (resubmitted 10 July 2014)

[25] AER, *Annual Benchmarking Report – Electricity Distribution Network Service Providers,* August 2014

[26] AER, *Category Analysis Benchmarking Metrics for DNSPs,* 19 August 2014

2 Background

To provide context, this section summarises the background information that is relevant to the assessment, including the NER requirements for DNSPs forecast operating expenditure, the information provided by AAD to the AER, the AER's Annual Benchmarking Report and Category Analysis findings as well as the Draft Decision.

2.1 NER Requirements

In undertaking our assessment, Advisian has taken account of the requirements of the NER in relation to preparation and assessment of DNSP Opex forecasts. The NER essentially requires that:[27]

a) a DNSPs' forecast operating expenditure (Opex) is necessary to meet the *operating expenditure objectives* that are described in NER6.5.6(a).

b) the *operating expenditure criteria* are used by the AER to determine whether the forecast Opex represents the reasonable and efficient cost of meeting the *operating expenditure objectives*.

c) the *operating expenditure factors* are used by the AER to assess whether the *operating expenditure criteria* are satisfied.

d) Following the submission of the DNSP's regulatory proposal, the AER must either accept or reject the DNSP's proposed forecast Opex on the basis of the *operating expenditure criteria* which are described in NER6.5.6(c).

e) the AER takes into account the *operating expenditure factors* in determining whether or not it is satisfied with the DNSP's proposed forecast Opex. The *operating expenditure factors* are described in NER 6.5.6(e).

Importantly, the NER's have recently been revised following a rule change that was approved by the AEMC in November 2012[28] which provides useful guidance on the application of the regulator's discretion when applying benchmarking techniques in accordance with the revised rules.

2.2 AER Annual Benchmarking Report

The AER's Annual Benchmarking Report[29] summarises the benchmarking that was undertaken based on the information provided by the DNSPs in response to the AER's Economic Benchmarking RIN. The AER is required to consider the Annual Benchmarking Report as a factor in determining whether it is satisfied with the DNSPs proposed Opex forecast.

The first annual benchmarking report was published at the same time of the Draft Decision and the AER summarised the findings as follows:

"The results of our MTFP analysis show:

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[27] National Electricity Rules 6.5.6, Version 65, 1 October 2014

[28] AEMC, *Rule Determination – National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012,*29 November 2012, pp. 111 to 113.

[29] AER*, Electricity Distribution Network Service Providers – Annual Benchmarking Report*, November 2014

- *the state wide average indicates that the Victorian and South Australian distributors appear to be the most productive. That said, one Queensland distributor Energex outperforms a Victorian distributor Ausnet Services on average over the observed period.*
- *The ACT, NSW and Tasmanian distributors appear to be the least productive*
- *Productivity across the sector is declining. This has been caused by large increases in the expenditure of distributors at a time when demand for their services has been relatively stable or declining. We recognise however, that some of the decrease in productivity may be attributable to changes in the operating environment, which are unaccounted for in the modelling, for example changes to bushfire related regulatory requirements.*

Taken together, the PPIs also show that the Victorian and South Australian distributors generally appear the most productive. They also highlight the impact customer density has on distributors' expenditure."[30]

In the report, the AER also identifies the key network outputs for efficiency purposes as:

- Customer Numbers
- Route Line Length
- Maximum Demand, Capacity and Energy Delivered
- Reliability[31]

In comparison, the network inputs are identified as:

"the resources that distributors use to deliver services (outputs) to their customers. The inputs used to provide distribution services can be separated into those that are consumed in the year that they are purchased and those that may be used over several years or, in the case of energy networks, over several decades. The former is normally referred to as operating expenditure (Opex) and the latter as assets or capital stock."[32]

Effectively, the models provide a measure of how 'efficiently' the capital stock and opex components of customer charges are (statistically speaking) translated into Customer Numbers, Route Line Length, Maximum Demand and Reliability by the DNSPs.

2.2.1   Benchmarking Findings

Having discussed the benchmarking model, the AER's benchmarking report then presents a range of Multilateral Total Factor Productivity (MTFP), Partial Factor Productivity (PFP) and Partial Performance Indictors (PPI) that illustrate the differences and relative 'performance' of the businesses on an absolute level (index score) and the change in the index score over time.

Overall the AER's analysis found that AAD's *absolute productivity* scores were generally at the lower extreme of the industry. However:

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[30] *ibid, p. 6.*

[31] *ibid, pp. 11-15*

[32] ibid, *p.16.*

- AAD's absolute MTFP score declined over the 2006-13 analysis period by 0.100 index points against a greater industry average decline of 0.149 index points. For AAD this represents an average annual decline of 1.51% against an industry average decline of 1.73%[33][34].
- AAD's absolute PFP score for capital increased over the 2006-13 analysis period by 0.026 index points against an industry average decline of 0.108 index points. For AAD, this represents an average annual improvement of 0.37% against an industry average decline of 1.39%.[35]
- AAD's absolute PFP score for Opex decreased over the 2006-13 analysis period by 0.252 index points against an industry average decline of 0.227 index points. For AAD, this represents an average annual decline of 4.16% against an industry average decline of 2.21%[36].

These results indicate that AAD outperforms the AER's assessed industry average *change in productivity* over the analysis period on the basis of:

1) lower (better) than the AER's measure of industry average productivity decline in absolute terms; and,

2) lower (better) than the AER's measure of industry average productivity decline when expressed in a proportion to the DNSPs initial MTFP index scores.

However the decline in AAD's Opex partial factor productivity over the analysis period is above the industry average and results in AAD recording the lowest absolute Opex PFP index score for 2013, at the conclusion of the analysis period.[37]

The AER has then provided a number of Opex, Capex, total cost and reliability PPI graphs which show:

- AAD is generally above the cohort (more costly) for measures for Opex per MW maximum demand and Opex per customer;
- AAD is within the cohort (within the cost range experienced by other DNSPs) for the asset cost (Capex) measure per MW maximum demand;
- AAD is at the upper end of the cohort (at the upper end of the cost range experienced by other DNSPs) for the total cost per MW maximum demand and the total cost per km line length measures; and,
- AAD is outside the cohort (better reliability performance) for reliability measures of total cost per customer and per km against customer minutes off supply.

Recognising that AAD appears to diverge significantly (an implied over performance or over expenditure) from the cohort for the AER's reliability measures, Advisian notes that the AER makes the following statements in relation to reliability performance:

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[33] ibid, Figure 16, p.32

[34] Economic Insights, *Economic Insights AER DNSP MTFP & MPFP 10Nov2014.xls*, 'DNSP MTFP & MPFP Sorted ', Column I (2013 MTFP) minus Column B (2013 MTFP)

[35] ibid

[36] Ibid (note that changes are from different bases therefore percentage declines are not proportional to changes in Index points)

[37] AER, *Electricity Distribution Network Service Providers – Annual Benchmarking Report*, November 2014, Figure 19, p. 35

"We would expect those distributors with greater route line lengths to incur higher minutes off supply per customer, as they may need to travel further distances when responding to outages"[38]

and:

"We would expect those distributors with greater line length to spend less per km and exhibit longer outage durations"[39]

Therefore the benchmarking report shows that whilst AAD's assessed change in total productivity has outperformed the industry average over the assessment period, the recent declines in Opex productivity, better than typical reliability performance and low absolute productivity scores calculated for AAD invites further investigation into the underlying reasons for these issues and their impact on the Opex required by AAD.

2.3   Draft Decision Finding

In its Draft Decision for AAD's distribution network, the AER has determined a total reduction of 41.6% ($157.0m real 2013/14) to AAD's proposed Opex allowance[40]. The majority of this figure ($122m real 2013/14)[41] is the result of the recommendation for a 36.8% reduction in Opex[42] on the basis of productivity benchmarking analysis conducted by Economic Insights[43].

The remainder of the Opex adjustment relates to specific adjustments for changes to AAD's cost allocation methodology and service classifications, including the AER's application of a productivity 'frontier' set at 75% of the highest scoring DNSP in the analysis as well as the 'roll forward' of the Economic Insights analysis period average 'base opex' to the 2012/13 base year based on an opex cost function derived from the preferred model.

The Economic Insights preferred methodology essentially reduces distribution business Opex to the four key explanatory variables of customer numbers, ratcheted maximum demand, circuit length and proportion of overhead and underground network. Following the analysis, the AER and Economic Insights have applied further adjustments to the 'base' level of 'efficient Opex' predicted by the model. These adjustments total approximately 30% of the Economic Insights recommendation that was accepted by the AER for 'base' Opex to account for specific factors affecting AAD. These are:

- 'Capitalisation policy'[44] (17.6%)
- Standard Control Services Connections (4.5%)

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[38] ibid, p. 45

[39] ibid, p. 46

[40] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p. 7-7

[41] ibid, p.7-17

[42] ibid. p 7-26

[43] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure of NSW and ACT Electricity DNSPs*, 17 November 2014.

[44] Advisian notes that whilst the AER refers to 'Capitalisation Policy', these adjustments actually relate to differences in the Capitalisation <u>Practices</u> between DNSPs. For clarity, we have generally referred to 'capitalisation practices' in this report unless in a direct quote from the AER.

- Backyard Reticulation (2.8%)
- Taxes and Levies (2.3%)
- OH&S Regulations (0.5%) [45]

The AER has taken the sum of these adjustments (27.7%) and made a miscellaneous allowance of 2.3% (the balance of the 30% adjustment) to account for a range of other factors that were identified during the review. However the AER found that these factors did not satisfy its materiality criteria on an individual basis[46].

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[45] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p. 7-90

[46] ibid, pp. 90-91

3 Advisian's Approach

This section outlines the approach taken by Advisian to respond to the Letter of Instruction provided by AAD. We first outline the key concerns arising from our review of the information provided to, and received from, the AER. This is followed by an explanation of how we considered the materiality of issues, assessed the relative differences between AAD and the 'top quartile' businesses[47] and how we quantified the relative impact on AAD's Opex.

3.1 Review of information

Advisian reviewed a range of information provided to the AER and received from the AER over the course of making the Draft Decision. This included the AAD regulatory proposal, responses to the AER's questions[48], discussions with AAD staff, the AER's benchmarking report, Draft Decision, supporting models and consultant reports. A list of the information provided by AAD or otherwise considered by Advisian is included in Appendix C

3.1.1 Application of Benchmarking Techniques

In preparing their Draft Decision, the AER has adopted a multistage approach in assessing the level of operating expenditure. On the basis of benchmarking analysis prepared by Economic Insights[49], the regulator has assessed the relative efficiency of the NSW DNSPs in comparison to other Australian DNSPs. The "validity" of the benchmarking results has been "confirmed" by making a number of efficiency comparisons on specific tasks (such as Vegetation Management) using information provided by all DNSPs in the AER's "Category Analysis" Regulatory Information Notice returns. Out of model adjustments have then been made on the "efficient" level of expenditure that the AER considers compensates for specific issues.

From our review, we recognise the difficulties encountered by the AER and its consultants in developing appropriate benchmarking models for disparate Australian distribution businesses. In particular, we note the limitations of the number of variables that can defensibly be included in the type of statistical models that have been employed due to the limited numbers of comparable Australian businesses and the wide variation in operating environments between DNSPs. Therefore it is understandable to attempt to augment the Australian data set with international comparators; however care must be taken to ensure that the additional data is genuinely comparable.

Advisian also recognises that the key historical issue with respect to the application of statistical benchmarking techniques to Australian DNSPs remains the underlying statistical assumptions that the operating environment, reporting practices, business environment and legacy technology is relatively homogenous between businesses. Within Australia, this assumption of homogeneity does

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[47] In this case the 'top quartile' refers to businesses that have scored over 75% of the highest scoring DNSP in the Economic Insights analysis. This is a notional measure that comprises five businesses (CitiPower, Powercor, United Energy, SA Power Networks, Ausnet). Therefore the top 'quartile' does not numerically relate to the top quartile of the 13 Australian DNSPs, the top quartile of customers, or the top quartile of assets.

[48] AAD, *Operating and Capital Expenditure 'Site Visit' Clarifications – 2012-19 Subsequent Regulatory Control Period, 3 October* 2014

[49] *An alternative set of Benchmarking was also performed by PECG, but this has not been utilised)*

not hold across the vastly different operating environments from the tropical and outback areas of Queensland served by Ergon Energy to the exclusively CBD and inner city service area of Citipower.

3.1.2   Statistical and Econometric Issues

Advisian has not been engaged to provide expert opinion on the technical aspects of the benchmarking models. However, in order to address the engagement, it is necessary to consider the factors that form the basis of the benchmarking performed by Economic Insights.

Advisian notes the historical difficulties experienced in accounting for the heterogeneous nature of Australian networks and inclusion of additional international data from Ontario (Canada) and New Zealand, which almost exclusively represent much smaller scale businesses operating in significantly different conditions to the Australian DNSPs.

With regard to the Ontario data, Advisian notes that the Ontario Government's Ontario Electricity Distribution Sector Review Panel (OEDSRP) does not consider either its individual DNSPs or industry structure to be *comparable* to other provinces within Canada, or states in Australia[50], and has recently determined that there is a need to consolidate the existing DNSPs to an industry structure that is more consistent with other jurisdictions. Whilst also providing useful commentary on scale economies, unique operating factors and other issues that appear to be inconsistent with Economic Insights conclusions on these matters, the OEDSRP report notes that:

> *"Ontario's fragmented system for distributing electricity is unique in Canada, a product of history rather than the outcome of rational planning. No other jurisdiction has chosen this structure as a desired outcome...*
>
> *...The range and variety of the province's Local Distribution Companies (LDCs) is remarkable and cannot be found in any other jurisdiction in Canada. One of the smaller utilities, Hydro 2000, serves just 1,208 customers in the eastern Ontario towns of Alfred and Plantagenet. The largest distributor in the province, Hydro One Networks, has a thousand times as many customers.*
>
> *The province's electricity distribution system is also notable for the large number of small LDCs.*
>
> *• There are 29 LDCs in Ontario that have fewer than 12,500 customers each.*
>
> *• These 'small' LDCs account for over a third of all the utilities in Ontario, but less than 4% of the province's electricity customers"*[51]

From Advisian's review of New Zealand data, it is clear that similar issues of scale and *comparability* are evident in the New Zealand dataset. As an example Advisian notes one of the NZ DNSPs comments that:

> *"For the size of our geographical area of 13,700sq km our customer base of 24,000 is one of the smallest in New Zealand.*

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[50] Ontario Distribution Sector Review Panel*, Renewing Ontario's Electricity Distribution Sector: Putting the Consumer First,* December 2012, p.9

[51]ibid, p.6.

To reach all of our customers we need 4,500km of lines – that's more than the distance from Auckland to Sydney and back. The lines include 1,500km of single wire earth return – a cost-saving technology for extensive rural networking for which we are internationally recognised. Each year 300km of lines on the network are inspected and maintained. This is done on a 15 year cycle."[52]

In relation to termite damage, (which is a major driver for much shorter (4 -5 year) inspection cycles that drive DNSP line maintenance costs in Australia), increasingly so the further north the DNSPs service area is located[53], the New Zealand Ministry of Primary Industries (MPI) responds directly to eradicate any identified colonies. The MPI identifies a total of four instances within New Zealand as follows:

"Coptotermes acinaciformis is a subterranean termite that forms nests in timber that is in contact with the ground. Of all native species in Australia, it is considered to have the most destructive impact on buildings and other wooden structures. They will also feed on living trees. They form large colonies and tunnel up to 50 metres from the nest to forage for food. They tunnel underground and, where necessary, form mud runways above ground.

There are four current MPI responses to this termite:

- *Nelson, 2009*
- *Auckland, 2010*
- *Pt Wells, 2012*
- *Karaka, South Auckland, 2012*

The Nelson infestation was treated with hexaflumuron baits and termite activity has ceased. The site will be monitored for five years before eradication is officially declared. The remaining three infestations are still being treated and termite activity is still present" [54]

Termites also appear to be the exception rather than the norm in Ontario. In addition to this and obvious climatic differences between the Australian States, Ontario and New Zealand, we are concerned that there are a range of environmental and industry factors that have not been taken into account to ensure that the benchmarking is based on *comparable* businesses.

Consequently, whilst we are cognisant of the economic, econometric and statistical issues, the primary focus of this report is on the technical, business practices and jurisdictional factors that affect the interpretation of the NSW DNSPs benchmarking results in relation to the AER's 'frontier businesses'. Given the historical difficulties experienced in accounting for the heterogeneous nature of Australian networks,[55] Advisian notes that the econometric issues with the modelling approach are being investigated separately by AAD's consultants Cambridge Economic Policy Associates (CEPA)

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[52] The Lines Company Website, http://www.thelinescompany.co.nz/network (pole inspection cycles for Australian DNSPs are typically in the order of 5 years based on the reported RIN information)

[53]*Huegin Consulting Ergon Energy Expenditure Benchmarking Partial productivity and cost driver analysis and comparisons 17 October 2014 – Network Location Termite Exposure Figure p8*

[54]New Zealand Ministry for Primary Industries website http://www.biosecurity.govt.nz/publications/biosecurity-magazine/issue-82/aus-termites

[55] and inclusion of additional international data from Ontario (Canada) and New Zealand, which almost exclusively represent much smaller scale businesses operating in significantly different conditions to the Australian DNSPs

and Huegin Consulting. Consequently this report focuses on the technical, business practices and jurisdictional factors that affect AAD's network in relation to the AER's 'frontier businesses'.

3.1.3 Technical Issues

Notwithstanding the AER's consideration of the issues that were identified in Advisian's (formerly Evans & Peck) report[56] that was submitted as an attachment to the Ausgrid proposal, we are of the view that the AER's benchmarking model does not appropriately take these factors into account and that the materiality of a number of these factors has been understated in the AER's analysis of specific 'out-of-model' adjustments[57]. Consequently, we consider that the notional 2.3% adjustment for these factors is insufficient in the case of AAD, based on our assessment of the magnitude of the impact of these factors. For the purpose of this report we have categorised these as technical differences, business practices, jurisdictional differences and the AER's application of its benchmarking findings to the AAD network.

3.2 Key Concerns

On the basis of our review of the AER's Draft Decision, Advisian notes that the AER and its consultant have focused almost exclusively on the relative productivity of the businesses. We recognise that this is an appropriate approach to measure the efficiency with which DNSPs can serve customer demands, however it does not fully account for the fact that some networks are inherently less efficient (more expensive) to operate than others on a unitised basis (e.g. per customer, per km, per MVA). Consequently we are concerned that the AER has considered that Opex productivity is an equivalent measure to Opex efficiency[58].

3.2.1 Opex Productivity v Efficient Opex

In determining the efficient Opex for a network business it must be recognised that there are a range of factors that are reflected in the existing asset base that create inherent and unavoidable differences in the efficient Opex required to operate and maintain a distribution network. These include issues such as system security requirements, legacy planning decisions, differences in customer type and location on the network.

To this end, we note that the Opex efficiency is primarily driven by the efficiency with which assets can be operated and maintained at the required reliability level, whilst productivity is driven by the efficiency with which the asset base can serve customers at an acceptable absolute level. Therefore the efficiency of Opex is driven by:

▪ The physical volume, type and capacity of assets actually installed;

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[56] Evans & Peck, *Review of factors contributing to variations in operating and capital costs structures of Australian DNSPs*, November 2012

[57] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, pp. 7-91 to 7-122

[58] In plain terms, this is akin to measuring someone's weight to determine a definitive 'optimal' height. Whilst general statistical relationships between weight and height do exist, there are simply too many factors that are unique to an individual for the statistical prediction from a single model to be reliable in all cases.

- The reliability performance of the network; and,
- The geographical distribution of assets and customers across the service area.

In the case of AAD, the reliability performance of the network is similar to the benchmark CBD network (CitiPower), whilst the line length is closer to a Victorian suburban network (Jemena) and the geographical distribution of customers (as indicated by the customers per square km of service area) is approximately 15%-20% of the Victorian suburban networks (Jemena and United Energy).

It is apparent from the AER's analysis that whilst these factors may have been appropriately considered for the purpose of calculating a relative Opex productivity measure between Australian and international DNSPs, they have not been appropriately considered for the purpose of determining the efficient base year Opex for AAD's network.

3.2.2   Areas for Investigation

In undertaking our assessment we have considered the AER's stated criteria for determining whether or not an operating factor should be taken into account. These are:

1) Is it outside of the service provider's control?

2) Is it material?

3) Is it accounted for elsewhere?[59]

Advisian's main concern is that the AER's benchmarking approach does not fully account for the technical differences between AAD and the frontier businesses and limited effort has been placed into ensuring that the cohort DNSPs used for benchmarking purposes are truly *comparable*. The remainder of this report is structured to address the following key issues:

1) **The AER's benchmarking approach does not appropriately account for the technical differences between AAD and the frontier businesses**. In particular Advisian has identified issues with the AER's benchmarking relating to:

   (a) Comparability of the DNSPs used for benchmarking purposes;

   (b) The inadequacy of the AER's benchmarking model to appropriately capture the variability in opex drivers between Australian DNSPs;

   (c) The failure to appropriately consider the effect of spatial density (customers/km^2) in addition to linear density (customers/km) on efficient Opex;

   (d) The need for DNSPs to operate and maintain the assets they actually have (e.g. 11kV distribution), rather than the assets they might have had (e.g. 22kV distribution) (if they had been subject to the same operating environment and historical development as the notional frontier DNSP), in a safe and reliable manner;

   (e) The differences in reliability and safety performance over the analysis period; and,

   (f) The application of the AER's adjustment for additional costs relating to backyard reticulation in the ACT.

   We have also identified that the AER's benchmarking model is under-specified due to its fundamental inability to take into account the effect on opex arising from differences in

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[59] ibid, p. 7-92

transformer capacity or the differences in scope of the services provided (and assets owned) by DNSPs

2) **The AER's benchmarking approach does not appropriately correct for the differences in business practices between AAD and the frontier businesses**. In particular Advisian has identified issues with the AER's benchmarking relating to:

(a) The AER's reliance on an erroneous and inconsistent assessment of vegetation management expenditure to support its conclusion that AAD is inefficient;

(b) The AER's reliance on an incomplete category analysis (considering only circuit km, and not corrected for reporting differences) to infer that AAD's maintenance expenditure on line and substation assets is inefficient;

(c) The failure to appropriately correct for differences in cost allocation (capitalisation) practices, including inconsistencies in the calculation and application of the AER's own ex-post model adjustments;

(d) The failure to appropriately correct the frontier businesses as well as AAD for differences in the allocation of corporate overheads in relation to the Victorian AMI Program;

(e) The failure to appropriately correct the frontier businesses to account for the realisation of specific operational synergies (e.g. shared management and shared control rooms) that are not transparently available to AAD due to its geographical isolation from other DNSPs.

3) **The AER's benchmarking approach does not appropriately take into account the unique market factors that affect the ACT**. In particular Advisian has identified issues with the AER's assessment relating to:

(a) The failure to consider whether benchmarking against the outsourcing approaches adopted by other businesses is achievable in the context of the existing ACT contractor market;

(b) The failure to consider the extent to which AAD's relative isolation limits its ability to realise greater labour and equipment utilisation due through the provision of unregulated contestable services.

4) **The application of the AER's benchmarking approach is inconsistent with productivity trends over the analysis period and the findings of other independent analysis of the data sets used for benchmarking**. In particular Advisian has identified issues with the AER's assessment relating to:

(a) The inadequate consideration of AAD circumstances, and apparent inconsistency of the AER's interpretation of the revised NER's when compared to the AEMC guidance;

(b) The failure of the methodology used to 'roll forward' productivity scores to account for the significant decline in the assessed productivity of the frontier businesses over the analysis period;

(c) The inability of the SFA CD model and resulting opex cost function to take account of differences in reliability performance between DNSPs resulting in an inconsistency between the reduced opex allowance and the NER requirements and STPIS incentives to maintain reliability at current levels.

(d)   The clear contradictory evidence from the Ontario Government's advisory panel with regard to Economic Insights conclusion that statistically, there are no apparent scale economies for DNSPs in the combined Ontario, Australian and New Zealand data set.

These issues are discussed in more detail in sections 4 to 7 our recommendations for specific adjustments within the AER's analysis are summarised in section 8.

3.3   Materiality

In undertaking our assessment Advisian has focussed on issues that can be demonstrated to be material in their own right or when similar related issues are aggregated at a category level. For the purpose of this report we have notionally considered issues that account for an Opex impact of more than $0.5m in any single year or $1m over the 2014/15 to 2018/19 regulatory control period. This is generally consistent with the dollar value of the AER's specific adjustments.

3.4   Quantification of impacts on Opex

Advisian notes that it is not always possible to fully quantify the impact on Opex for all businesses; however it is possible in most cases to demonstrate a relative advantage or disadvantage of a business relative to its peers based on a comparison of the relevant results. Wherever possible we have quantified the impact of our analysis on the basis of a:

▪ Fixed dollar value
▪ Percentage adjustment
▪ Relative advantage/disadvantage and how this could best be addressed

In some cases the specific issues discussed are most appropriately addressed through changes to the model specification or adjustments to the assessed productivity of the frontier businesses.

Advisian notes that whilst we do not consider that the AER's SFA benchmarking model to be robust, for the purpose of this report we have used the AER's approach of ex-post adjustments to the SFA productivity scores to quantify the value of the adjustments. The only difference in approach is that our calculation makes corresponding adjustments to all of the DNSPs under consideration.

This approach has been adopted for three reasons.

(a)   to avoid the need to test and validate a range of alternative statistical models, which is beyond the scope of Advisian's engagement and is being considered separately;

(b)   to retain analytical consistency with the approach taken by the AER / Economic Insights; and,

(c)   to demonstrate the materiality of the issues and relative effect on the overall productivity frontier when the productivity scores for all DNSPs are adjusted for the same heterogeneous factors (rather than only adjusting AAD).

Our calculation approach to determine the impact on the base year Opex is summarised in Figure 3-1
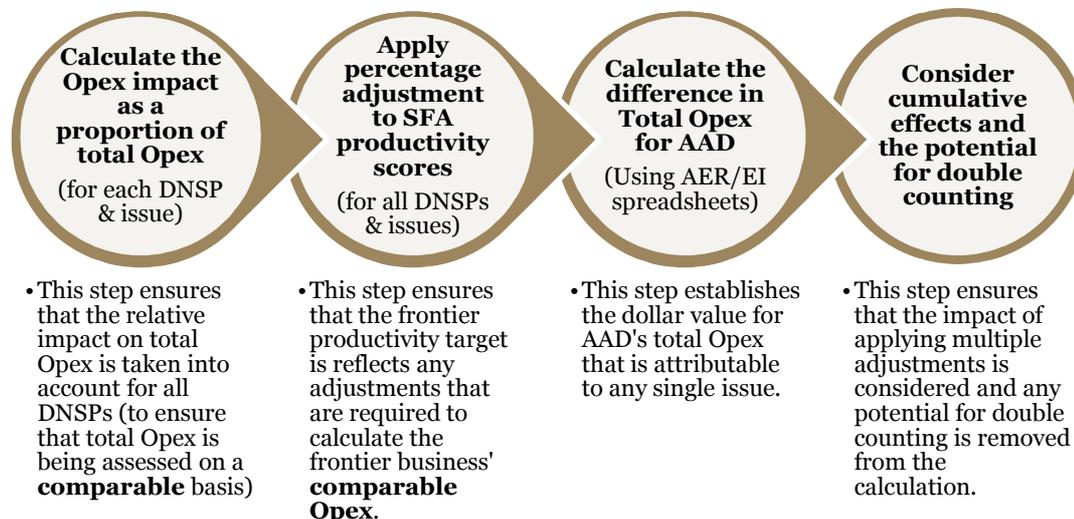
Figure 3-1 Calculation approach for adjustments to base year Opex[60]
Source: Advisian

3.4.1   Establishing the 2012/13 'Base' efficient Opex

Advisian notes that the Economic Insights analysis has been based on averages over an analysis period from 2006-2013. This means that the figures that have been calculated represent the 'average' (notionally the 2009 midpoint of the period). The AER has subsequently applied ex-post adjustments to the modelled results and then 'rolled forward' the results using the cost function derived from the model to a 2012/13 basis for the purpose of its draft decision. Therefore the figures presented in the Economic Insights report do not equate directly to the figures used in the AER's draft decision.

To avoid the need to replicate the Economic Insights analysis, we have used the AER's spreadsheets that underpin the draft decision to calculate the equivalent 'base' efficient Opex figure, exclusive of any ex-post adjustments applied by the AER. To calculate this figure, Advisian has[61]:

(a)   taken the AAD base Opex of $73.38m reported in the AER's Opex model for 2012/13[62];

(b)   removed the AER's Opex reduction of 45.2% on the 'rolled forward' base Opex reported in the AER's Opex base year adjustment spreadsheet for AAD [63] to obtain an AAD 'efficient' productivity score of 0.548 (inclusive of the AER's 30% adjustment for AAD);

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[60] AER Spreadsheets, *AER draft decision ActewAGL distribution determination - Opex base year adjustment draft decision - November 2014.xlsx* and AER *draft decision ActewAGL distribution determination - Opex model - November 2014.xlsm* (which in part reproduce Economic Insights Spreadsheet *Opex base year adjustment_NSWACT_14Nov2014_final.xlsx)* have been consolidated into Advisian Spreadsheet, *Advisian Opex Model Adjustments – January 2015.xlsm* for analysis purposes.

[61] The calculation is shown in Advisian spreadsheet, *Advisian Opex Model Adjustments – January 2015.xlsm*, 'Advisian Adjustments' sheet

[62] AER spreadsheet, *AER draft decision ActewAGL distribution determination - Opex model - November 2014.xlsm*, 'Input| Reported Opex' sheet

(c)   removed the existing ex-post allowances of 30% from the 'efficient' AAD productivity score to obtain a 'base' 2012/13 productivity score for AAD of 0.422[64].

(d)   Multiplied the 'base' productivity score (0.422) by AAD's reported 2012/13 Opex ($73.38m) to calculate the AAD 'base' efficient Opex for 2012/13 of $30.93m.

This figure has been used as the 'base' 2012/13 figure for the purpose of quantifying our adjustments for the issues raised in this report. This has been adopted because it uses figures that are reported on the same basis as those used by the AER in making its draft decision, inclusive of the effect of 'rolling forward' the opex determined from the Economic Insights models and ex-post adjustments to the base year.

Whilst we have not conducted a comprehensive audit of the AER's models to determine the reasons for the variance, for the purpose of reconciling our figure to the AER's draft determination, we note that the figures reported in Table A.3 of the Draft Decision[65] demonstrate that Advisian's calculated 'base' opex is conservative (understates the base opex and therefore the value of each adjustment).

Table 3-1 Reconciliation of Advisian Base Opex to AER Draft Decision

Adjustments	Value
Starting Point 'RAW' CD SFA forecast with frontier service provider as benchmark	**$26.0m**
AER Adjustment 1 Change benchmark to weighted average of top quartile efficiency score range	+$2.7m
AER Adjustment 2 Adjust benchmark to account for operating environment factors	+$8.6m
AER Adjustment 3 Adjust benchmark to move from average results to 2013 results	+$4.9m
AER Substitute Base Opex	**$42.2m**
Remove AER Adjustment 2 for operating environment factors	-$8.6m
Remove proportion of AER Adjustment 3 attributable to the operating environment adjustment i.e. $4.9m x ($8.6m)/($26.0m +$2.7m +$8.6m)	-$1.1m
AER substitute less operating environment adjustments	**$32.5m**
Advisian Calculated Base Opex	**$30.9m**

Source: Advisian Analysis

3.4.2   Quantification of Adjustments

With the 'base' efficient Opex determined, we have then applied adjustments for <u>all DNSPs</u> in accordance with the AER's practice of making adjustments to the productivity scores in proportion to

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[63] AER spreadsheet, *AER draft decision ActewAGL distribution determination - Opex base year adjustment draft decision - November 2014.xls,* 'Adjustment Summary' sheet

[64] Advisian notes that this differs from the Economic Insights 'base' SFA productivity score for AAD as it includes the effect of the AER's roll forward from the analysis period average to the 2012/13 base year.

[65] *AER, Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure, November 2014, p.7-28*

the change in Total Opex for DNSPs that is attributable to the issue under consideration. For example, if an exogenous issue accounts for 20% of the total Opex for DNSP A and 10% of the total Opex for DNSP B then the productivity scores would be reduced by a factor of 20% for DNSP A and 10% for DNSP B. This is necessary to ensure that the relative effect of exogenous issues has been taken into account across all DNSPs to ensure that the productivity scores remain *comparable* across all businesses.

Following the adjustment to the productivity scores for all DNSPs:

(a)   the frontier productivity target has been recalculated for the five frontier businesses for each issue individually; and,

(b)   the dollar value of the impact calculated based on the revised AAD and 'frontier' business productivity score.

As evidenced (in section 8 of this report) by the need to express the quantified values that arise from these adjustments as a range (depending on whether an issue is considered in isolation or in combination with other issues), the AER's approach of applying ex-post adjustments is relatively imprecise when the effect of exogenous adjustments to the frontier DNSPs as well as the other NEM DNSPs are taken into account.

It is for this reason that we ultimately consider that the AER's historical approach to reviewing and adjusting the revealed base year cost is preferable to the AER's application of the Economic Insights SFA results. This ultimately avoids the substantial regulatory risk that arises from the application of an unproven benchmarking model that is fundamentally mis-specified for the purpose of determining efficient Opex (rather than a notional measure of relative productivity) for Australian distribution network businesses.

For the avoidance of any doubt, in calculating the adjustments attributable to the issues discussed in the remainder of this report, Advisian notes that our adjustments relate only to AAD's base year Opex. We have not considered the effect of step changes or scale escalation/de-escalation trends over the next regulatory control period.

4   Technical Differences

This section outlines our analysis and findings in relation to the technical differences between AAD and the other NEM distribution networks in response to the questions:

1) *What are the fundamental technical differences between the ACT electricity distribution network and distribution networks in other states that form the top quartile of the AER's reported "efficiency frontier"? Comment on the impact of these technical differences on ActewAGL's Opex relative to the "top quartile" distribution networks.*

To respond to these questions, we have firstly considered issues in relation to factors included in the AER's approach, followed by the volume of assets that AAD must operate and maintain differences in the definition of network boundaries and finally the impact of back yard reticulation, which is unique to the ACT.

4.1   The AER's Opex Benchmarking Approach

In assessing the efficiency of Opex, the AER has been influenced by the results from four models prepared by Economic Insights. These are:

▪ Cobb Douglass stochastic frontier analysis (SFA CD)
▪ Cobb Douglass least squares estimate regression (LSE CD)
▪ Translog least squares estimate regression (LSE TLG)
▪ Opex Multilateral partial factor productivity (Opex MPFP)

The DNSP average Opex productivity scores over the period 2006-13 are shown in Figure 4-1[66] .
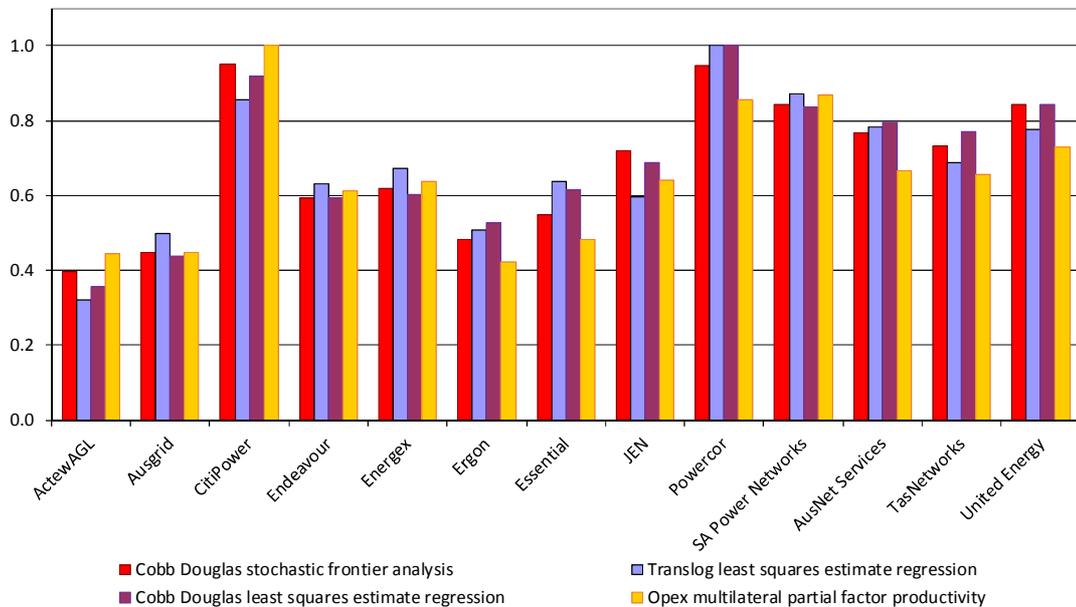
Figure 4-1 Comparison of AER Opex benchmarking approaches
Source: AER

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[66] *AER Benchmarking Fact Sheet. Figure 1*

Based on these models, AAD is reported as having efficiency in the range 35 – 43%. In its Draft Decision, the AER has adopted the SFA CD results (40%), but noted the relative consistency between the results from the four models.

In order to assess the capacity of the models to deal with differences between DNSPs, it is necessary to assess the variables that have been used in the benchmarking models to "explain" relative efficiencies. These are shown in Table 4-1, together with the coefficients calculated by Economic Insights.

Table 4-1 AER Opex benchmarking model variables

SFA CD	LSE TLG	LSE CD	Opex MPFP
Customer Numbers (.667)	Customer Numbers (.580)	Customer Numbers (.652)	Customer Numbers (.458)
Circuit Length (.106)	Circuit Length (.093)	Circuit Length (.097)	Circuit Length (.238)
Ratchet Maximum Demand (.214)	Ratchet Maximum Demand (.299)	Ratchet Maximum Demand (.253)	Ratchet Maximum Demand (.176)
Share UG (-.131)	Share UG (-.178)	Share UG (-.201)	Energy Throughput (.12)
Year (Common Value for DNSPs - used to determine trend in efficiency)			Minutes off Supply
Country dummy (not applicable to Australia)			-
-	Multiplicative combinations of first 3 above	-	-

Source: AER

4.2   Adequacy of AER's model to capture variability

The issues raised in section 4.1 raise questions regarding the adequacy of the AER's preferred model to capture the variability between individual DNSPs. In this regard, we note that the variables common to all models (as summarised above) are:

- Customer Numbers
- Circuit Length
- Ratcheted Maximum Demand

Figure 4-2 below shows the relationship between Customer Numbers, Ratchet Maximum Demand and Energy Throughput for the 13 DNSPs regulated by the AER. Both Ratchet Maximum Demand and Annual Energy Throughput are highly correlated with Customer Numbers (both having a R^2 of 0.95). We note that Economic Insights has rejected 'capital variables' from the Opex cost function estimates on the basis that it:

"has a very high correlation of 0.95 with energy delivered (Energy) output and of 0.94 with the ratcheted maximum demand (RMDemand) output"[67]

Consistent with this approach Advisian is therefore of the view that the high correlation between Customer Numbers and Ratcheted Demand means that the models then effectively have only three exogenous variables remaining to explain the Opex (productivity) variation between Australian DNSPs:

▪ SFA CD, LSE TLG and LSE CD

      – Customer Numbers
      – Line Length
      – Share UG Construction

▪ Opex MPFP

      – Customer Numbers
      – Line Length
      – Adjustment for Minutes off Supply

AER Regulated DNSPs - Relationship between Customer Numbers, Energy Throughput and Ratchet Maximum Demand
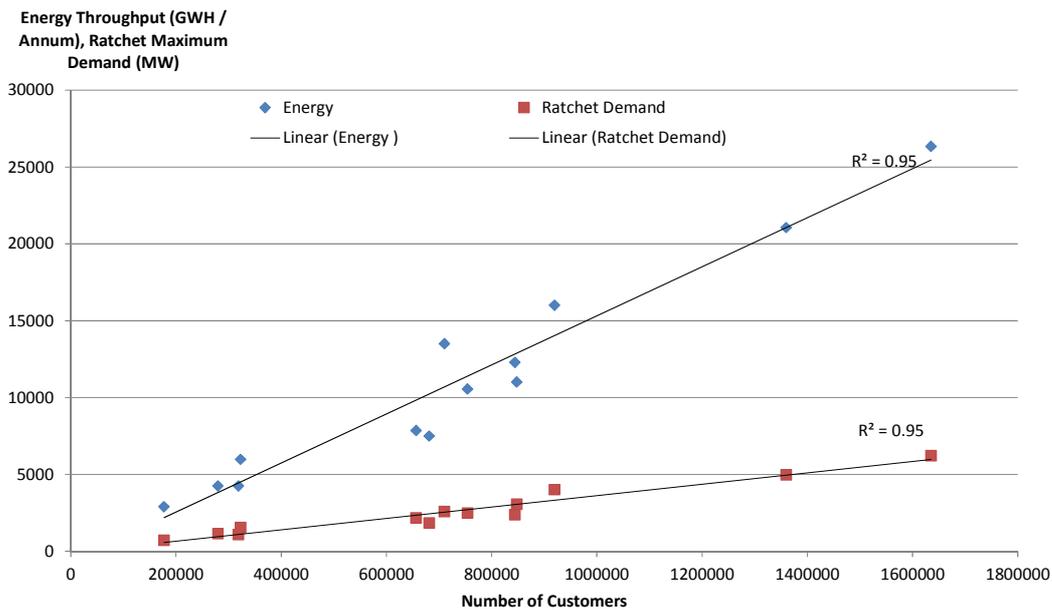
Figure 4-2 Customer Numbers, Ratcheted Maximum Demand and Energy Throughput
Source: Advisian Analysis

In forming this model, Economic Insights has utilised a compendium of Australian, New Zealand and Canadian (Ontario) Data on DNSPs to gain sufficient observations to provide a statistically 'rich' data set from which to draw conclusions. It is our understanding that the model is based on 68 DNSPs – 13 Australian, 18 New Zealand and 37 Ontario.

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[67] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, p.32

As outlined above, Advisian has not been engaged to provide technical commentary on the modelling process adopted. However, integral to our understanding of the adequacy of the models in capturing the variability between AAD and efficient DNSPs is an understanding of the characteristics of the DNSPs contributing to the model.

In the context of customer numbers arising as a significant explanatory variable in determining Opex (in round terms, a 1% change in customer numbers gives rise to a 0.8% change in Opex within the Economic Insights model if Ratcheted Demand is included with Customer Numbers) Advisian has examined characteristics of the DNSPs in the benchmark set in relation to this critical variable[68] to ascertain *"comparability"*. This is shown in Figure 4-3.
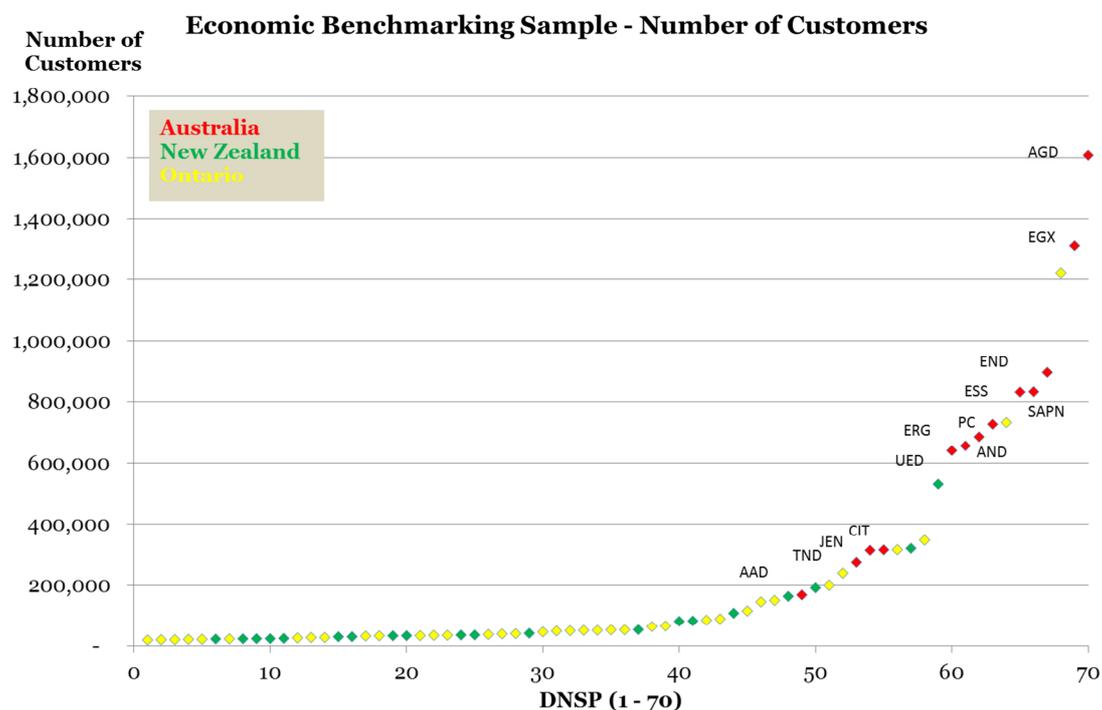
Figure 4-3 Customer numbers for combined Australian and international DNSPs
Source: Advisian Analysis

In terms of customer numbers, the Australian DNSPs are significantly larger than the benchmark sample as a whole, with only 9 of the international DNSPs having customer bases between the smallest (AAD) and largest (Ausgrid) DNSPs. Whilst largely a matter for technical analysis by specialist econometricians, in our opinion this lack of overlap in this parameter is the first signal that the results should be treated cautiously, particularly in the context of the magnitude of the Draft Decision made in relation to the proposed reduction in AAD's Opex.

From a network management perspective, Advisian notes that customer numbers themselves have relatively little fundamental impact on the Opex requirements of a DNSP. This is because:

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[68] *Advisian's data set has 2 more New Zealand DNSPs – we have not reconciled which two should be removed.*

1) following the connection of a customer to the network, it is the volume of inspection and maintenance activity that determines the level of network Opex that is required to safely and reliably operate a distribution network;

2) where customer numbers are adopted as the most material scale metric, it must be recognised that networks with a higher linear connection density (customers/km) have higher load at risk for an given network length. This tends to result in the adoption (based on a risk based business case) of a greater degree of capital investment in reliability initiatives (e.g. undergrounding, reclosers, load transfers).

Whilst Advisian acknowledges the correlation between customer numbers and Opex is strong, caution is warranted in assuming strong causal links between correlated variables. In this regard, where a range of causal factors are not considered, the reliance on customer numbers as the primary scale metric for a DNSPs Opex is likely to be misleading as the 'customer number' variable is acting as a proxy for a range of other factors that are most appropriately considered separately (particularly given that the sample itself is dominated by DNSPs with a much smaller number of customers than the NEM businesses)

A similar lack of overlap between the data points exists when line lengths are considered. This is shown in Figure 4-4. With the exception of CitiPower and AAD, only three of the overseas DNSPs overlap with the Australian DNSPs in this parameter. 39 of the 57[69] overseas DNSPs have lower line lengths than CitiPower, the Australian DNSP with the shortest line length.

Economic Benchmarking Sample - Line Length
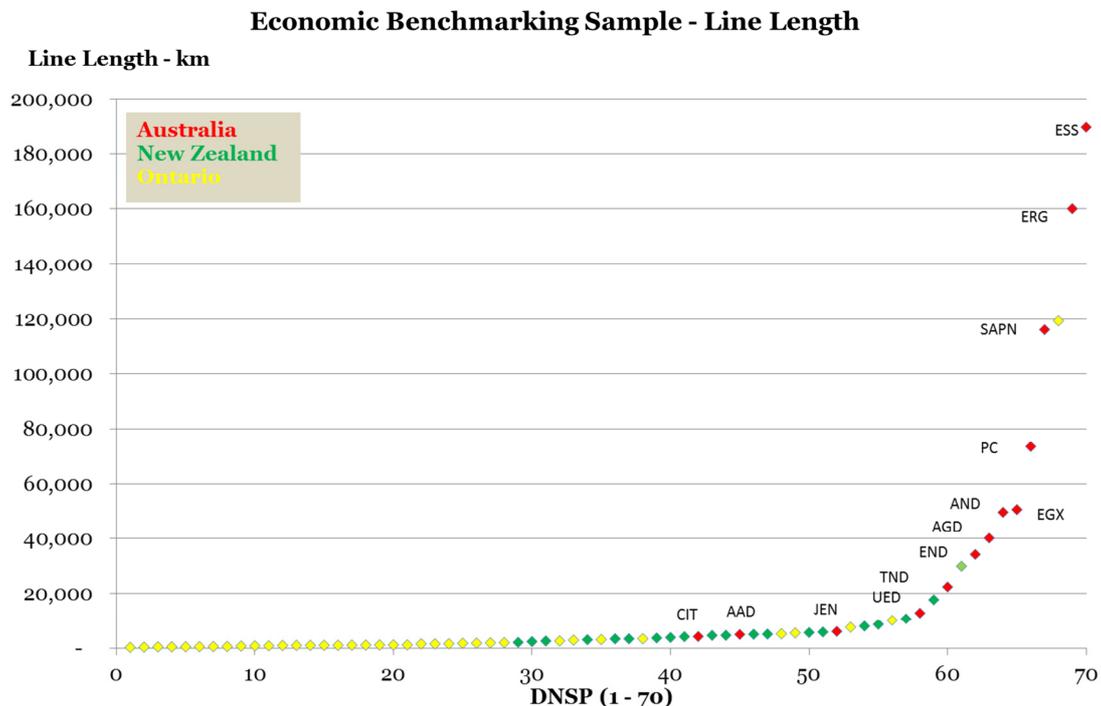
Figure 4-4 Line length for combined Australian and international DNSPs
Source: Advisian Analysis

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[69] *Adjusting for the differences between Advisian's data set, and that used by Economic Insights*

In Advisian's opinion, this lack of overlap gives further rise to the question of whether "*comparable*" DNSPs have been used in the benchmarking, with a consequent need for caution in direct application of the modelling results, again particularly in the context of the magnitude of the changes that the AER has proposed for AAD.

Larger distribution areas (and indirectly, longer line lengths) result in certain Opex dis-economies due to:

1) larger distribution areas requiring a greater number of more geographically isolated depots to maintain reliability performance in more remote areas of the network;

2) the inability to reasonably redeploy, share or outsource resources (whether personnel or equipment) that are necessarily located in more remote areas that are isolated from other networks.

Whilst this is partially reflected in line length measures, the sparseness of international comparators that are of a similar scale to the Australian DNSPs is of concern. In this respect, Advisian notes that AAD is (in Australian terms) a comparatively small network that is more geographically isolated from other NSP's than any of the frontier businesses. Therefore, whilst the linear density may be similar to other urban DNSPs, it shares many operational issues with the Australian rural distributors (but does not have the corresponding length of line or customer base to spread its fixed costs over in the analysis). In this regard, Advisian considers that the AER's preferred model does not account for the exogenous circumstances of AAD.

The combination of customer numbers and line length gives rise to the AER's primary measure of customer density (customers per line km)[70] that has been used in applying its analysis and judgement. The distribution of Australian DNSPs within the international benchmarking group is shown in Figure 4-5.

Whilst, on this measure, the Australian DNSPs are distributed throughout the benchmarking data set, three distinct categories emerge:

▪ DNSPs with a low customer density (up to 20 customers / km) – Essential, Ergon, Powercor, SAPN, Ausnet and TasNetworks. On this measure, these DNSPs generally share characteristics with New Zealand DNSPs.

▪ DNSPs with a medium customer density (20 – 40 customers/km) – Energex, Endeavour, AAD and Ausgrid. On this measure, these DNSPs share characteristics with a mix of NZ and Ontario DNSPs.

▪ DNSPs with a high customer density (50+ customers/km) – Jemena, United Energy and CitiPower. On this measure, these DNSPs share characteristics with Ontario DNSPs.

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[70] We note that the AER's 'customer density' variable (customers per line km) is a linear measure that is often termed 'connection density' rather than 'customer density' (customers per square km). Connection density is a measure of the average distance between customer connections to a distribution line across a network. The geographical dispersion of customers across a DNSPs service area (customers per square km) is a significantly different spatial measure that is weakly correlated connection density. For clarity, Advisian has generally adopted the terms 'linear density' for customers/km and 'spatial density' for customers/km².
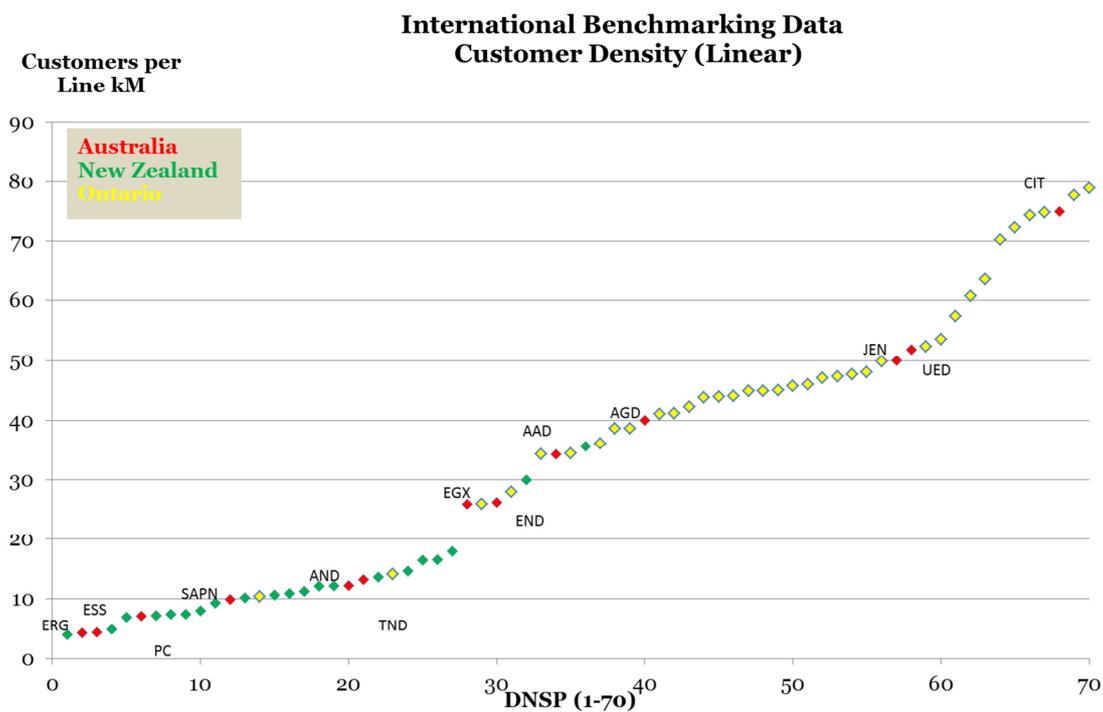
Figure 4-5 Customers per line km for combined Australian and international DNSPs
Source: Advisian Analysis

The third exogenous variable in the SFA CD, LSE TLG and LSE CD models is the share of underground construction as a proportion of total lines. Figure 4-6 compares the Australian and international DNSPs on this measure.

Again, the Australian DNSPs are distributed throughout the benchmarking data set and three distinct categories emerge:

- DNSPs with a low proportion of underground (up to 20%) – again Essential, Ergon, Powercor, SAPN, Ausnet and TasNetworks. On this measure, these DNSPs share characteristics with a mix of New Zealand and Ontario DNSPs.
- DNSPs with a medium proportion of underground (20 – 40%) – Energex, Endeavour and Ausgrid, but joined by United Energy and Jemena. On this measure, these DNSPs share characteristics with a mix of NZ and Ontario DNSPs.
- DNSPs with a high proportion of underground network (around 40%) – AAD and CitiPower. On this measure, these DNSPs share characteristics predominantly with Ontario DNSPs.

On the two measures implicit in the benchmarking models, there is considerable homogeneity in the 'low density' low UG proportion. Whilst the DNSPs in the two 'mid' groups are largely the same, AAD slips into the 'high' group on the underground proportion measure, Jemena and United Energy slip back to the 'mid' group on this measure.

**International Benchmarking Data
Underground Proportion**
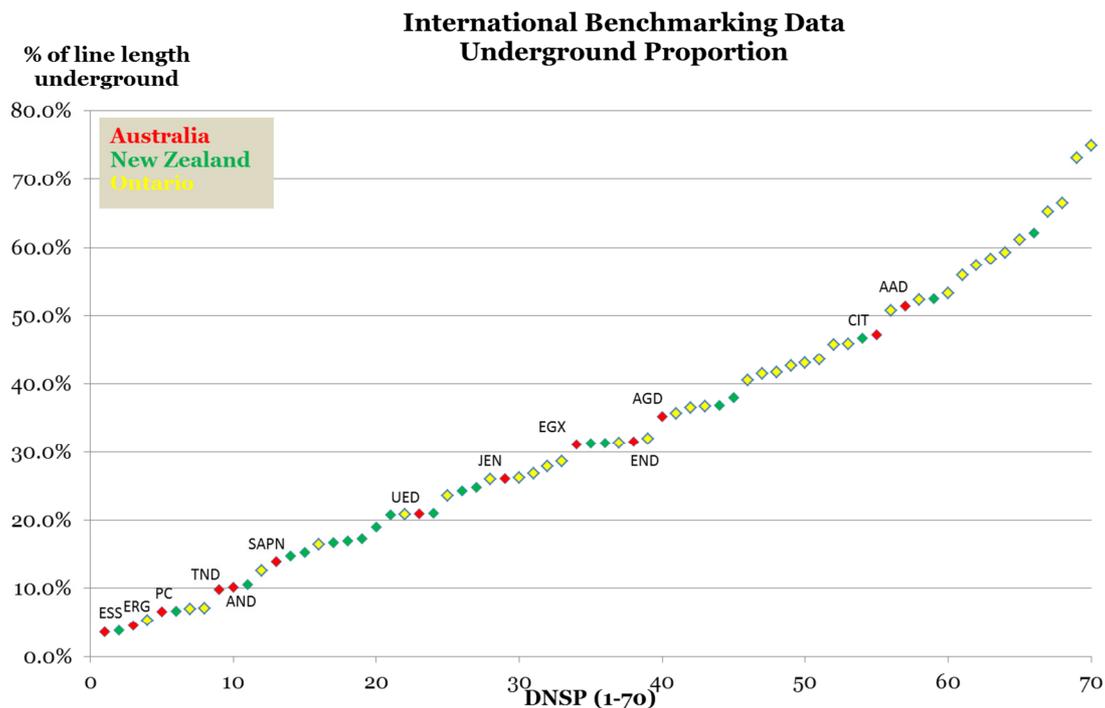
Figure 4-6 Underground proportion of network for combined Australian and international DNSPs

Source: Advisian Analysis

From a network management perspective, Advisian notes that the proportion of underground lines does represent a relevant Opex cost driver, as underground lines typically incur less inspection cost than overhead lines. However, these costs can be significant when failures do occur, and are influenced by design factors such as whether direct burial or pit / duct systems have been employed. In CBD areas, reticulation is often by way of designated pits and ducts (and in some cases tunnels). In less dense urban and suburban areas, a greater proportion of direct buried cable (with or without mechanical protection) is typically used and accessing the cable is more likely to require excavation. These factors do impact on the efficient Opex required to safely and reliably maintain a distribution network.

Therefore, whilst the proportion of underground network is a relevant driver of Opex, the AER's approach does not consider the nature of the underground network, which in AAD's case is predominately suburban (rather than urban/CBD).

In Advisian's view, our analysis of the AER's Opex benchmarking approach gives rise to two primary concerns:

1) Firstly, given that the SFA CD model is a 'one size fits all' approach, we are concerned about the lack of homogeneity between DNSPs on the factors that have been determined to be the most critical attribute in determining efficiency. Advisian would have expected the benchmarking analysis to include some 'class' analysis that maximised homogeneity within the classes, and maximised heterogeneity between classes.

2) Secondly, the DNSPs in the medium customer density group have generally ranked poorly on efficiency, with three of the four assigned 'scores' of 60% or less on the SFA CD ranking. In

Advisian's opinion, this in itself is cause to seek further explanation. It is conceivable that a contributor to AAD poor Opex productivity ranking is the lack of model fit in this group, combined with over emphasis on the underground proportion measure.

These issues are further discussed in our responses to specific issues in the following section.

4.3   Linear v Spatial Density

The AER's consultants do not appear to have appropriately considered spatial density (i.e. customers/sq. km) as an alternative to linear density (i.e. customers / km) in developing their benchmarks. Whilst this may be due to data limitations, particularly in relation to New Zealand DNSPs, the AER has expressed the view that:

> *"We are satisfied that it is not necessary to provide an operating adjustment for customer density. An adjustment for customer density does not satisfy operating environment adjustment criterion three. On the basis of second stage regression analysis of Opex MPFP results, we are satisfied that output variable sufficiently account for the effects of customer density."*[71]

AER goes on to state:

> *"The use of service territory as a density measure has proven problematic. This is due to the difficulty in accurately measuring service territory items such as lakes, national parks and unpopulated areas, as the networks do not incur costs for areas that are unserviced, customers per square kilometre of service area is not a useful measure for Opex for service comparisons.*[72]
>
> *Because the MTFP and Opex cost function models use customer numbers, line length and demand as outputs (like the MPFP model) we are satisfied that they will also account for customer density. Density measures are ratios of customer numbers, energy throughput, and demand to line length."*[73]

Advisian does not agree with the AER's conclusions on this matter for the reasons explained below. The issue that distinguishes Australia from many overseas comparisons is the large variation in spatial customer density between the 13 Australian DNSPs, which ranges from 0.4 customers/km² (Ergon) to 2050 customers/km² (CitiPower), a ratio of 1:5125. This ratio is significantly greater than the linear density ratio of 4.3 customers / km (Ergon) to 75 Customers / km (Citipower), a ratio of only 1:17.4.

Figure 4-7 shows the spatial density of the DNSPs included in the benchmarking analysis.

In comparison, the New Zealand DNSPs generally serve low density areas of population that is more comparable to the Australian rural distributors, whilst the Ontario DNSPs generally serve areas that are much more aligned on average to the higher customer densities encountered in the Victorian

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[71] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, p.*7-133*

[72] ibid, p.*7-135*

[73] ibid, p.*7-136*

urban DNSPs. In addition, comparisons within the New Zealand or Ontario data sets are more appropriate due to the much greater homogeneity of environmental factors and common jurisdictional requirements between the businesses.[74]
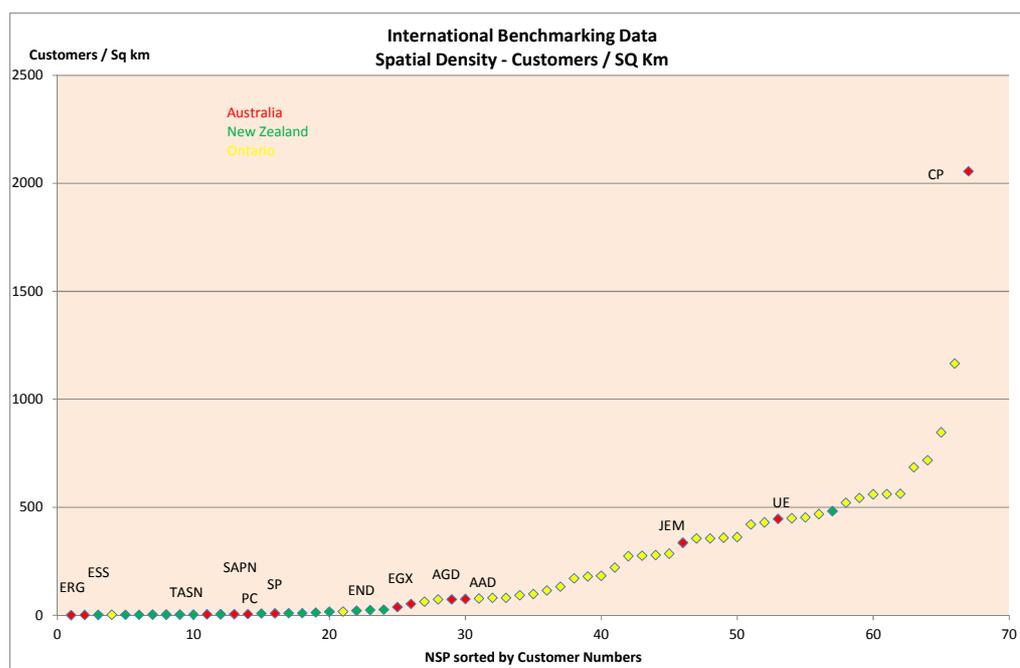
Figure 4-7 Spatial density for combined Australian and international DNSPs
Source: Advisian Analysis

Advisian notes a recent study that was completed by London Economics and PowerNex Associates for Hydro One Networks in Ontario that was initiated in response to a request from the Ontario Energy Board to "*investigate the relationship between customer density and distribution service costs*"[75]. This study involved econometric analysis using four models and five years of reported data (2006-2010) to evaluate the differences in both Total Costs and Operating, Maintenance and Administrative (OM&A) costs for networks of different linear and spatial customer density. The study found that:

▪ *"Estimated coefficients for customer density in all four models are statistically significant at the 95 percent confidence interval*
▪ *More specifically, all four models show a negative relationship between costs and customer density*

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[74] Both Ontario (Ontario Govt.) and New Zealand (NZ Govt.) are subject to a single level of common jurisdictional oversight for electricity distribution networks. Within the NEM, there are six separate jurisdictions (NSW, Qld, Vic, SA, Tas, ACT), each with differing jurisdictional legislative obligations, licensing requirements and technical standards. This is in addition to an independent federal economic regulator.

[75] London Economics, PowerNex Associates, *Density Study Results Stakeholder Consultation – Prepared for Hydro One Networks Inc.* October 19 2011, p.3.

Based on the results of the fourth model, which considers OM&A and the Capital Proxy, a fivefold increase in customer density would [only] *lead to a 150 percent increase in cost. For example, an increase from 5 customers per km² to 25 customers per km² or from 25 to 125 customers per km²"* [76]

The results are illustrated in Figure 4-8, which clearly show the much greater spread of both OM&A and replacement cost (as the proxy for Capex)[77] at lower customer densities (below about 100 customers/km²), and far greater consistency in costs for higher density areas (>100 customers/km²). Figure 4-9 shows that the spatial density of the urban/suburban Victorian businesses (United, Jemena and CitiPower) is above 300 customers/km² in all cases, which is well above the point at which both OM&A and replacement cost per customer were found to 'level' out. In contrast the AAD reports a lower average spatial density that is under 100 customers/km². Noting the materiality of this finding within the Ontario businesses, Advisian is concerned that the Economic Insights and AER's analysis has not taken spatial density into account, citing data quality issues (national parks, lakes and unserviced areas). Advisian notes that much of the additional Opex arising from the presence of these unserviced areas is due to the fact that these areas disrupt 'point to point' transport meaning that for maintenance and inspection activities, sparsely populated areas of a distribution network usually require field staff to drive *around* the unpopulated areas to reach assets or customers.

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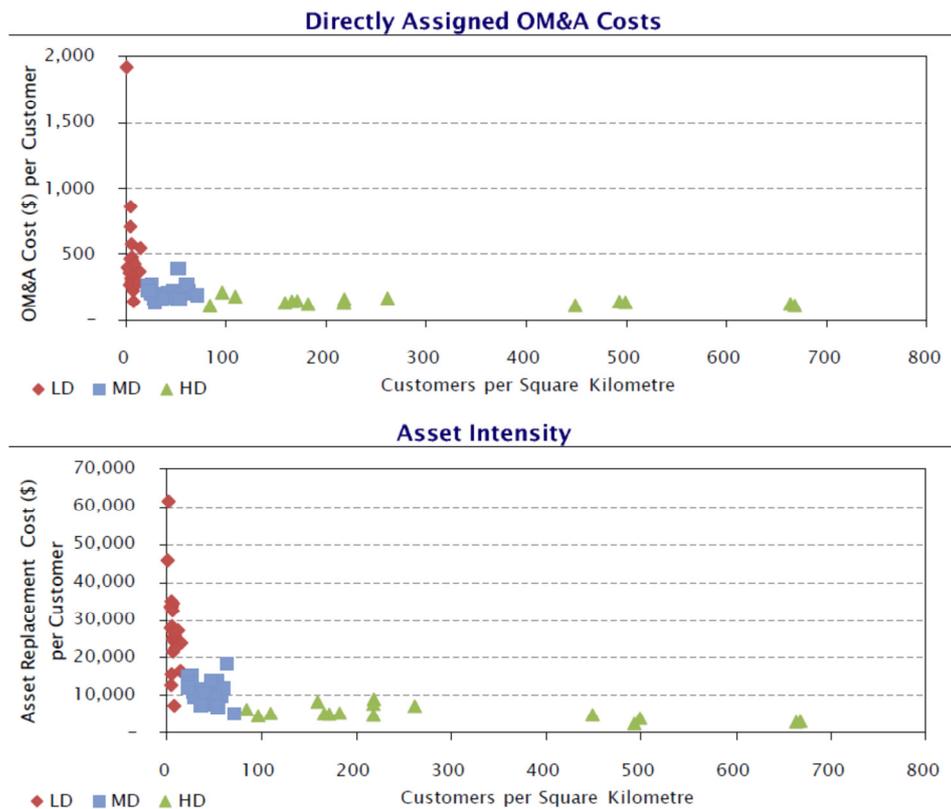
[76] *ibid p. 12* Advisian clarification added in square brackets

[77] Advisian notes that London Economics/PowerNex Associates has used the replacement cost for the network as the proxy for capex in its benchmarking. This differs from the AER/Economic Insights measure of Annual User Cost, which is distorted by asset age, historical standard life assumptions for regulatory depreciation, investment cycles and historical accounting treatment.

Figure 4-8 Comparison of Cost per Customer to Customers per km²
Source: London Economics & PowerNex Associates[78]

For the purpose of context, Advisian also notes that Ontario is approximately 60% of the area of Queensland, with the largest business, Hydro One serving approximately 75% of the province[79]. This leaves approximately 70 DNSPs serving a relatively compact area that is comparable in size to either Victoria (5 DNSPs) or New Zealand (27 DNSPs). Given that the London Economics/PowerNex Associates study relates to sample areas within the same business, many of the issues relating to the reporting inconsistencies between businesses that are evident in the Australian DNSP RIN data do not apply in this case.

As with our prior assessment, four observations are pertinent:

▪ DNSPs with low spatial densities (up to 10 customers / sq. km) include Essential, Ergon, Powercor, SAPN, Ausnet and TasNetworks. On this measure, these DNSPs share characteristics with New Zealand DNSPs.

▪ A diverse range of DNSPs with a spatial density between 30 and 100 include Endeavour, Energex, Ausgrid and AAD. On this measure, these DNSPs share characteristics with a mix of NZ and Ontario DNSPs.

▪ DNSPs with a high spatial density (300-500)– Jemena and United Energy, shared with Ontario DNSPs

▪ CitiPower as an outlier, with extremely high spatial density.

Taking these factors into consideration, Advisian is concerned that the AER's reliance on a linear customer density measure does not adequately reflect the Opex cost drivers that are associated with the differences in spatial density.

Figure 4-9 shows the relationship between linear density and spatial density for the benchmarking sample. Some New Zealand DNSPs are not shown due to unavailability of data.

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[78] *ibid p.13*

[79] Hydro One, *Annual Report 2013*, p. 17

International Benchmarking Data
Linear Density vs Spatial Density
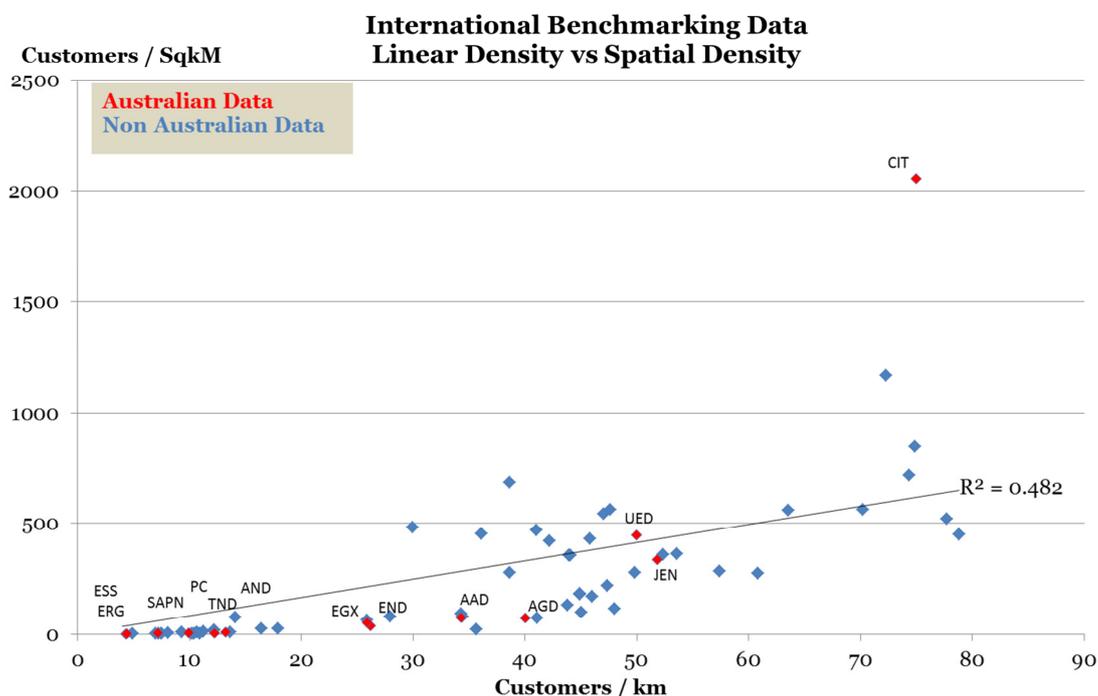
Figure 4-9 Spatial density v Linear Density for combined Australian and international DNSPs
Source: Advisian Analysis

The correlation coefficient (R^2) between linear density and spatial density is less than 0.5 which indicates that the reliance on linear density alone to act as a proxy for spatial density is weak. Accepting the AER's concern that spatial measures may be unduly influenced by areas which do not need to be served by electricity distributors, we note that this is equally valid for the international DNSPs and by dismissing spatial density, there is an inherent bias in the analysis towards businesses where the distribution of population and topographical constraints are less of an issue[80]. With this in mind, it is evident from Figure 4-9 that there is greater alignment between the spatial density measure in the international data with the AER's frontier businesses than for the Australian 'mixed' rural and urban DNSPs. In this regard, Energex, Endeavour, AAD and Ausgrid all fall at the lower extreme of businesses with a comparable linear density, whilst United Energy and Jemena are far more typical of the relationship between linear and spatial measures of density in the international data.

Consistent with our earlier approach, the following observations regarding the heterogeneity of the data set are pertinent:

▪ DNSPs with a both a low linear and low spatial density are Essential, Ergon, Powercor, SAPN, Ausnet and TasNetworks. On this measure, these DNSPs share characteristics with a mix of New Zealand and Ontario DNSPs.

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[80] Notably, the Victorian (and to a lesser extent, South Australian) DNSPs are concentrated across a much smaller total area as Victoria is simply physically much smaller in area than other states. Inclusive of all National Parks and unserviced areas, Victoria (served by five DNSPs) covers a total area that is 9% of the combined area of NSW and Queensland (which is also served by five DNSPs).

- A group in the middle comprising Energex, Endeavour, AAD, Ausgrid, Jemena and United Energy.
- DNSPs with a very high spatial density, notably CitiPower, which is clearly an outlier.

Advisian makes the general observation that, with the exception of United Energy, the 'mid' group has generally benchmarked poorly. Our concern again relates to the lack of homogeneity of the DNSPs in the benchmarking sample set. The fact that the models have generally identified CitiPower as the most efficient Australian DNSP is of concern given its 'outlier' characteristics on measures such as linear and spatial density.

Advisian concurs with the AER's view that spatial density in itself fails to recognise unserved areas such as lakes, National Parks, waterways and the like. However, we consider that it is a material Opex cost driver for businesses with lower spatial density. Whereas in high density areas (by either spatial or linear measure) point to point transport routes exist[81], the practical reality is that as spatial density decreases, more indirect 'hub and spoke' transport routes become necessary. Power lines generally take direct routes across property, rivers, parkland and other obstacles, whereas roads frequently do not.
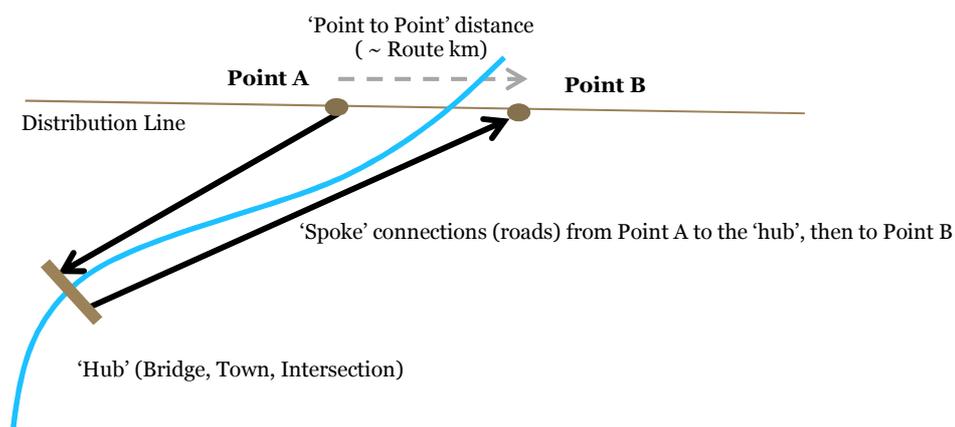
Figure 4-10 Impact of 'Hub & Spoke' v 'Point to Point' transport networks
Source: Advisian

In these cases it is necessary to travel from point A back along a 'spoke' (road) to a 'hub' (regional centre, river crossing, intersection) to travel to another point B on an adjacent 'spoke', effectively travelling two sides of a triangle draw between point A, point B and the 'hub'. In more densely populated and less topographically diverse areas, more interconnected transport networks mean that the distance travelled would be much closer to the distance between point A and point B.[82] This is illustrated in Figure 4-10.

Recognising that these operational difficulties do exist in practice, the question turns to how they can be taken into account in determining the efficient Opex for AAD. In this regard, it is these travel time factors, along with reliability performance requirements that Australian DNSPs consider the number

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[81] Such that in most cases it is possible to travel more or less directly between any two points on the network.

[82] In the case of the author's own property, approximately 1.5 route kilometres of line connects two neighboring properties to a common 11kV control point. However, due to property boundaries and rivers, the distance by public road (which the DNSP is forced to use) from one property to the control point is approximately 16kM, even though the route length is less than 2km.

and location of field crews and depots to deploy across their networks. As the spatial density of a DNSP decreases, more depots, equipment and personnel are required to maintain a given level of service performance, with less opportunity to share personnel or specialist equipment between depots or with other DNSPs[83] for the resources that are deployed to serve geographically isolated areas. Consequently, the impact of these factors are ultimately reflected in the staffing levels, contracting strategies, business structure, maintenance strategies and accommodation costs included in a DNSPs Opex, which will result in less spatially dense businesses appearing less productive than higher density networks across most categories of Opex.

The London Economics/PowerNex Associates analysis considered five independent variables (Customer Density[84], Number of Customers, Energy Density, Time/Trend Variable) to find that:

a) Spatial customer density was a significant driver of operating (and capital) expenditure, with an estimated regression co-efficient in the order of -0.100 for opex; and,

b) Linear customer density was a separately significant driver of operating (and capital) expenditure, with an estimated regression co-efficient in the order of -0.299; [85]

Whilst linear density notionally has a higher coefficient (-0.299) than spatial density (-0.100) the ratio of these variables for (say) CitiPower to AAD is an order of magnitude different. In the case of linear density the ratio is 2.2 (75 customers / km vs 34.3 customers / km) whereas the spatial density ratio is 27.3 (2055 customers / sq. km vs 75.2 customers / sq. km). This variation means that a linear density model, in all likelihood, understates the benefit that Citipower derives from high spatial density. By implication therefore, it over attributes "inefficiency" to AAD.

Advisian considers that there are four approaches that could be adopted to more appropriately account for these issues for the purpose of setting AAD's efficient Opex:

1) Adjustment to the benchmarking model specification to take account of spatial density across all DNSPs in the sample;

2) Consideration of DNSPs on a 'class' basis to ensure that the businesses included in the benchmark sample remain *comparable* (as envisioned by the AEMC in its guidance on the use of the AER's analysis in exercising discretion under the rules i.e. *"In addition, the AER can conduct its own analysis, including using objective evidence drawn from history, and the performance and experience of comparable NSPs."*[86])

3) Applying a specific 'out-of-model' adjustment of the productivity results to account for the additional Opex driven by differences in spatial density in a similar manner to the other specific adjustments applied in the AER's Draft Decision;

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[83] Either through increasing the effective utilisation of internal resources serving the regulated network through the provision of unregulated services to other DNSPs; or, by minimising the volume of internal resources through contracts with third parties that also serve co-located or neighbouring DNSPs.

[84] Both Linear and Spatial density measures were separately considered

[85] Ibid, p.12

[86] AEMC, *Rule Determination – National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 29 November 2012, p. 112.

4) Reliance on AAD's audited revealed cost for the base year (as adjusted for specific and identifiable adjustments for one-off costs or specific inefficiencies or categorisation issues) on the basis of the AER's statements that:

"the total Opex in a recent year typically best reflects a service provider's current circumstances"[87]

"...we have incentives in place to reward the service provider for making efficiency improvements by allowing it to retain a portion of the efficiency savings it makes. Similarly, we penalise the service provider when it is relatively less efficient. This gives us confidence that the service provider did not spend more in the proposed base year to try to inflate its Opex forecast for the next regulatory control period" [88]

and

"...These regulatory obligations ensure that the financial incentives a service provider faces to reduce its costs are balanced by obligations to deliver services safely and reliably. In general, this gives us confidence that recent historical Opex will be at least enough to achieve the Opex objectives" [89]

As there is likely to be analytical issues such as defining cross-correlations between spatial density, linear density and other variables in the benchmarking models that are difficult to separate (and arguably would then fail to unequivocally satisfy the AER's criterion of '*is it accounted for elsewhere*'[90]) and given the limitations of the statistical methods and datasets that underpin the results, Advisian is of the view that is not apparent how this issue can be directly accounted for in the AER's analytical models on the basis that:

▪ The inclusion of additional variables into the model would absorb degrees of freedom in the model and with the potential to reduce the statistical validity of the approach;

▪ The analysis of DNSPs by 'class' would reduce the volume of comparator businesses and the Economic Insights model was stated to become unstable with too few DNSPs included[91]. Therefore it is unlikely that a stable model could be obtained for the 'classes' of networks that we have identified;

▪ The application of a specific 'out-of-model' adjustment for spatial density factors is problematic because, assuming all other factors are equal, it simply accounts for a proportion of the difference between productivity scores for different DNSPs.

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[87] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p. 7-7

[88] ibid

[89] ibid

[90] ibid, p. 7-92

[91] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure of NSW and ACT Electricity DNSPs*, 17 November 2014, p. 33.

As the impact of spatial density is embedded in the reported historical Opex for the business, the inherent difference in productivity would manifest itself as a consistent difference in measured productivity between networks over time. This is in fact seen in the similar relative trends in MTFP indexes in the Economic Insights report[92] and reproduced in the AER's annual benchmarking report[93]. However these differences, regardless of the underlying reasons, implicitly form part of the AER's interpretation of 'inefficiency' based on the SFA CD results unless a specific 'out-of-model' adjustment has been made by the AER.

- The use of AAD's 'revealed' audited base year costs, along with the regulatory proposal, detailed RIN responses and engagement with the business during the preparation of the AER's decision represent the best available information for the Opex required to operate the AAD business.

  However, the AER has considered this information to be of less significance in making its decision than the Economic Insights benchmarking models, which are based on a specification of network information that has been available to the AER at the time of each of its previous DNSP determinations[94] and subsequently does not account for the large amount of additional RIN information collected by the AER. Furthermore, the productivity scores have been averaged over an extended period which included the Global Financial Crisis, Australian mining boom, substantial volatility in AUD foreign exchange rates and significant investments by some (Qld, NSW, ACT), but not all networks due to greater network specific augmentation and security of supply requirements. Finally, the averaging process adopted by Economic Insights implicitly fails to account for the material decline in the productivity of the frontier businesses over the analysis period.

Should it be accepted that the issue of spatial density (or any other factor) *'is outside the service provider's control'* and that it *'is material'[95],* then the fact that it is difficult to account for with the available data for the Australian and international comparators does not diminish the significance of the issue. Under the current assessment approach, the AER implicitly attributes the effect of all of these factors to 'inefficiency' unless a specific factor is made[96]. Rather Advisian considers that this should lead the AER to recognise that differences in the assessed productivity simply represent an indicative measure of relative differences based on the particular specification that has been adopted.

As a result of this finding, and noting the materiality of the adjustments to AAD's Opex, Advisian would expect greater weight to have been placed on testing the sensitivity of results to alternative

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[92] ibid, figure 3.1 and figure 3.2, pp.17-18.

[93] AER, *Electricity Distribution Network Service Providers – Annual Benchmarking Report*, November 2014, figure 17 and figure 18, pp. 33-34

[94] *Line Length, Customer Numbers, Network Maximum Demand, Proportion Underground and Total Opex have historically been available from annual regulatory accounts and reliability reporting information. These factors have been published in summary form by the AER in its annual State of the Energy Market reports since 2007.*

[95] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p.7-92 (these represent the AER's other two criteria for specific Opex adjustment)

[96] With a small (and in Advisian's opinion materially insufficient) allowance for 'miscellaneous' operating environment factors.

model specifications[97] or otherwise the regulator's effort directed to the more detailed assessment of the recent, audited, total historical Opex that has been revealed by AAD, in recognition that "*the total Opex in a recent year typically best reflects a service provider's current circumstances*"[98].

As a result, Advisian considers that the fourth option (use of AAD's revealed base year as the starting point) represents the most appropriate and robust means of accounting for the difference in spatial density and all other network specific factors. This removes the substantial regulatory risk that the AER has incorrectly attributed inherent productivity differences to inefficiency in Opex expenditure. We note that if this is not addressed in the final decision, Advisian is concerned that it will lead to material under-expenditure on operating and maintaining the 'non-frontier' networks which is not in the long term interest of AAD customers[99]; does not promote efficient investment or operations in the NEM or the AAD network[100]; and, does not allow AAD to recover the efficient cost of achieving the operating expenditure objectives[101].

Notwithstanding this, we note that the AER's preference in the Draft Decision has been to:

- rely on the results of Economic Insights benchmarking models for the purpose of deriving productivity measures;
- infer that the relative productivity measure is an appropriate basis for setting efficient base operating expenditure; and,
- make specific percentage adjustments to the revised Opex that are required for factors that are not considered in the model.

Therefore, whilst the adoption of the revealed base year (inclusive of any specific adjustments applied by the AER) as the starting point would implicitly include all of the issues that require specific adjustments, the remainder of this report focuses on the most material of the specific adjustments that must be made to the AER's assessment of AAD's base Opex, or the productivity results of the frontier businesses to account for inherent differences between AAD and the frontier businesses.

4.4   Asset Volumes

The AER has taken account of some but not all of the asset volume information provided by the DNSPs in the Economic Benchmarking RIN and the Category Analysis RIN. Table 4-2 summarises the reported asset volumes for the five frontier businesses[102] to demonstrate the volume of assets that are maintained per customer for the 2013 reporting year.

In the tables below, the cells have been shaded on a colour scale from green (inherently lower opex) to red (inherently higher opex) for the 13 NEM DNSPs. Advisian notes that the general prevalence of

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[97] Advisian notes that consistency of results across a wide range of different model specifications using a single statistical methodology would provide a more compelling justification for the AER's strong conclusions on the relative Opex productivity of businesses than results obtained by testing similar model specifications across a wide range of statistical methods.

[98] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p. 7-7

[99] *In accordance with the National Electricity Objective*

[100] *In accordance with the National Electricity Objective*

[101] *In accordance with Opex Criteria under the NER*

[102] *From the DNSPs Economic Benchmarking RIN templates*

'green' and 'yellow' results for the frontier businesses highlights the natural advantage that the 'frontier' businesses have with regard to asset volumes. AAD on the other hand, records substantial areas of disadvantage in areas that are not taken into account by the model (transformer capacity measures). Given that the Economic Insights benchmarking models were intended to provide a notional customer focussed measure of relative productivity, it is not surprising that the 'frontier' businesses operate fewer assets per customer[103].

From Table 4-2 it is evident that the frontier business generally maintains a smaller volume of assets per customer than the industry average across both line and substation assets. However, in relation to AAD, Table 4-3 shows that AAD generally operates and maintains:

▪ significantly less line assets per customer than the frontier business;
▪ significantly more zone and distribution substation assets per customer than the frontier business; and,
▪ significantly more underground network than the frontier business.

As the AER's network scale metrics relate only to line length and not installed substation capacity, the higher zone and distribution transformer capacity per customer represents a significant additional Opex requirement[104] that is not accounted for in the AER's model specification.

Table 4-2 2013 Asset Volumes per Customer (Frontier Businesses)

	110kV+ m/Cust	44kv - 66kV m/Cust	Zone kVA /Cust	11kv-33kV m/Cust	Dist kVA /Cust	SWER m/Cust	LV m/Cust	% UG
SA Power Networks	0.0	1.8	6.7	30.3	11.1	34.9	38.0	19%
Ausnet	0.0	0.0	5.1	37.1	9.4	9.8	15.9	13%
CitiPower	0.0	0.6	8.7	6.0	13.5	0.0	7.2	48%
Powercor	0.0	4.4	4.4	49.1	9.6	29.8	18.1	7%
United Energy	0.0	0.9	5.1	7.2	7.6	0.1	11.8	21%
Industry Cust Wtd Avg[105]	1.0	2.5	10.9	37.8	11.0	16.5	20.8	23%
Frontier Cust Wtd	0.0	1.7	5.7	28.9	10.0	18.1	20.5	18%

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[103] This is because a business with fewer assets to operate and maintain per customer will simply require less Opex per customer. Naturally, this will mean these businesses appear more productive.

[104] Advisian notes that Opex is principally driven by the total number of assets (the volume of inspections/maintenance operations), rather than the total capacity (it generally costs more to maintain two smaller distribution transformers as one larger one of the same total capacity). However the RIN information collected by the AER in accordance with Economic Insights specifications has only recorded installed capacity. As the installed capacity is generally aligned to the number of distribution transformers, we consider that total capacity represents a reasonable approximation for transformer numbers in the absence of a more appropriate data set for all 13 DNSPs.

[105] Weighted by 5 yr. average customer numbers from AER spreadsheet EBT DNSP PPI.xls 'Analysis' sheet (as provided in support of the annual benchmarking report)

Avg								

Source: Advisian Analysis of EB RIN Information

This fundamentally disadvantages AAD as the AER and Economic Insights has deliberately chosen model specifications to place substantially more weight on *'demand side outcomes'*[106] in order to ensure that "*...the DNSP is only given credit for network capacity actually used and not for capacity that may be installed but excess to users' current or reducing requirements*"[107]. This demonstrates Advisian's key concern that the model used by the AER is suited and intended for determining the <u>relative productivity</u> for the network and as a consequence is insufficiently specified and fundamentally unsuited to determining the <u>efficient Opex</u> required to safely and reliably operate and maintain the existing network (rather than the hypothetical network that a DNSP may have had if it was subject to the same blend of historical factors as the notional 'frontier' business). With perfect hindsight, Advisian concurs that some of these assets may not be optimally utilised. However, Opex rarely varies with utilisation. It is also unlikely that they can be removed from service. They must therefore continue to be inspected, operated and maintained for the foreseeable future.

Table 4-3 2013 Asset Volumes per Customer (AAD and Frontier Businesses)

	110kV+ m/Cust	44kv - 66kV m/Cust	Zone kVA /Cust	11kv- 33kV m/Cust	Dist kVA /Cust	SWER m/Cust	LV m/Cust	% UG
ActewAGL	1.1	0.1	8.4	14.5	12.3	0.0	14.4	53%
Frontier Cust Wtd Avg[108]	0.0	1.7	5.7	28.9	10.0	18.1	20.5	18%
% diff	+30%		-48%	+50%	-24%	+100%	-30%	-191%

Source: Advisian Analysis of EB RIN Information

Furthermore, in comparison to the Victorian urban DNSPs, to whom the AER makes a number of direct comparisons with regard to relative efficiency[109], it is evident from Table 4-4 that on a 'per customer' basis, and bearing in mind that Customer Numbers is by far the dominant explanatory variable in the SFA model, AAD must operate and maintain:

▪ 36% more sub transmission line;
▪ 40% more zone substation transformer capacity;
▪ 108% more 11kV-33kV distribution lines;
▪ 32% more distribution transformer capacity; and,
▪ 38% more low voltage line.

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[106] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure of NSW and ACT Electricity DNSPs*, 17 November 2014, p. 11.

[107] *ibid*

[108] Weighted by 5 yr. average customer numbers from AER spreadsheet EBT DNSP PPI.xls 'Analysis' sheet (as provided in support of the annual benchmarking report)

[109] For example AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, p. 7-19

Advisian notes that the only area of inherent Opex cost advantage that is evident is the greater proportion of underground circuit km within the AAD network.

Table 4-4 2013 Asset Volumes per Customer (AAD and Victorian Urban DNSPs)

	110kV+ m/Cust	44kv - 66kV m/Cust	Zone kVA /Cust	11kv-33kV m/Cust	Dist kVA /Cust	SWER m/Cust	LV m/Cust	% UG
ActewAGL	1.1	0.1	8.4	14.5	12.3	0.0	14.4	53%
CitiPower	0.0	0.6	8.7	6.0	13.5	0.0	7.2	48%
United Energy	0.0	0.9	5.1	7.2	7.6	0.1	11.8	21%
Jemena	0.00	1.0	5.2	7.5	8.5	0.0	11.1	27%
Vic Urban Cust Wtd Avg[110]	0.0	0.9	6.0	7.0	9.3	0	10.5	29%
% diff	-36%		-40%	-108%	-32%	0%	-38%	-81%

Source: Advisian Analysis of EB RIN Information

However, the apparent Opex advantage of undergrounding is offset by a significantly higher number of poles per customer that AAD must maintain, in part exacerbated by the use of backyard reticulation in the ACT, and the ability for CitiPower, Jemena and United Energy to achieve a much greater ratio of circuit km's to route km's than is typical for the industry by running multiple circuits along the same route[111].

Advisian observes that the higher pole intensity of the AAD network when compared to the frontier businesses networks highlights that the networks are substantially different in a manner which is not captured by the OH network length metrics relied on by the Economic Insights SFA CD model.

As shown in Table 4-5, despite the apparent Opex benefit of a greater proportion of underground circuit length, the configuration of the ACT network in comparison to the customer weighted average of the Victorian urban DNSPs is such that AAD must maintain:

- 41% more poles per customer;
- 20% more route length per customer for an equivalent circuit length;
- 36% more overhead line length per customer.

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[110] Weighted by 5 yr. average customer numbers from AER spreadsheet EBT DNSP PPI.xls 'Analysis' sheet (as provided in support of the annual benchmarking report)

[111] This largely arises from the greater spatial density of customers across the Victorian urban distribution areas. Advisian recognises that using a 22kV distribution voltage and running multiple circuits per span does introduce some additional Opex costs associated with the need for higher poles for clearance reasons, leading to larger trucks, more complex safety requirements and line work activities due to the closer proximity of other live circuits on the same pole. This is offset by the reduced number of, (generally larger) poles, due to the longer average span length that is achievable for 22kV lines; and the maintenance efficiencies that arise from co-located assets.

Table 4-5 2013 Poles and Circuit Length per Customer (AAD and Victorian Urban DNSPs)

	Poles[112] / Customer	Circuit km/Route km	OH Route Length (m)[113] /Customer
ActewAGL	0.30	1.25	11.37
CitiPower	0.14	1.39	5.12
United Energy	0.25	1.41	9.18
Jemena	0.24	1.72	10.08
Vic Urban Customer Weighted Avg[114]	0.21	1.6	8.4
% diff	-41%	+20%	-36%

Source: Advisian Analysis of EB & CA RIN Information

The substantial difference in the results between comparisons of AAD with the customer weighted average of the notional 'frontier DNSP' and to the subset of Victorian Urban DNSPs that the AER has used to make direct comparisons highlights the issues that we discussed in sections 4.1 and 4.3 with regard to the need to consider the relative impact of different 'classes' of networks. (Advisian has also considered the issue of comparable scope of services provided and differences in network boundaries more specifically in Sections 4.4.1 and 4.4.2)

Whilst we recognise that certain additional factors were considered to varying degrees in the AER's MTFP and PPI benchmarking, the Stochastic Frontier Analysis model used by Economic Insights to determine an efficient cost function for a DNSP limits the drivers for the rate of change for Opex to the four key inputs of customer numbers, circuit length, 'ratcheted maximum demand' (RMD)[115], and proportion of underground circuit length. Of these, customer numbers accounts for approximately two thirds of the Opex elasticity in the SFA model with less significant contributions from the other three factors[116].

On the basis of the facts presented above, Advisian is of the opinion that the benchmarking approach used to determine the frontier businesses does not (and the preferred model specification cannot) appropriately account for the differences in the volume of assets that the businesses must to operate and maintain. Whilst the modelling approach taken by Economic Insights may be appropriate for assessing the relative productivity of the businesses (which simply demonstrates that DNSPs that can meet the historical maximum demand with fewer assets, generally do so at lower cost per customer), it is not a reasonable basis for setting efficient Opex because it does not account for the exogenous factors that have led to the need for historical investments in, and configuration of the existing asset base.

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[112] Category Analysis RIN Information Sheet 5.2 Asset Age Profile, (sum of installed poles - excluding staking, stay poles and cross arms)

[113] OH route length has been calculated by Advisian on the basis of the route length reported in the EB RIN (DOEF0301) multiplied by the proportion of overhead to total circuit km's reported in the 'Physical Assets' sheet. i.e. DPA01/ (DPA01 + DPA02).

[114] Weighted by 5 yr. average customer numbers from AER spreadsheet EBT DNSP PPI.xls 'Analysis' sheet (as provided in support of the annual benchmarking report)

[115] The historical maximum demand recorded over the analysis period – which is also highly correlated with Customer Numbers for Australian DNSPs.

[116] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, p.33.

As a result we do not consider that the AER's benchmarking approach is sufficiently developed, proven or robust to support the scale of Opex adjustments that have been proposed. We are also highly concerned that the AER and Economic Insights have knowingly designed the model in a way that systemically discriminates against DNSPs with a high installed capacity, regardless of whether or not this capacity:

▪ was installed in response to the specific planning criteria that has been applied in each state (as was the case for much of the recent NSW, Qld and ACT investment);

▪ was installed in response to market driven augmentation signals, including the best available forecasts, as reviewed by the AER, at the time of the last regulatory determinations[117];

▪ is, or was required to maintain security of supply to customers, or otherwise maintain system security; or,

▪ is required to accommodate an intermediate sub-transmission transformation step due to the configuration, supply voltages and location of available capacity from the upstream transmission network (this issue is discussed in more detail in section 4.4.1).

Whilst we understand the AER's desire to ensure that its benchmarking analysis aligns with demand side (customer) outcomes, we also note that this has subsequently resulted in a model specification that does not, and was never designed to reflect the underlying Opex cost drivers of Australian electricity distribution networks, which primarily relate to the volume, configuration and geographical distribution of assets.

To enable the AER's preferred model to be used as a basis for determining efficient Opex (as distinct from providing a consumer focused measure of relative productivity) Advisian considers that changes must be made to better reflect differences in the volume and nature of the assets that must be operated and maintained. We have identified three principal factors that are highly material to determining the efficient Opex requirements for the business but are not appropriately taken into account in the model for the purpose of determining efficient Opex.

1) The use of total installed zone and distribution transformer capacity rather than ratcheted maximum demand to recognise differences in security requirements, utilisation and load distribution across the network[118];

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[117] For example the AERs Final Decision for ActewAGL for the 2009/10-13/14 period (page xv) states that

"The AER considers that ActewAGL's revised maximum demand forecast provided in its revised regulatory proposal provides a realistic expectation of the demand forecast required to achieve the Capex and Opex objectives in the transitional chapter 6 rules

The AER considers the revised energy forecast provided to the AER on 25 March 2009, generated according to the AER's conclusions on the assumed price elasticity of demand, is an appropriate input to the post–tax revenue model (PTRM) under clause 6.12.1(10) of the transitional chapter 6 rules."

[118] The AER's view that its productivity measure should not take account of capacity that is installed but not 'needed' highlights the fundamental difference between <u>measured productivity</u> and <u>required efficient opex</u>. A DNSP who installed additional capacity in reasonable anticipation of rising demand (based on the best available forecasts at the time of investment commitment), does not receive any funding to maintain these assets under the AER's 'productivity' approach. In practice, investment in these assets was prudent and efficient and it would be imprudent and inefficient to simply stop maintaining them (i.e. avoid incurring opex), and impossible to 'partially' maintain them, simply because they are currently not, or not fully, required to meet the historical maximum demand. (i.e. a transformer that is 'half used' can't be 'half inspected' and 'half maintained')

2)   The relativity between route length and circuit length as well as a correction of rural distributors to account for the lower Opex required to maintain SWER line in comparison to conventional two, three or four wire distribution lines[119]; and,

3)   The recognition of the impact of spatial density (customers per km[2]) as distinct from linear density (customers per km) on the nature and configuration of electricity distribution networks, and consequently on the efficient Opex requirements for a distribution network.

Our reasons for points 1) and 2) are discussed in more detail in section 4.4.1 and 0 below, whilst point 3) has previously been discussed as a separate issue in section 4.3.

4.4.1   Installed Transformer Capacity

The four benchmarking models used by the AER and its consultant have incorporated 'Ratcheted Maximum Demand' as a demand variable that was adopted as an alternative to, and considered to act as a proxy for installed system capacity. Economic Insights explains in its report that the intention in adopting this variable was:

▪   Firstly, to address the suggestion of user groups that the use of maximum demand represented a better measure than installed capacity as it only gives credit for network capacity that is actually used[120].; and,

▪   Secondly that the use of 'ratcheted maximum demand' was intended to address the issue that the use of the observed maximum demand would *'fail to give the DNSP credit for capacity it had been required to provide to meet previous maximum demand which may have been higher than those currently observed'*[121].

Advisian notes that the nature of electricity distribution networks is such that augmentation is required to be planned and investment made to deliver a project in time to meet a forecast peak demand at a particular point in the network (i.e. at a spatial level), to accommodate different load types at different points in the network[122], as well as additional capacity being installed to provide system security and to accommodate forecast growth. There is also the potential for distortion of the results based on differences between networks in the extent to which customers, rather than the DNSP, own distribution transformers. We note that none of these factors are recognised where either

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[119] Single Wire Earth Return (SWER) line consists of widely spaced poles with a single high tension conductor strung between and was historically used as an inexpensive means to electrify rural areas. In comparison to conventional three phase 11kV or 22kV distribution lines, SWER lines typically require less than half the poles due to average spans in the order of 200m in length and half to one quarter of the total conductor length. From an Opex perspective, this translates to approximately half the pole inspections and minimal maintenance of pole top structures. However there is generally no Opex benefit for 'per km' line inspections.

[120] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, p.11.

[121] ibid

[122] For example, commercial loads are typically daytime peaking, whilst residential loads are typically evening peaking. Significant utilisation benefits exist in areas, such as inner city suburbs, where the same network assets serve both commercial and residential loads. This is an exogenous factor that inherently advantages networks where customers are located in closer physical proximity (higher spatial density) and disadvantages areas such as the ACT which has historically developed distinct geographically separated commercial and residential precincts (legacy environmental factor).

maximum demand or ratcheted maximum demand is used in place of installed capacity for the purpose of setting efficient Opex.

In this respect, Advisian notes the Productivity Commission's comments in relation to the effect on measured productivity of recent capital investment within the Australian mining industry:

> *"Efficiency has a time dimension. It can be efficient to 'over-invest' in certain assets ahead of their full utilisation because investment must precede production or because it can be less costly to build in spare capacity at a given time, than to re-invest at a later time to add further capacity. One of the reasons for the recent slowdown in measured productivity of the Australian economy is that mining companies made large investments ahead of the extraction of output. Few suggest that the Australian mining industry is inefficient for this reason.*

> *Benchmarks that fail to recognise the implications of timing can be misleading...Static measures are still useful, but need to be carefully interpreted."*[123]

As shown in Figure 4-2 and discussed in section 4.1, Advisian believe that the ratcheted maximum demand variable is highly correlated with customer numbers and therefore could notionally be removed from the model with limited impact on the results (leaving the resultant model specification driven almost entirely by customer numbers)

Whilst not directly an issue for AAD (other than through model misspecification), Advisian has previously identified a major issue in NSW and Queensland relating to scope of activities and legacy design issues which results in a significant expansion of transformer capacity in those states on a relative basis. The issue arises from NSW and Queensland DNSPs taking bulk supply at 132kV or 110kV, and then transforming it to a 33kV sub-transmission voltage before a final transformation to high voltage distribution level. This issue arose as new networks were interfaced to legacy networks. As a general principle the Victorian and South Australian DNSPs that form the 'frontier DNSP' transform from 66kV to their relevant high voltage (22 or 11kV). In comparison, AAD transforms its energy from 132kV supply from TransGrid directly to 11kV.

The amount of transformer capacity installed by each DNSP, on a kVA per customer basis is shown in Figure 4-11. Clearly there is a high correlation with how DNSPs have ranked in the AER's benchmarking with those having high capacities generally benchmarking poorly, whilst those with low capacities have benchmarked well. CitiPower is the exception. However this is explained by the greater proportion of higher capacity customers located in CBD areas.

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[123] Productivity Commission, *Electricity Network Regulatory Frameworks – Productivity Commission Inquiry Report No. 62,* April 2013
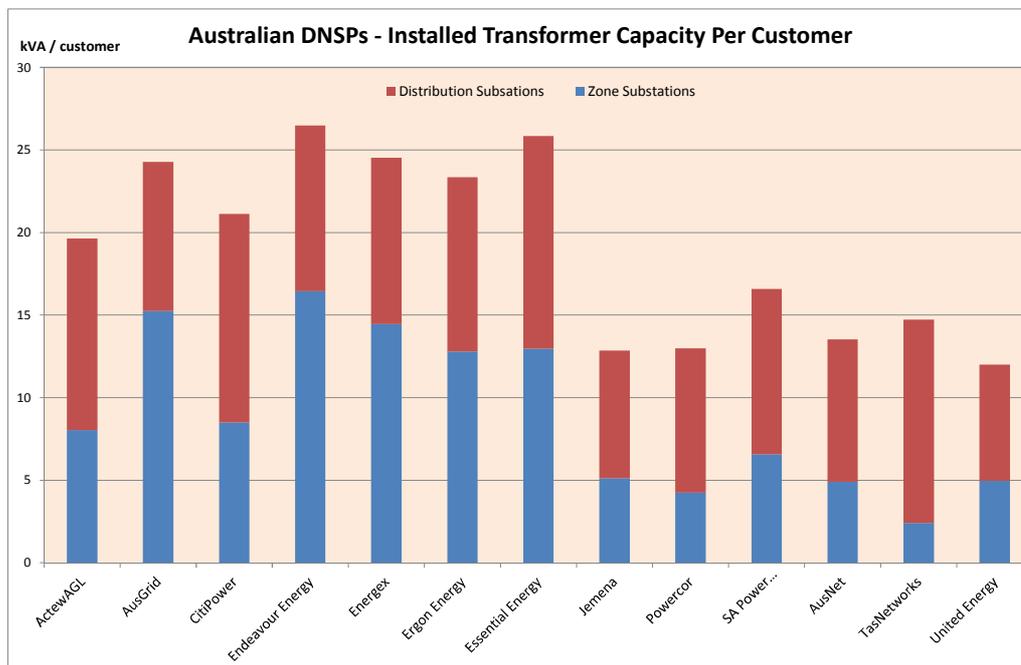
Figure 4-11 Australian DNSPs Installed Capacity per Customer
Source: Advisian Analysis

Again, this issue has been recognised by Economic Insights in preparing its MTFP analysis, where sub-transmission transformer capacity has been excluded from the capacity measure for capital inputs quantities. In this regard, Economic Insights states that:

> *"Those DNSPs with more complex system structures because they have inherited more 'upstream' distribution boundaries will be at a disadvantage relative to DNSPs with simpler structures and a more 'downstream' boundary. Excluding the first stage of two stage transformation at the zone substation level for those DNSPs with more complex system structures allows more like-with-like comparisons to be made across DNSPs"[124]*

With regard to DNSP operating factors, Economic Insights also states that:

> *"...distribution network complexity is also likely to be a factor influencing efficiency levels which is largely beyond current management control in the short term. Those DNSPs that have inherited a more 'upstream' boundary with the transmission network, and hence, may have more sub transmission and possible two-stage transformation at the zone substation level may require more inputs to produce the same amount of (measured) output than DNSPs with more 'downstream' boundaries and single stage transformation"[125]*

Following its adjustments to the MTFP model, Economic Insights reports that the effect of excluding the first stage of two stage transformation is a 6 percent increase in MTFP levels for Energex and Endeavour, with smaller figures reported for Ausgrid, Ergon and Essential.

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[124] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, p.13.

[125] ibid, p. 14

Whilst this does not directly affect AAD, what is more relevant is that a material proportion of energy in Victoria passes directly from the TNSP's system into the DNSP networks at high voltage distribution levels (22kV). This is highlighted in the following extracts from the *Transmission Connection Planning Report 2013* which is produced jointly by the Victorian electricity distribution businesses:

> "*RICHMOND TERMINAL STATION 22 kV (RTS 22 kV)*
>
> *RTS 22 kV is a summer critical station equipped with two 165 MVA 220/22 kV transformers, providing supply to CitiPower's distribution network. The terminal station's supply area includes inner suburban areas in Richmond and Prahran and Melbourne City's Russell Place and surrounding areas. The station also provides supply to City Link and public transport railway substations east of the Central Business District. Due to uneven load sharing between the two 22 kV buses at RTS, the N rating is only slightly higher than the N-1 rating. The N-1 ratings are restricted by over-voltage limits on transformer tapping. A line drop compensator however, limits the overall 22 kV transformation output to 141 MVA for both summer and winter.*"[126]
>
> "*WEST MELBOURNE TERMINAL STATION 22 kV (WMTS 22 kV)*
>
> *WMTS 22 kV is a summer critical station consisting of two 165 MVA 220/22 kV transformers, which supply CitiPower's distribution network. The terminal station provides major 22 kV supply to the West Melbourne area including Melbourne Docks, Docklands Areas, North Melbourne (including a railway substation), Parkville and Carlton, and the northern and western inner Central Business District and surrounding areas.*"[127]

In all, Advisian has identified 11 instances where supply is taken directly into the high voltage distribution network. Whilst Advisian concurs that such an approach makes sound technical and economic sense, the magnitude of these supplies materially impact the scope of activities of a number of DNSPs that form the "frontier" DNSP which is not reflected in the benchmarking models. Essentially this is an exogenous factor that favours four of the five DNSPs that form the 'frontier DNSP.

Figure 4-12 demonstrates the proportion of demand that Advisian has estimated is taken in this way by the Victorian DNSPs.

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[126] Jemena, CitiPower, Powercor, AusNet, United Energy, *Transmission Connection Planning Report 2013*

[127] ibid

% of Demand Supplied at 11/22kV by TNSP
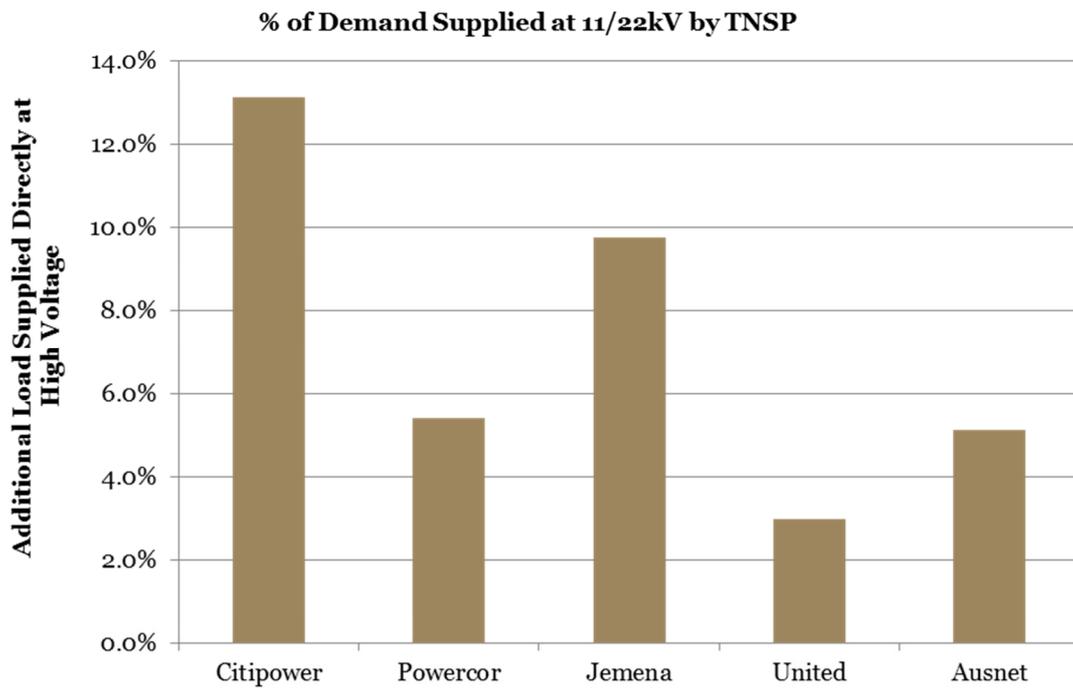
Figure 4-12 Indicative Percentage of Demand Supplied at 11/22kV from the TNSP
Source: Advisian Analysis / Estimates

This decrease in the scope of the 5 Victorian DNSPs (due to the fact that they do not transform all of the energy that they distribute) directly impacts AAD to the extent that the reference point against which it has been judged by the AER does not incorporate 'full scope' DNSPs[128].

In addition to reduced scope at the input side of their businesses, the Victorian DNSP's also appear to have a greater prevalence of supply at high voltage to their customers than is the case for AAD. This is shown in Figure 4-13 which shows the proportion of customer owned distribution transformers compared to the total of customer owned and DNSP owned distribution transformers for 2012 and 2013.

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[128] The Victorian DNSPs do not transform all of the energy supplied from the transmission system.

Customer Owned Distribution Transformer Capacity / Total Customer & DNSP Owned Distribution Transformer Capacity)
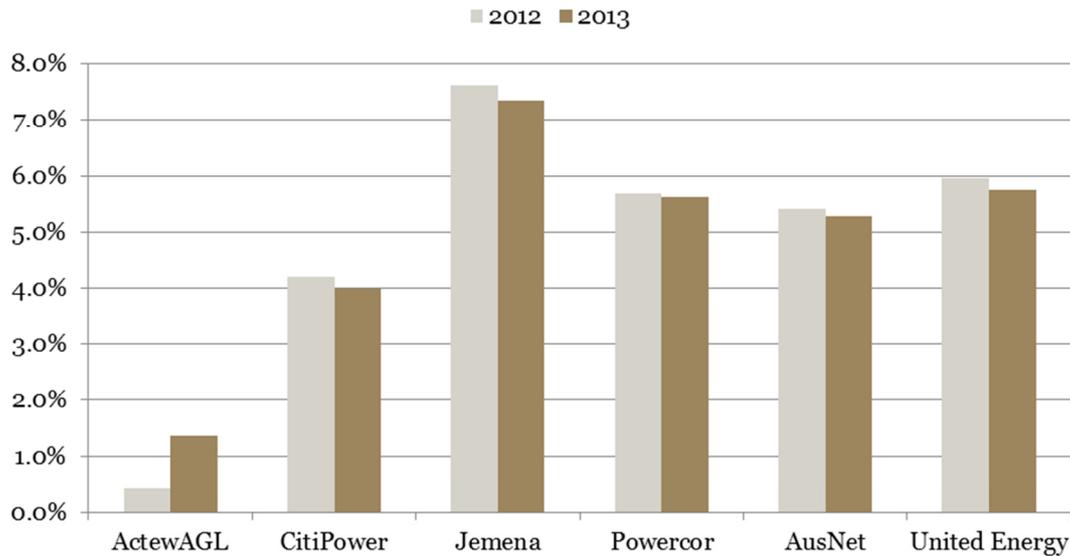
Figure 4-13 Percentage of Distribution Transformer Capacity Owned by Customers
Source: Advisian Analysis of CA RIN

Whereas around 5% of distribution transformers (range 4 – 7.6%) are owned by customers in Victoria, in the ACT this has historically been an order of magnitude lower (0.4%) only recently rising to 1.4%. It should be emphasised that lower transformer capacity is an indicator of decreases in a range of assets such as switchboards, enclosures, and low voltage connections. In simple terms, a higher proportion of customer ownership means the Victorian DNSP's have less assets to maintain than AAD, all other things being equal. The AER's models also fail to address this variation in "scope".

Advisian considers that these issues, along with the corrections discussed earlier in relation to the use of ratcheted maximum demand is best addressed by rebasing the benchmarking models to reflect installed (and owned, operated and maintained by the DNSP) transformer capacity as an input variable in place of ratcheted maximum demand (which in any case, is strongly correlated with customer numbers). This should address a range of matters such as the legacy issues in NSW / Qld, different planning standards and the like. The reality is that Opex is required to maintain the installed fleet of transformers in order to meet safety and reliability obligations, regardless of whether they are required to meet the system peak or not. Advisian is of the strong view that Opex funding based on some "idealised" average network will leave DNSPs short of funds to safely and reliably operate the network they have, rather than the one they might have had.

Similar issues arise in relation to the Ontario distributors. Whilst Advisian has not been able to source data on which to provide quantitative analysis, we note the following in the Ontario Distribution Sector Review Panel report:

> *"Even though the operating costs of small LDC's (local distribution companies) are generally higher, they would be even greater if they incorporated the full cost of distributing low-voltage power to customers.*
>
> - *Some LDC's… …buy high-voltage power from Hydro One Networks, then run it through their*

own transformer stations to step down or reduce the voltage of electricity before sending it to consumers

- *Some Large LDC's and most small and mid-sized LDC's buy their power from Hydro One Networks but at a lower voltage after it has already been stepped down because they have no transformer stations themselves.*
- *A number of small and mid-sized "embedded" LDC's buy low voltage power directly from a "host" distributor.*

These are critical distinctions, as the small and mid-sized LDC's are charged for the use of the transformer stations and other distribution assets required to serve their customers. LDC's do not typically reflect these charges in their operating and capital costs reported to the OEB (Ontario Energy Board), leading to an understated OM&A totals..." [129]

The extent to which this scope variation occurs within the Ontario benchmark distributors influences the benchmarking models and is ultimately a matter for econometric specialists. However, Advisian would expect that it certainly does not enhance confidence in the model. We are concerned that much of this effect for the Ontario DNSPs has implicitly been attributed to the Ontario 'dummy variable' that has been employed by Economic Insights. The same issues are expected to be implicit in the New Zealand data, partly explaining the degree of variation.

4.4.2   Route Length

The AER's preferred SFA CD model specification is reliant almost exclusively on the circuit length as the primary differentiator between urban and rural networks. With the exception of the underground percentage variable, no differentiation is made between line types (including different construction types and voltages), ratings or costs. With further development, Advisian would expect benchmarking models to evolve to include a weighting system to deal with this issue. This is not practical in the context of the immediate Draft Decision, but serves to highlight the premature application of the current level of model development to the magnitude of the Opex reductions proposed by the AER.

Single Wire Earth Return (SWER) technology is extensively applied in both Australia and New Zealand to supply remote locations. It is characterised by a single (usually steel) wire with long spans between poles – typically 200 metre and a single insulator to carry the conductor. As such, it is a low capital cost technology.

Notwithstanding inspection costs, its long span lengths lead to fewer poles per circuit km and its limited pole top hardware should result in lower Opex costs on a line kilometre basis than conventional two, three or four wire line construction. This is partially offset by more expansive earthing requirements at each customer offtake point.

In Advisian's opinion, SWER represents a significant source of heterogeneity both within the Australian DNSPs and across the international benchmarking set. Its impact does not appear to have been tested or considered by Economic Insights.

As a general principle, the benchmarking models treat all line types equally (through the Circuit Length parameter), with the exception that the Underground Proportion modifier in the SFA CD,

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[129] Ontario Distribution Sector Review Panel, *Renewing Ontario's Electricity Distribution Sector: Putting the Consumer First*, December 2012,

LSE TLG and LSE CD models effectively "penalises" (in terms of efficient cost allowance) those DNSPs with above average underground proportions on the basis that these are "low(er)" maintenance cost assets. Whilst accepting this principle Advisian is concerned that (since AAD has the highest Underground Proportion of all Australian DNSPs) any model shortfalls in this parameter will impact AAD disproportionately. No sensitivity analysis has been conducted on this factor.

Figure 4-14 shows the relative portion of Overhead, Underground and SWER circuits. In our previous discussion in section 4.3, Advisian has identified a "cluster" of DNSPs characterised by low linear and spatial density. These organisations are also characterised by relatively high proportions of SWER. Advisian is concerned that the one for one treatment of SWER with circuit length may bias the benchmarking model in favour of networks with a significant proportion of SWER. This concern is heightened by the fact that three of the "frontier" DNSPs – Powercor, SAPN and Ausnet have significant SWER networks and the comparisons between AAD with the Victorian urban DNSPs in section 4.4 reveal a substantial disadvantage with regard to the volume of assets that must be maintained on a 'per customer' basis.
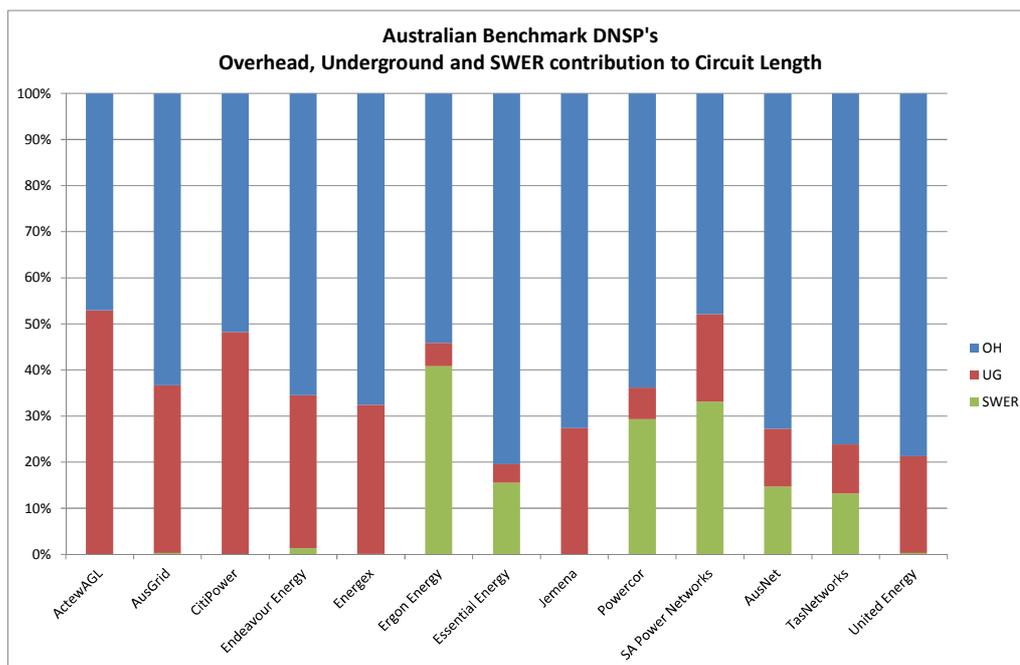
Figure 4-14 Line Components – OH, UG and SWER
Source: Advisian Analysis

Where no adjustment has been made for the impact of SWER on the key circuit km metric that is used in the model, the need to consider DNSPs in homogeneous classes for modelling purposes becomes more pertinent.

However, as a starting point within the modelling framework presented in the AER's Draft Decision, Advisian recommends that the SWER component of circuit length is discounted by a factor of 50%

for the purpose of Opex benchmarking[130]. This reflects an initial estimate of the reduced volume of inspections and maintenance arising from fewer poles and cross arms on SWER lines and is summarised in Table 4-6 below.

Table 4-6 Advisian Recommended SWER Adjustment to Circuit Length.

	SWER km	Adjustment to circuit length	% Adjustment to Circuit km	% Change in Total Opex[131]
ActewAGL	0	-	0.0%	0.0%
Ausgrid	125	-62.5	0.2%	0.0%
Endeavour	485	-243	0.7%	0.1%
Essential	29,766	-14,883	7.8%	0.8%
Energex	39	-20	0.0%	0.0%
Ergon	65,321	-32,661	20.4%	2.2%
SA Power Networks	29,144	-14,572	16.6%	**1.8%**
TasNetworks	495	-247	1.1%	0.1%
Ausnet	6,459	-3,229	7.4%	**0.8%**
CitiPower	0	-	0.0%	**0.0%**
Jemena	0	-	0.0%	0.0%
Powercor	21744	-10,872	14.7%	**1.6%**
United Energy	41	-21	0.2%	**0.0%**

Source: Advisian Analysis of EB RIN

The impact of this adjustment would ideally be quantified on the basis of a revised econometric model, however, for the purpose of this draft report; it can be estimated through the application of the SFA CD co-efficient. In this case, a 1 percent reduction in circuit length, will lead to a 0.106 percent reduction in Opex[132]. Based on a customer weighted average of the frontier businesses, the application of a 50% reduction in the impact of SWER on circuit length reduces the effective circuit length of the frontier business by 9.3%, which equates to a 1.0% reduction in the total Opex of the frontier DNSPs. Taking the total Opex adjustments from Table 4-6 and using them to adjust the productivity scores of each DNSP results in a $0.38m upward adjustment to AAD's Opex.

Table 4-7 Advisian Recommended Adjustment for Circuit Length

Issue	Adjustment $m (% of efficient base)
SWER Circuit Length	**+$0.38m** (1.2%)

Source: Advisian Analysis of EB RIN

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[130] This reflects that typical SWER span lengths in the order of ~150m-200m result in substantially fewer pole inspections than conventional lines with typical span lengths in the order of ~60m-90m. From an Opex perspective, the marginally greater travel time between poles on a SWER line is more than offset by the much lower number of inspections that are required per km.

[131] "% adjustment to Circuit km" multiplied by the Economic Insights elasticity of 0.106

[132] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, p.33.

4.5   Reliability

Advisian notes that reliability has not been considered in any of the SFA CD, LSE TLG or LSE CD models. The Opex MPFP model deducts a proportion of Opex on the basis of absolute reliability (SAIDI).

In Advisian's experience, the underlying reliability of a network is largely a function of the physical design of the network taking into account such factors as the number and distribution of zone substations, length of high voltage feeders, degree of undergrounding, degree of insulated conductor and the effectiveness of vegetation management and other maintenance strategies. Many of these particularly impact SAIFI – the frequency of outages. CAIDI reflects the duration of outages. CAIDI captures an organisations ability to respond and implement repairs or switching when faults do occur. This is highly influenced by resourcing levels and deployment strategies, primary drivers of Opex. The combination of SAIFI and CAIDI, i.e. the number of outages and the time to respond, reflects in SAIDI – the overall outage time customers experience on average. SAIDI ultimately reflects the unserved energy which, when multiplied by the Value of Customer Reliability, gives the cost to the community of outages.

Advisian has reviewed SAIDI and SAIFI, and by implication CAIDI, over the 8 year period 2006 – 2013 provided in the Economic Benchmarking RINs. For the purpose of this analysis, the impacts of Major Event Days and other excluded events have been omitted from the measure.

Figure 4-15 shows unplanned SAIDI for AAD and the 5 "efficient frontier" DNSPs over the 8 year period.
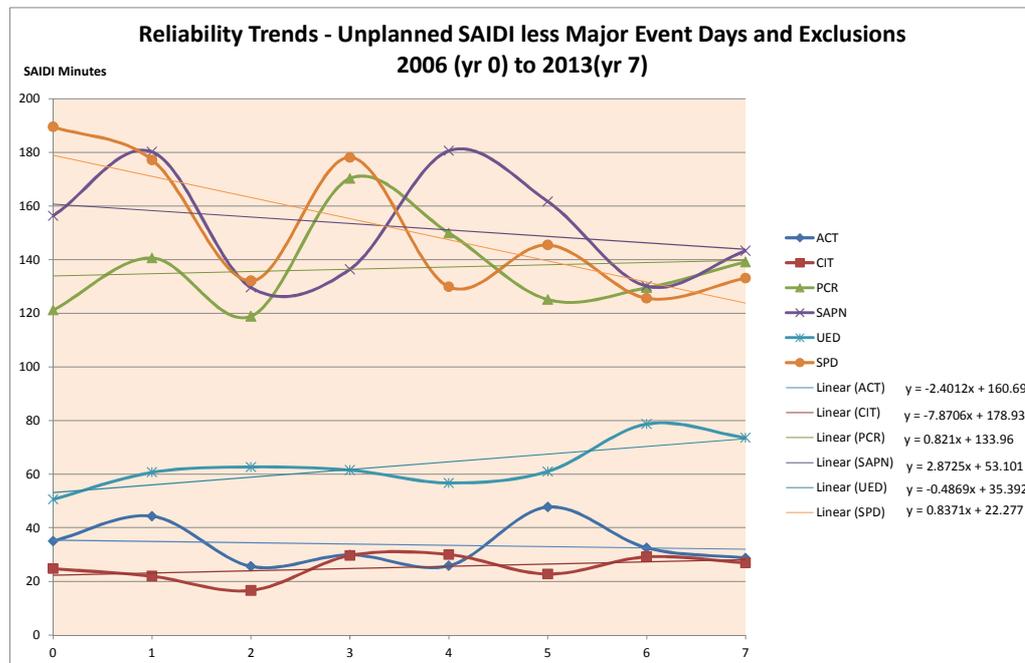
Figure 4-15 Reliability Trends – Annual Unplanned SAIDI 2006 to 2013
Source: Advisian Analysis of EB RIN

In order to determine a trend in reliability for each DNSP, a trend line has been used to calculate a starting point (Year 0 – 2006) and ending position (Year 7 – 2013). The resultant change in SAIDI over the period is shown in Figure 4-16.
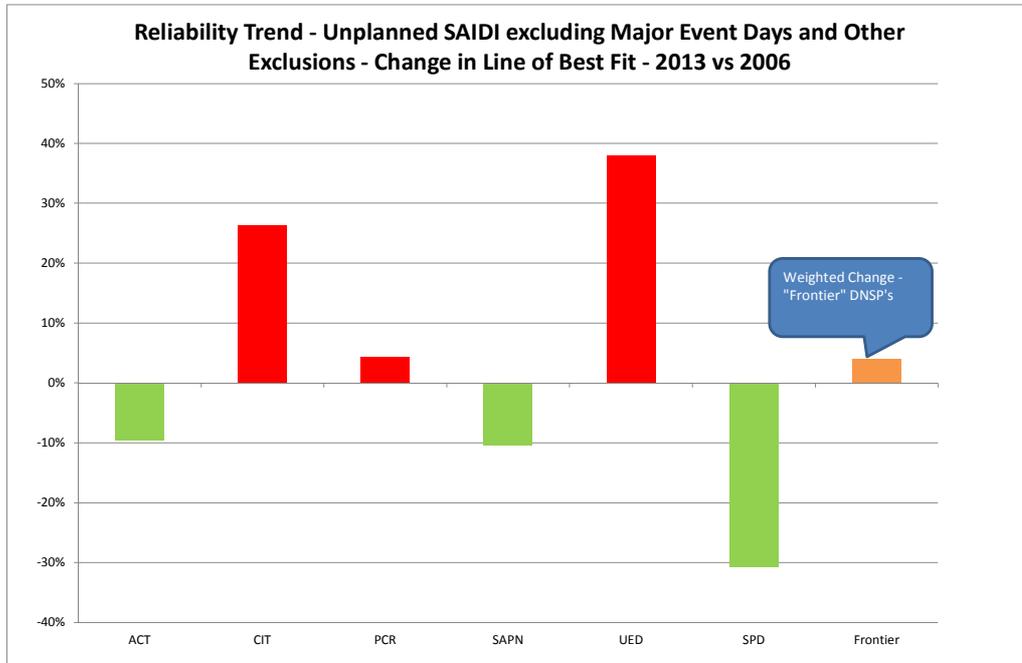
Figure 4-16 Reliability Trends – Change in Unplanned SAIDI 2006 to 2013
Source: Advisian Analysis of EB RIN

On this "integrated" SAIDI measure, AAD has improved reliability by approximately 10% over the period whilst the reliability of CitiPower, United Energy and (to a smaller extent) Powercor networks appear to have deteriorated.

When the analysis is repeated using SAIFI, the results are inconsistent with the SAIDI measures above. Figure 4-17 shows that SAIFI has improved significantly for most of the "frontier" companies whilst AAD and United Energy have remained stable.
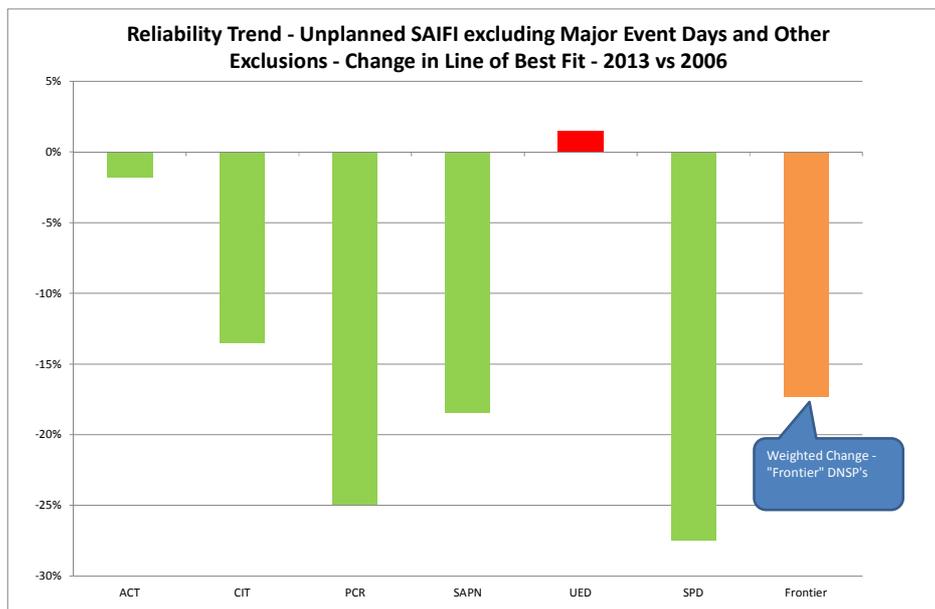
Figure 4-17 Reliability Trends – Change in Unplanned SAIFI 2006 to 2013
Source: Advisian Analysis of EB RIN

In addition to the effectiveness of Opex programs such as vegetation and equipment maintenance, SAIFI can be positively impacted by replacement and augmentation Capex programs. Clearly, the "frontier" DNSPs have been effective in achieving SAIFI improvements.

However, performance on the CAIDI measure has not been so clear cut. The implied CAIDI (calculated by dividing SAIDI by SAIFI) is shown in Figure 4-18.

CAIDI appears to have deteriorated significantly for the majority of efficient frontier DNSPs whilst AAD and Ausnet have achieved slight improvements in response times. In Advisian's view, deteriorating CAIDI is more likely to be Opex related than Capex related as deterioration of CAIDI performance typically reflects under resourcing to respond to outages and other factors such as rationalisation of depots resulting in longer response times. A number of the "frontier" DNSPs have been able to achieve a SAIFI / CAIDI trade off to maintain SAIDI. However, CitiPower and United Energy do not, on the basis of the data presented, yet appear to have achieved this balance.
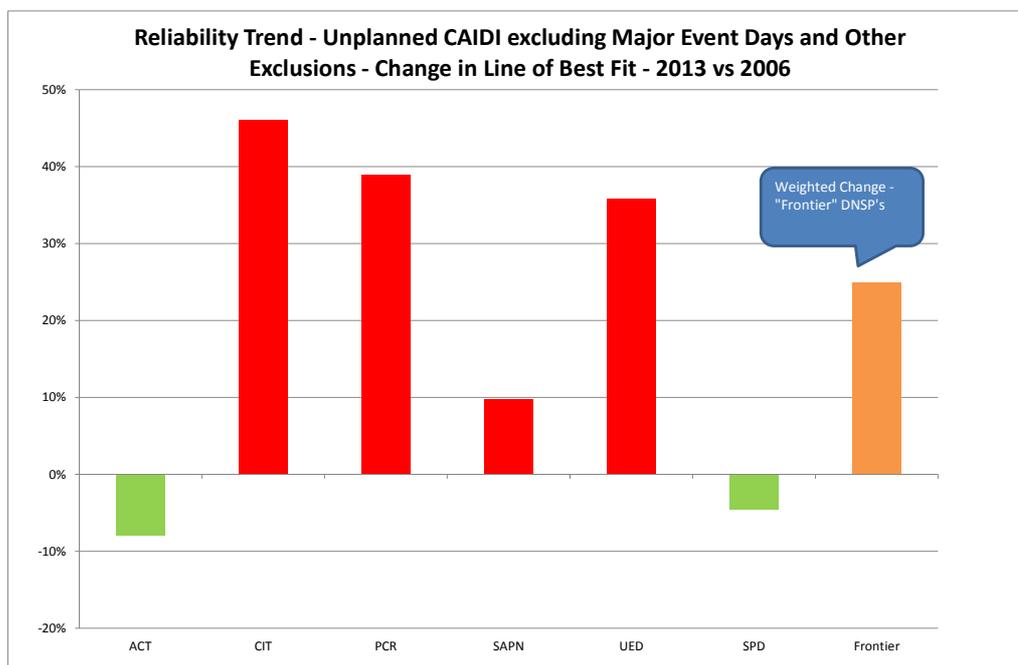
Figure 4-18 Reliability Trends – Change in Unplanned CAIDI 2006 to 2013
Source: Advisian Analysis of EB RIN

In Advisian's opinion two conclusions can be drawn.

1) Firstly, that the "ceteris paribus" assumption underpinning constant reliability in the benchmark model does not necessarily hold, and some adjustment should be made to reflect changes in reliability. This is particularly relevant given CitiPower's premier efficiency position.

2) Secondly, it highlights that reliability can be achieved by a combination of Opex and Capex programs. AAD, in maintaining (or improving) CAIDI has achieved this operationally.

We also note that AAD independently maintains its own estimate of VCR for the ACT as the AEMO NSW VCR figure is based on a very limited sample of ACT customers. For this reason we have calculated the value of this adjustment on the basis of the AAD value for VCR of $67.26k ($2014/15)[133] because it is more specific to ACT customers[134].

Taking AAD's average maximum demand of 331 MW and correcting for a 3.4 minute difference SAIDI gives 18.78 MWh of unserved energy. At AAD's value for VCR, this equates to a $1.26m upward adjustment to AAD's total Opex (and not less than an upward adjustment of $0.50m when calculated using the NSW residential VCR). Some adjustment would also appear prudent for the "frontier" DNSP's which would have a second order Impact on AAD. We have not quantified this.

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[133] AAD, *STPIS Reliability Incentive Rates 2015-2019,* 30 May 2014, p. v

[134] The equivalent figures from AEMO's *Value of Customer Reliability Review Final Report*, September 2014 are: NSW residential ($26.53k) p 18., NEM Agricultural ($47.67k) p. 23 , NEM Commercial ($44.72k) p. 23, and NEM Industrial ($44.06k), p 23. Page 23 of the AEMO report also shows that smaller business place a considerably higher value on reliability than the sector averages reported above.

Table 4-8 Advisian Recommended Adjustment for Reliability

Issue	Adjustment to Total Opex $m (% of efficient base)
Reliability	**+$1.26m** (4.1%)

Source: Advisian Analysis

4.6   Backyard Reticulation

On the basis of AAD's response to the AER's questions on Opex and Capex[135], the AER accepted a specific adjustment of $2.0m to account for the additional costs that are required to accommodate backyard reticulation in the AAD network.

In applying this adjustment, the AER has:

▪ calculated that the $2.0m fixed additional Opex to accommodate the backyard reticulation portion of the network represents approximately 2.7%[136] of AAD's $73.3m reported historical Opex for 2012/13 Opex base.

▪ applied this 2.7% figure as an upward adjustment as part of the '30' allowance provided to escalate AAD's base productivity score.

This means that the AER's alternative forecast does not make the full $2.0m allowance for backyard reticulation indicated in the AER's Draft Decision as follows:

"…ActewAGL quantified several examples of the incremental expenditure associated with backyard reticulation. In particular, ActewAGL cited costs of $2.0 million per annum for:

▪ *notification letters prior to inspection*
▪ *cancelled inspections*
▪ *additional time for inspections*
▪ *access issues (primarily due to scaffolding requirements)*

Our view is that backyard reticulation places an uncertain set of barriers between the assets and ActewAGL's staff (or contractors) not present for other service providers. These incremental costs are the equivalent of approximately 2.8 percent of ActewAGL's base year Opex"[137]

Advisian has calculated that the adjustment made for backyard reticulation in the alternative forecast is approximately $0.84m due to the AER's application of the adjustment as a percentage that has been calculated on the basis of AAD's historical base year rather than as a percentage of the AER's alternative forecast.

Given that the items that have been identified by AAD (e.g. scaffolding, notification letters, cancelled inspections) are largely a fixed cost due to the low variability in the number of inspections required

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[135] AAD, *Operating and Capital Expenditure 'Site Visit' Clarifications – 2012-19 Subsequent Regulatory Control Period, 3 October* 2014

[136] Advisian notes that the small difference between our calculated figure of 2.7% and the 2.8% quoted by the AER relates to the calculation of our percentage based on the 'rolled forward' 2012/13 base Opex, rather than the 'analysis period average' used by the AER.

[137] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, pp. 7-115 to 7-116

each year, the AER's implied assumption that the costs associated with backyard reticulation are proportional to total Opex does not reflect the underlying cost driver of the work and therefore does not enable AAD to recover its efficient costs for providing network services.

On this basis Advisian recommends an additional upward adjustment of $1.26m to account for the largely fixed $2.0m incremental cost that was estimated by AAD and accepted by the AER for operating a backyard reticulation network in the ACT. As we have already removed the impact of the AER's ex-post adjustments in the calculation of the base Opex, this represents an upward adjustment of $2.0m when applied in the same way as the AER's other the fixed costs such adjustments (Standard Control Services Connections, Jurisdictional Taxes and the 2.4% 'miscellaneous' adjustment).

Table 4-9 Advisian Recommended Adjustment for Backyard Reticulation

Issue	Adjustment to Total Opex $m (% of efficient base)
Backyard Reticulation	**+$2.0m** (6.5%)

Source: Advisian Analysis

4.7   Conclusions – Technical Differences

Advisian has considered the key technical differences that have not been taken into account in the AER's Opex benchmarking approach and concludes that:

1) the AER's benchmarking model is not suitable for determining efficient Opex as it has intentionally been specified to provide a relative measure of productivity which is overlooks much of the volume of installed assets, which are a critical cost driver for DNSP Opex.

2) the use of AAD's revealed base year as the starting point represents the most appropriate and robust means of accounting for the difference in spatial density and all other network specific factors. Where this is not adopted, a number of specific adjustments are required to account for factors that are not addressed in the model.

3) in comparison to the Victorian urban DNSPs, to whom the AER has made direct comparisons, AAD must maintain substantially more assets per customer due to differences in scope and legacy network issues.

4) Correcting the model specification to account for installed transformer capacity in place of ratcheted maximum demand allows correction for a number of factors that better reflect the volume of assets that must be maintained.

5) Correcting the circuit length parameter to take account of the lower Opex requirements for SWER line results in a 13% reduction in circuit length for the notional frontier business. In turn this accounts for a 1.0% reduction to the frontier business total Opex.

6) The assumption of constant reliability trends does not hold for AAD or CitiPower and correction should be made to account for the declining performance of CitiPower over the analysis period.

7) The AER's application of the fixed additional cost of $2.0m for maintaining the ACT backyard reticulation network has been applied as a downscaled +2.8% percentage adjustment. This

results in the under recovery of the costs required to operate and maintain the ACT network by $1.18m.

The impact on Opex arising from these adjustments is summarised in Table 4-12. We note that the issues relating to Linear v Spatial Density and Installed Transformer Capacity relate to factors that are not taken into account in the Economic Insights SFA CD model specification. Because of the intentional under specification of the model in relation to installed capacity, these factors must be taken into account separately through either a revised model specification that transparently and robustly accounts for these factors or the reliance on the revealed base year cost as the starting point for determining the AER's 'base' opex. This will also take into account the issues relating to network scope.

Table 4-10 Advisian Recommendations – Technical Factors

Issue	Adjustment to Total Opex $m (% of efficient base)
SWER Circuit Length	**+$0.38m** (1.2%)
Linear v Spatial Density	Adjustment to model **or** As revealed in the audited base year
Installed Transformer Capacity v Ratcheted Maximum Demand	Adjustment to model **or** As revealed in the audited base year
Reliability	**+$1.26m** (4.1%)
Backyard Reticulation	**+$2.0m** (6.5%)

Source: Advisian Analysis

5 Business Practices

This section outlines the differences in business practices, focussing primarily on cost allocation practices and cost allocation between AAD and the other NEM distribution businesses in response to the following questions:

2) *What differences in business practices exist between ActewAGL and other Australian DNSPs that affect how the reported Opex and Capex figures should be interpreted for benchmarking purposes? What is the impact of these differences in business practices on ActewAGL's Opex relative to the "top quartile" DNSPs that form the AER's efficiency frontier?*

To respond to these questions, we have firstly considered issues in relation to the AER's detailed review of AAD's vegetation management practices and network maintenance which form the basis of the AER's Category Analysis findings that AAD reports 'very high' opex. We have then considered the adjustment for operating leases that has been made by the AER, followed by differences in capitalisation and cost allocation practices that are material to interpreting the relative productivity results in the contexts of setting the efficient Opex for AAD.

5.1 Vegetation Management

In Attachment 7: Operating Expenditure of its Draft Decision, the AER has "*used detailed review to investigate supporting evidence for the benchmarking results in the detail of AAD's historical expenditure*"

One area for detailed review has been Vegetation Management. The AER's primary evaluation has been based on examining vegetation management (spend) per km of overhead route length. Their rationale for this was:

"*We chose vegetation management per km of overhead route length because the length of overhead lines is more likely to drive vegetation management costs than customer numbers. We used overhead route line length[138] rather than maintenance span or circuit length.*

Ideally, we would use maintenance span length. Maintenance span length measures the length of service provider's power lines that have undergone vegetation management in the preceding 12 months. However, service provider's estimation assumptions seem to influence the data on maintenance spans. For some service providers maintenance spans are only a small part of overhead line route, while for others they make up the vast majority of the overhead line length. Therefore, we consider overhead route line length is a better measure of the area of network that requires vegetation management."[139]

Advisian is concerned that the AER's rejection of the vegetation information provided by the DNSPs in favour of OH route length fails to recognise that the primary driver of vegetation management expense is in fact, vegetation. The AER has qualitatively recognised this, as evidenced by Figure 5-1 Australian Vegetation taken from the Draft Decision for Essential Energy, but failed to quantify its

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[138] Advisian notes that the AER's calculation of overhead route length is incorrect.

[139] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p. 7-110

impact. Whilst Advisian shares the AER's concern over the consistency of the Vegetation Span data in the Benchmarking RIN's, we note that it is not logical to simply ignore it in a detailed assessment of vegetation management costs.
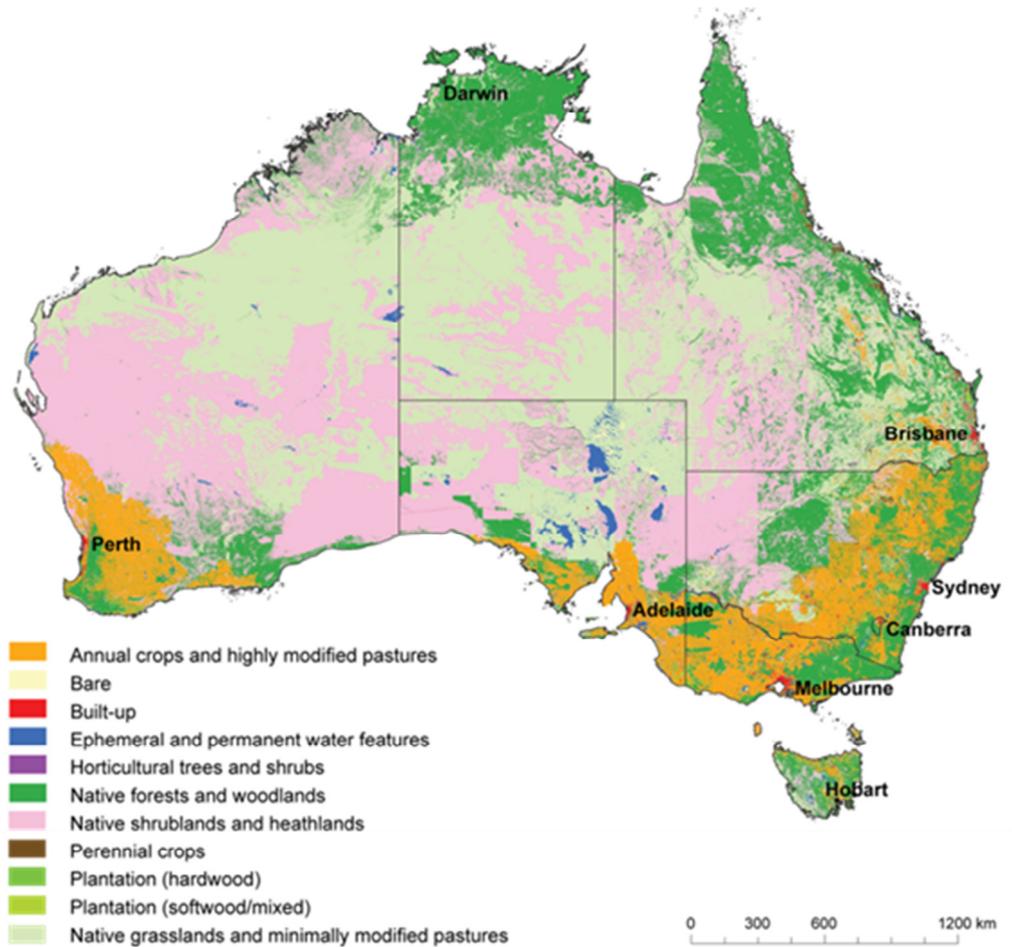
Figure 5-1 Australian Vegetation

Source: *Essential Draft Decision Attachment 7 – Figure A-27   Extent of all forms of vegetation across Australia, 2009*

Figure 5-2 shows the vegetation spans as a percentage of total spans from 'Environmental' tab of the economic benchmarking RINs. On inspection of the initial data, Advisian had concerns with some data points (specifically Endeavour, Citipower and TasNetworks).

Advisian is aware from a parallel engagement that Endeavour has revised their percentage down from 100% (which was clearly erroneous) to 61%. TasNetworks and Energex reported only one year of Vegetation span data, whilst all others reported 3 or more years. Coastal distributors (AAD[140], Ausgrid, Energex, Endeavour, Jemena, and Ausnet Services) all report values in excess of 50%. The two hybrid coastal / inland distributors Ergon and Essential are around 30%. Powercor and SA Power Networks, with service territories overlapping large areas of cropping and modified pasture

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[140] Advisian notes that whilst ActewAGL is not technically 'coastal', Figure 5-1 illustrates that the vegetation in its network is more comparable to the coastal areas for other DNSPs. (i.e. the ACT is shown as a predominately 'native forests and woodlands', with smaller proportions of 'built up' areas and 'annual crops and highly modified pastures')

report ratios of approximately 10%. Citipower and United Energy report low values, which appears to be consistent with their shared responsibility and inner urban service territory. The value for TasNetworks does not seem consistent with the vegetation map.

In conducting its detailed assessment, the AER determined overhead route kilometres by deducting underground circuit kilometres from total route kilometres, and assuming the balance was the overhead route length. This is numerically incorrect as underground circuits will also have multiple cables in the same route.

The result of the AER's calculation is an understatement of overhead route km that is likely to adversely affect AAD due to the high proportion of underground circuits in its network. Given that there are significant variations between DNSPs in the ratio of circuit kilometres to route kilometres (in the range 1.03 to 1.72) Advisian is of the view that the AER's approach has the potential to materially distort the results. Advisian's preferred approach, in the absence of other information, is to apportion route kilometres in direct proportion to circuit kilometres. In summary:

▪ **'Vegetation Circuit km'** is calculated by multiplying overhead circuit length by the ratio of vegetation spans to total spans to calculate 'Vegetation Circuit km')
▪ **'Vegetation Route km'** is calculated by apportioning route length by the ratio of overhead to underground (assumes the same circuits / route for each) and multiplying overhead route length by the ratio of vegetation spans to total spans to calculate 'Vegetation Route km')
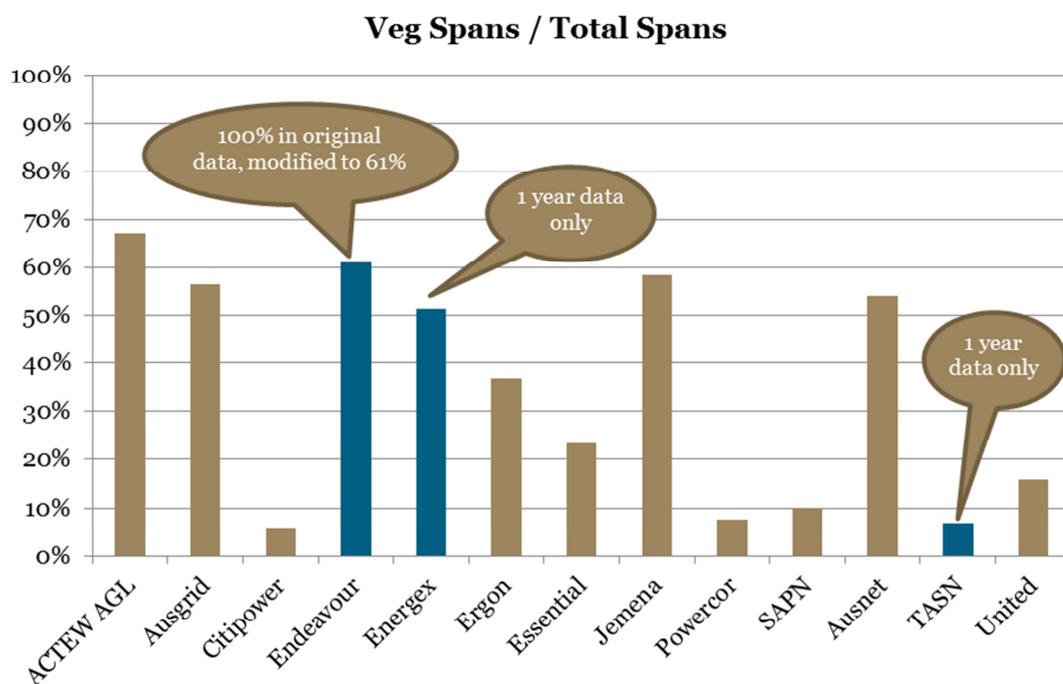
Figure 5-2 Vegetation Spans to Total Spans
Source: Advisian Analysis

The resultant average annual spend per Vegetation Circuit km and Vegetation Route km is shown in Figure 5-3 and Figure 5-4 as a revision to the AER's figures A.16 and A.19.
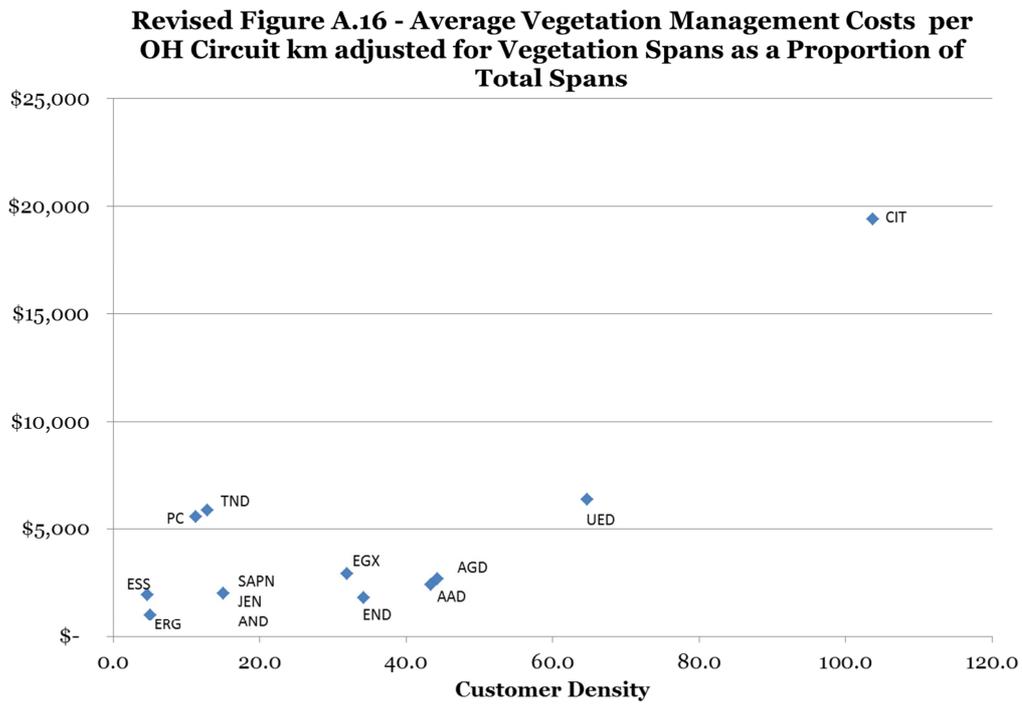
Figure 5-3 Average Vegetation Management Costs per OH Vegetation Circuit km

Source: Advisian Analysis
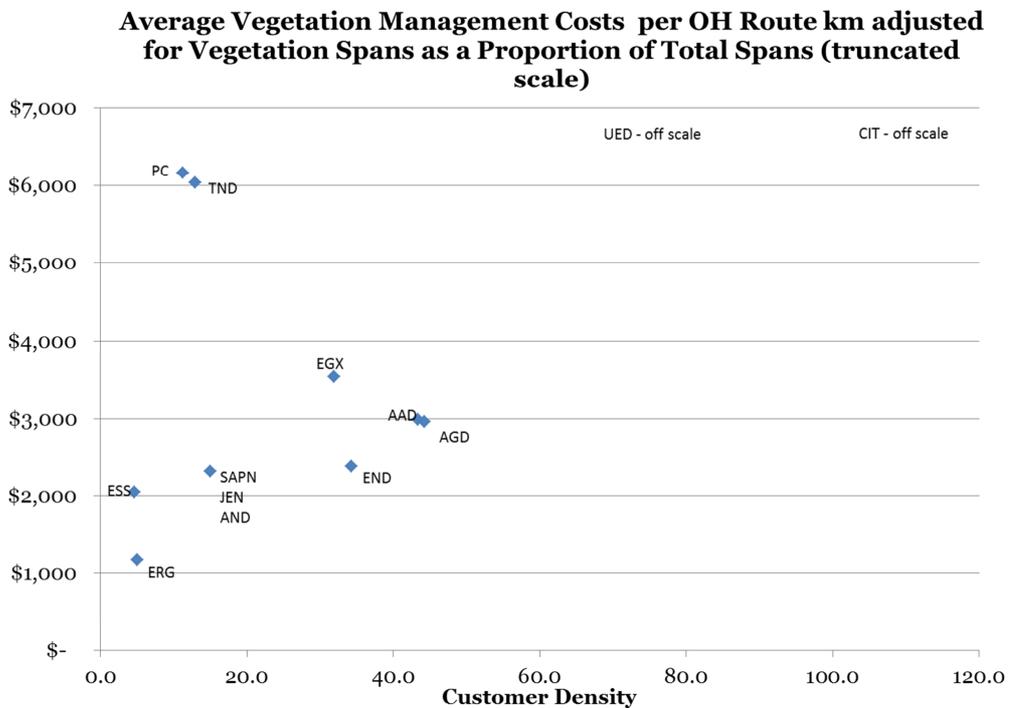
Figure 5-4 Average Vegetation Management Costs per OH Vegetation Route km (Truncated Vertical axis)

Source: Advisian Analysis

Advisian notes that once corrected for the information provided by the DNSPs, these results clearly contradicts the AER's conclusion that "*ActewAGL has very high costs compared to most of its peers on this measure*"[141]

The second issue that the AER has failed to accommodate in its deliberations is that whilst it has recognised that AAD is technically not responsible for all vegetation management in its service area, it has not made adjustments to take account of similar provisions in the Victorian jurisdiction.

In particular, there are 2 relevant provisions in the Electricity Safety Act (Vic) 1998

> *84C   Requirement to keep trees clear of electric lines—Councils*
>
> *A Council responsible for the management of public land in an area of land declared under section 81 is responsible for the keeping of the whole or any part of a tree situated on that land clear of an electric line that is not a private electric line.*
>
> *81   Declared area in urban area*
>
> *(1) The Governor in Council, by Order published in the Government Gazette, may declare an area of land in an urban area for the purposes of this Part.*
>
> *S. 81(2) amended by No. 39/2005 s. 48(Sch. 1 item 2).*
>
> *(2) An Order under subsection (1) must contain a description sufficient to identify the land concerned which may include a description by reference to a map held by Energy Safe Victoria*

Evidence from the Victorian Royal Bushfire Commission[142] shows that almost 90% of local councils in Victoria have some responsibility for the vegetation management of power lines. Although the line length in some rural areas that councils are responsible for may be small, the proportion of line length under control of the councils is considered material to the benchmarking undertaken by the AER, particularly for the more urban DNSPs.

From our review of the AER's Draft Decision, the Annual Benchmarking Report and the Economic Insights report, it is not apparent how these Victorian factors have been taken into account in either the benchmarking, or the Category Analysis that the AER has presented.

Furthermore, as part of its detailed review, the AER also concluded that AAD's vegetation has been ineffective as follows:

> "*Figure A.18* [reproduced as Figure 5-5 below] *shows that the number of vegetation –related interruptions to supply increased significantly each year between 2009-10 and 2012-13*
>
> *This is not the result we would expect given that ActewAGL's regulatory proposal states it increased reliability and safety focused operating expenditure in the 2009-14 period, particularly for vegetation management.*"[143]

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[141] ibid, p. 7-117

[142] http://www.royalcommission.vic.gov.au/getdoc/971e090c-3a46-4618-91df-519a884233d0/RESP.4000.012.0001.pdf

[143] ibid, pp. 7-117 to 7-118
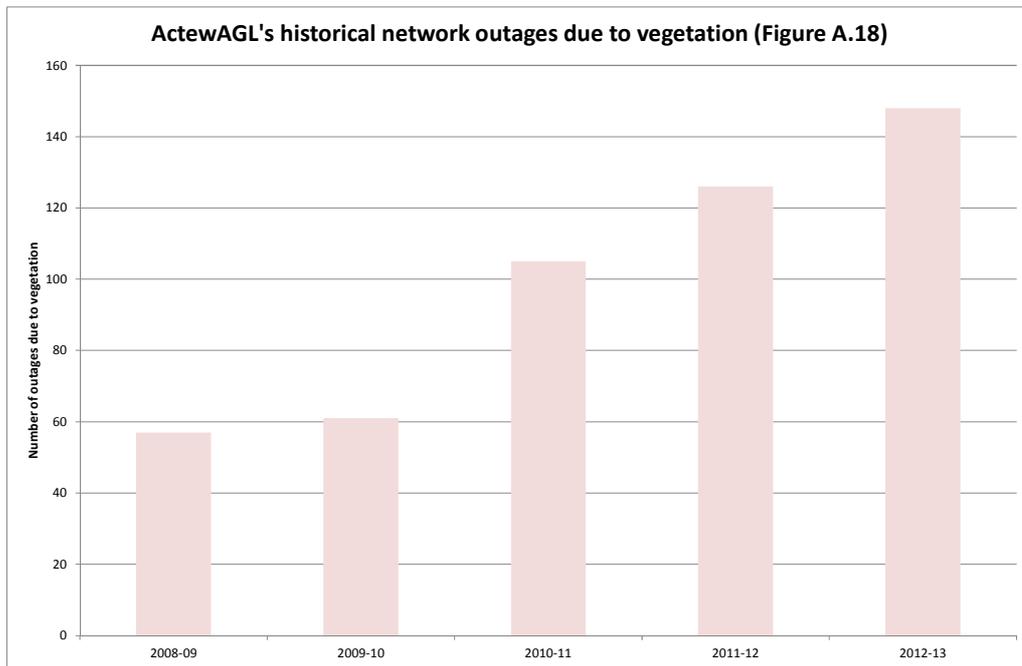
Figure 5-5 AAD Historical Network Outages due to Vegetation
Source: AER

Advisian notes that the recognised industry benchmarks for reliability measurement are SAIDI and
SAIFI and the AER has not presented the impact of these Vegetation Outages on SAIDI and SAIFI.
Advisian has extended the analysis of the outage data analysed by the AER to determine these
impacts. Figure 5-6 shows the impact on Urban and Rural SAIDI.
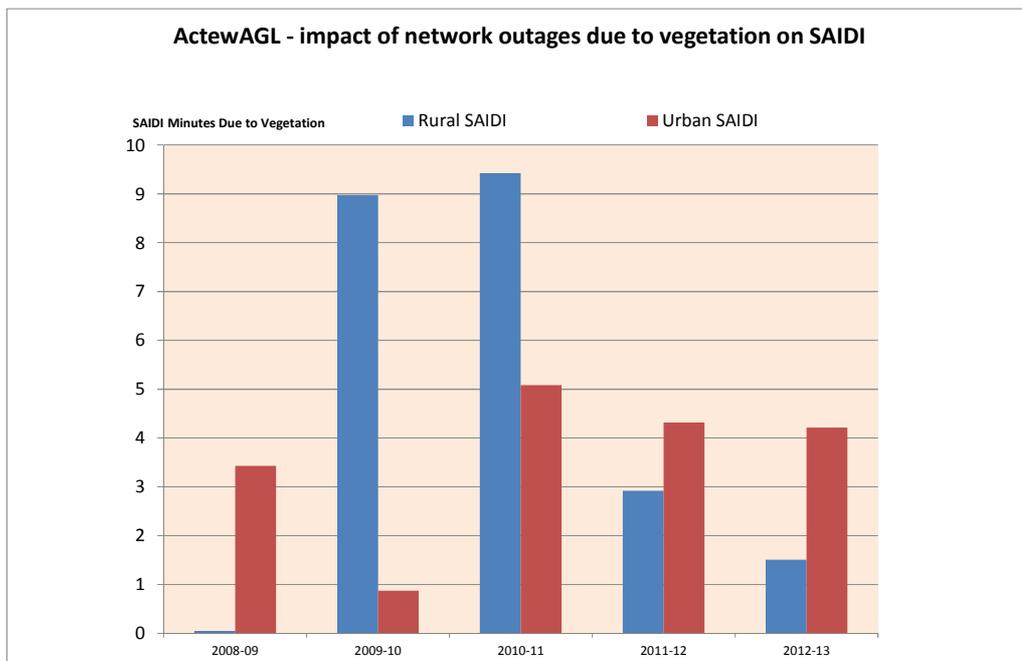
Figure 5-6 AAD SAIDI Impact of Network Outages due to Vegetation
Source: Advisian Analysis

Advisian notes that whilst the number of events may have risen, their impact on Rural SAIDI has declined significantly since 2009-10 whilst Urban SAIDI has remained relatively stable over the last three years.

Figure 5-7 shows a similar trend for Urban and Rural SAIFI.
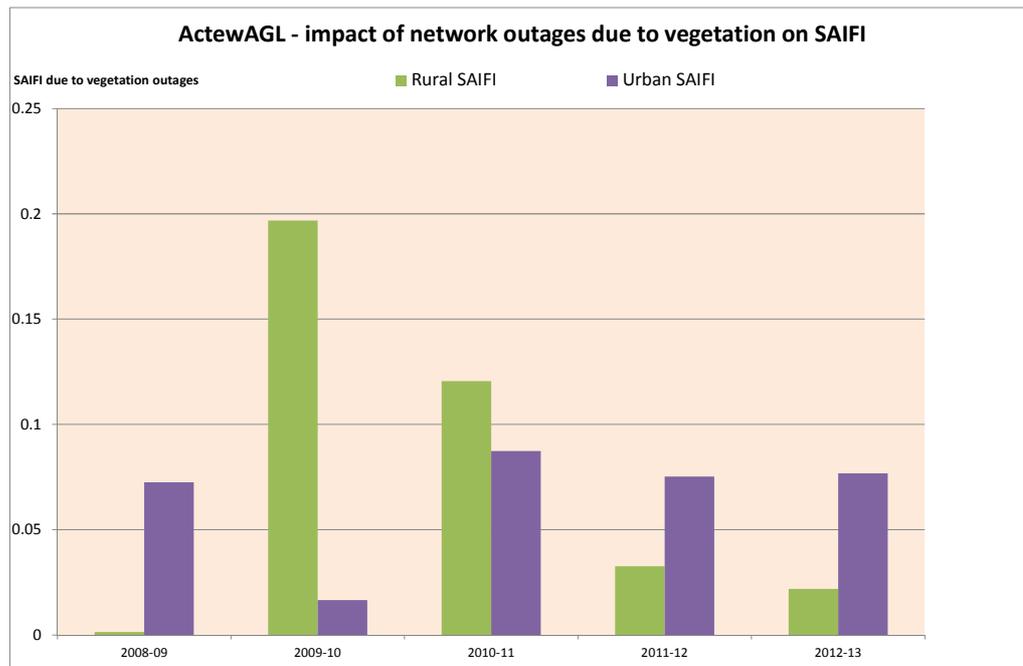
Figure 5-7 AAD SAIFI Impact of Network Outages due to Vegetation
Source: Advisian Analysis

On the basis of our review of the AER's findings on AAD's vegetation management Opex, Advisian concludes that:

- The AER use of a vegetation cost / km of overhead line as a benchmark measure is fundamentally flawed because it does not recognise differing vegetation patterns in the DNSPs
- When the DNSP provided RIN data is taken into account, it shows that AAD costs are within industry norms.
- Whilst recognising that AAD is not technically responsible for all vegetation management in its service territory, the AER has failed to recognise that similar provisions do exist in other jurisdictions, particularly Victoria. These impacts have not been captured or accounted for in the benchmarking models.
- The information presented in Figure A.18 is misleading, in that it does not consider the impact on SAIDI and SAIFI. Whilst there may have been more incidents due to vegetation, their impact is much smaller, meaning that the program is in fact improving reliability using the measures adopted by the industry and reported to the AER.

On the basis of these findings, Advisian considers that the AER's argument that the Category Analysis relating to vegetation management supports the economic benchmarking outcomes is flawed.

We note that this adjustment does not have a direct dollar or percentage adjustment associated with it, as the AER has relied on the findings of its detailed review of AAD's vegetation management to

conclude that the business is inefficient and therefore applies its total forecast based on the Opex benchmarking results.

Given that the basis for concluding that AAD's vegetation management expense has changed following Advisian's correction of errors in the AER analysis, it is necessary that the AER reviews whether its justification for being 'satisfied' of the need to apply the benchmark forecast remains valid.

5.2   Network Maintenance

In the Draft Decision, the AER's category analysis found that AAD's relative maintenance costs were 'very high', largely on the basis of its assessment that is summarised in figure A.14 of Attachment 7.

Figure A.14   Average maintenance per circuit km for 2009 to 2013 against customer density ($2013–14)
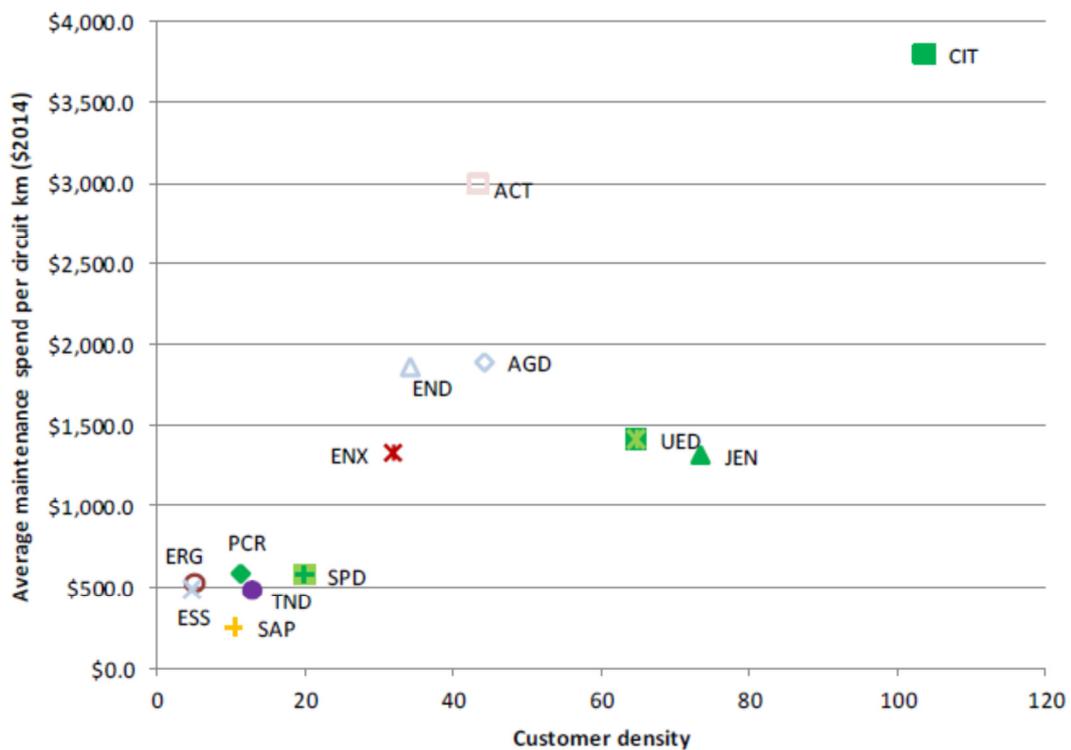
Figure 5-8 Average Maintenance Cost per Circuit km
Source: AER Draft Decision Attachment 7[144]

The AER explains that maintenance costs have been compared on the basis of circuit km in preference to other, equally valid metrics as follows:

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[144] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, p. 7-75

"We chose maintenance per circuit kilometre because assets are more likely to drive maintenance costs than customer numbers. We used circuit length because it is a more easily understandable and intuitive measure of assets than transformer capacity or circuit capacity"

Advisian notes that this comparison of maintenance costs by circuit km alone is ultimately misleading for the following reasons:

▪ As noted in section 4.4, the 'frontier' businesses are at a substantial natural advantage due to the relatively low volume of **both** line assets **and** transformer assets that they must maintain on a 'per customer' basis;

▪ The AER's recognition that it is the volume of assets that drives maintenance (rather than customer numbers) is correct, however this is inconsistent with the opex cost function derived from the Economic Insights opex cost function model;

▪ The use of circuit km's alone fails to recognise that route km, and transformer numbers/capacity (all of which are reported in the RIN templates) are equally valid drivers of maintenance opex that must also be considered in order to form a view on the relative efficiency of AAD's maintenance opex. Significantly, the Victorian urban distributors report a higher ratio of circuit km to route km, which reflects that more circuits are co-located on the same route (and consequently greater exogenous maintenance synergies per circuit);

▪ The maintenance costs are influenced by the different capitalisation practices that are applied to assets such as pole top structures which are discussed in the following sections; and,

▪ The category analysis does not account for issues relating to differences in the scope of network services. These include issues relating to the direct 22kV supply from the Ausnet transmission transformers in Victoria and differences in the treatment and ownership of underground services[145].

In this regard, Advisian considers that the AER's Category Analysis in relation to AAD's high maintenance costs presents an incomplete view of the relative efficiency of AAD's maintenance expenditure. As with our analysis of vegetation management, Advisian does not recommend a specific adjustment in relation to maintenance, but notes that numerically, these issues are best addressed through changes to the model specification or otherwise relying on the revealed base year opex as the starting point for the AER's analysis.

5.3 Cost Allocation ("Capitalisation") Practices

In the Draft Decision, the AER made an allowance of 17.6% to account for differences in 'capitalisation policy' between the businesses. This was calculated on the basis of a $3.0m adjustment for the use of operating leases for IT and fleet and a $9.9m adjustment to Opex to account for the difference in AAD's capitalisation practices over the analysis period. However, the application of this adjustment as a percentage of AAD's reported 2012/13 Opex leads to the inclusion of less than the $12.9m accepted by the AER. This is detailed in section 5.3.1 below.

In making this adjustment, the AER noted that:

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[145] *AAD has historically recorded an average of $488k p.a. over the 2008/09 to 2012/13 period in opex relating to the maintenance of underground services (AAD Project Numbers 7516052 and 7516028)*

"Although an adjustment for differences in capitalisation policy does not satisfy operating environment criteria one[146], not adjusting for differences in capitalisation policies may penalise ActewAGL for actions unrelated to efficiency"[147]

Advisian also observes that whilst the AER has taken account of differences in capitalisation identified by AAD, no adjustments have been made for material issues that contribute to the relative efficiency of the "frontier" businesses. In this regard, the AER states in its Annual Benchmarking Report that

"We have not formed a view on the operating environment factors that need to be considered as this required examination of the operating environment for all distributors against all of their counterparts. We will consider the impact of operating environment factors in greater detail in future regulatory determinations"[148]

We note that this treatment places the ACT and NSW DNSPs at a distinct disadvantage to the Victorian DNSPs as adjustments for operating environment factors that benefit the "frontier" businesses will not be identified until their next Determination (and therefore will not be taken into account) in setting the efficient Opex.

As part of our review, we have identified two material areas where AAD's historical practices (as reflected in the benchmarking data) place it at a significant disadvantage to the "frontier" businesses in respect to the Opex benchmarking results.

5.3.1 Operating Leases and Capitalisation Practices

In the Draft Decision, the AER has calculated a total 17.6% adjustment for capitalisation issues. Of this, $3.0m relates to AAD's use of operating leases as opposed to finance leases for fleet and IT equipment and $9.9m relates to changes in AAD's capitalisation approach.

In applying the adjustment, the AER has:

- calculated that the $12.9m figure for the operating lease and capitalisation practices adjustments represent 17.6% of AAD's $76.4m Opex reported for 2012/13.
- applied this 17.6% figure as an upward adjustment as part of the '30%' allowance provided to escalate AAD's base productivity score.

As with our earlier discussion on the application of the AER's adjustment for backyard reticulation, Advisian is of the view that much of this adjustment relates to the fixed Opex costs associated with operating the AAD business. However, the AER's approach of applying the 17.6% to the 'efficient base' forecast for AAD of $30.3m (instead of the $76.4m reported figure) results in the recovery of only $5.44m (42.2%) of the $12.9m figure accepted in the AER's Draft Decision[149].

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[146] i.e. is it outside the service provider's control?

[147] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, pp. 7-98

[148] AER, *Electricity Distribution Network Service Providers – Annual Benchmarking Report*, November 2014, figure 17 and figure 18, pp. 23

[149] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, pp. 7-100

Operating Leases

Advisian is of the view that the adjustment for operating leases represents a largely fixed cost that reflects the plant, personnel and equipment that is required to operate the ACT network and does not decrease in proportion to total Opex. The AER's adjustment for lease expenses equates to $1.26m, which given the $2.5m in vehicle lease expenses and $0.4m in IT lease expenses incurred in 2012/13, does not allow AAD to recover the efficient costs of operating and maintaining its network.

We recognise that the AER's application appears to assume that these costs can be reduced in proportion to all other total Opex, which illustrates a substantial analytical weakness in the AER's adjustment methodology. Effectively, the AER must assume that costs that are used to underpin any operating environment adjustment are either 100% fixed or 100% variable in proportion to total Opex. In this case, lease costs for the vehicles and IT equipment required to operate AAD's network are largely fixed.

Therefore we recommend that the operating lease expense adjustment is applied in a manner that takes account of the full $3.0m amount of revealed operating lease costs that are required to operate the ACT network. This represents a 9.7% upward adjustment for lease costs when applied to the 'base' efficient Opex for AAD.

Capitalisation Practices

In addition, the $9.9m adjustment for AAD's changes to capitalisation practices has been made to reflect that the business has recently amended, and the AER has accepted a new Cost Allocation Methodology that was noted by the AER to be '… *more consistent with the practices of other service providers'.*[150]

This adjustment is primarily focused on correcting the historical data to normalise AAD against other DNSPs for differences in accounting practices, rather than for economic reasons. Therefore Advisian considers that, in the absence of more transparent assessment of AAD's circumstances, there is little assurance that this large (-57.8%, -$5.73m) reduction in the allowance for capitalisation practices allows AAD to recover the efficient costs of operating the ACT network.

In our opinion, we consider that capitalised costs (or in AAD's case adjustments for costs that have historically NOT been capitalised, but now will be under the revised CAM) are largely a fixed cost representing the costs of operating and maintaining a specific network. As recognised by the AER, the allocation of costs is largely an accounting matter however differing treatment can have a material effect on the apparent productivity of a business.

Noting the AER's statements that:

> "…*not adjusting for differences in capitalisation policies may penalise ActewAGL for actions unrelated to efficiency"*[151]

and,

> "*the total Opex in a recent year typically best reflects a service provider's current circumstances"*[152]

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[150] ibid

[151] ibid p. 7-98

and the AEMC's statement that

> *"The Commission considers that the removal of the "individual circumstances" phrase will clarify the ability of the AER to undertake benchmarking. It assists the AER to determine if a NSP's proposal reflects the prudent and efficient costs of meeting the objectives. **That necessarily requires a consideration of the NSP's circumstances as detailed in its regulatory proposal**."* [153]

Advisian recognises that the $9.9m adjustment for Opex reflects AAD's recent change in capitalisation practices to better align with the approach of other NSP's.

The inclusion of the full amount represents a further 32.0% upward adjustment to the 'base' Opex for the AER's substitute forecast and would simply include for the $9.9m of capitalised costs accepted by the AER for the purpose of calculating the adjustment.

Table 5-1 Advisian Recommended Adjustment for Operating Leases and Capitalisation Practices

Issue	Adjustment $m (% of efficient base)
Operating Leases	**+$3.00m** (9.7%)
'Capitalisation Policy'	**+$9.90m** (32.0%)

Source: Advisian Analysis

5.3.2 Pole Top Structures

As noted above, the AER's assessment approach for operating environment factors is such that environmental factors are currently being taken in to account on a case by case basis for each DNSPs regulatory determination. Therefore any inherent benefit that applies to the majority of the frontier businesses will not be recognised until after a full round of determinations has been completed as the Victorian DNSPs have a later determination than the DNSPs in other states.

The potential for material inherent advantages that are not immediately apparent is highlighted by the unexpected materiality of the treatment of pole top structures to the reported total Opex. Advisian initially considered this issue as a peripheral matter that arose from recent changes to the AAD capitalisation approach for pole top structures. However on investigation it reveals a material Opex benefit that almost exclusively favours the "frontier" businesses. Our investigation is summarised as follows:

- Prior to March 2012, AAD treated urban pole top structure replacements primarily as a maintenance task and consequently reported the associated costs as an operating expense;
- To investigate the materiality of this issue, Advisian used the replacement capital expenditure information in the Repex sheet of the RIN to determine the volume of pole top structure replacement that was capitalised by other DNSPs;

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[152] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p. 7-7

[153] AEMC, *Rule Determination – National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 29 November 2012, p. 107.

- Advisian found that for the "frontier" businesses, pole top structure replacements accounted for a much greater proportion (11% to 36%) of the reported Repex over the 2009-13 period than the other Australian DNSPs (0% to 9%). This demonstrates that the difference in capitalisation approach (and corresponding effect on the reported opex) is a material issue that must be addressed.
- All business were normalised to report all pole top structure replacement as a maintenance (Opex) cost which resulted in upward adjustments of between 4% and 18% to the five "frontier" businesses and between 0% and 3% for the remaining Australian DNSPs.

These calculations show that the largest of the Victorian frontier businesses by customer numbers or line length are materially advantaged by the differing accounting treatment of pole top structure capitalisation to the remainder of the Australian DNSPs.

Table 5-2 Normalisation of Opex for Pole Top Structure Replacements (2009-2013)

	Pole Top Structures ($m)	Total Repex ($m)	% of Total Repex	Avg Adjust. ($m)	Total Opex ($m)	% of Total Opex
Powercor	$82.2	$346.3	24%	$16.4	$162	10%
AusNet	$147.0	$408.4	36%	$29.4	$163	18%
CitiPower	$16.1	$147.2	11%	$3.2	$50	6%
SA Power Networks	$41.0	$271.5	15%	$8.2	$196	4%
United Energy	$42.7	$303.1	14%	$8.5	$117	7%
ActewAGL	$2.5	$81.8	3%	$0.5	$53	1%
Ergon	$44.7	$717.6	6%	$8.9	$356	3%
Energex	$48.8	$541.6	9%	$9.8	$345	3%
Ausgrid	$0.0	$3,208.0	0%	$0.0	$541	0%
Endeavour	$0.0	$636.6	0%	$0.0	$241	0%
Essential	$27.0	$602	4%	$5.4	$385	1%
TasNetworks	$0.1	$115.0	0%	$0.0	$79	0%

Source: Advisian Analysis of CA RIN (Repex Sheet)

Therefore the productivity score for all DNSPs must be adjusted to a comparable basis for benchmarking proposes. This is required to take account of differences in the capitalisation practices between DNSPs of pole top structures.

As the overall adjustment has been calculated as a proportion of total Opex, it is able to be applied as a downward adjustment to the index scores derived from the Economic Insights SFA CD Model. The resulting productivity scores are shown in Figure 5-9 and reflect the adjustment that is required to bring all DNSP's to a consistent basis with AAD for comparison purposes.

Due to the capitalisation of pole top structures for part of the period, this results in a small (1%) reduction in AAD's base Opex productivity score, but more significant reductions in the relative performance of all of the frontier businesses. In turn, this leads to a change in the calculated customer weighted productivity scores for the "frontier" businesses from 0.86 to 0.78.

The effect of this change to the notional frontier has been calculated by Advisian using the AER and Economic insights spreadsheets and results in a $3.32m upward adjustment in the substitute Opex forecast.
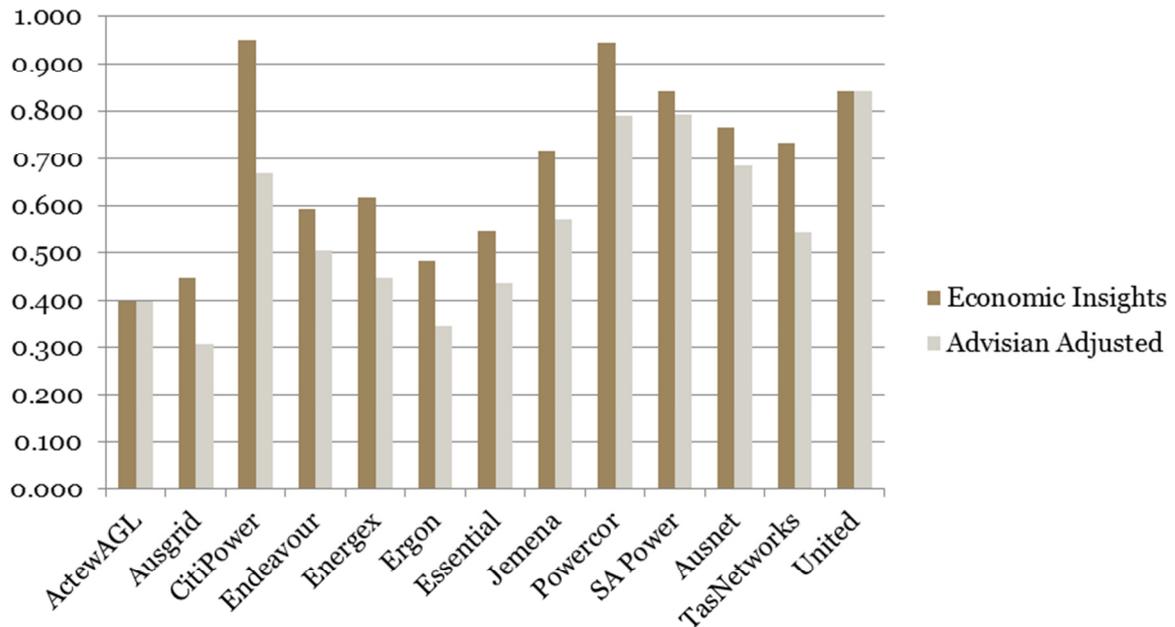
Figure 5-9 Advisian Adjusted Productivity Scores for Pole Top Structures
Source: Advisian Analysis of CA RIN[154]

Noting the materiality of this factor in the analysis, Advisian recommends that adjustment is made to the productivity results for all businesses to ensure that productivity comparisons are being made on a consistent basis. Similarly, we note that the treatment of pole top structures is one example that is pertinent to AAD and there are likely to be other 'maintenance Capex' items, such as pole staking, that have not been capitalised in the same manner between DNSPs over the analysis period.

Due to the limitations of the publically available data, Advisian has not conducted the comprehensive assessment of the capitalisation practices for all Australian DNSPs that would be necessary to ensure that all such factors have been corrected to a comparable basis for opex benchmarking purposes. To ensure that the results are not biased by reporting (rather than economic) factors, this assessment should be completed before primary reliance is placed on the benchmarking results as an alternative forecast (particularly considering that the revealed costs already account for all of these factors).

Table 5-3 Advisian Recommended Adjustment for Pole Top Structure Costs

Issue	Adjustment $m (% of efficient base)
Pole Top Structures	**+$3.32m** (10.7%)

Source: Advisian Analysis

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[154] *No adjustment has been applied to Jemena as Jemena have claimed confidentiality over the detailed replacement costs in the public version of the CA RIN.*

5.3.3   Network 'Overheads'

Similar to other capitalisation corrections, Advisian notes that the policy of businesses with regard to capitalisation of the Network 'Overhead' costs reported in the AER's CA RIN has the potential to distort productivity findings when Opex and Capex are considered in isolation.

Network Planning & Asset Management functions within DNSPs are typically areas where businesses adopt differing positions on how personnel costs are allocated to Opex or Capex for reporting purposes. Advisian understands that AAD generally expenses most of these costs, whilst we are aware that other businesses capitalise more of this expenditure through direct and indirect allocations to capital projects. This is supported by the CA RIN and EB RIN information, where AAD reports zero capitalisation of network overheads. Significantly, the only other business that does not report any capitalisation of network overheads is United Energy, who reports the vast majority of their network inputs as 'contract costs'[155] (which implicitly includes the equivalent contractor network overheads in the amount that is capitalised to projects).

As a result, the different treatment of these factors is a significant difference that materially disadvantages AAD in relation to the frontier businesses. Table 5-4 provides a comparison of the proportion of network overheads that are capitalised across AAD and the "frontier" distributors.

Table 5-4 Rate of Capitalisation of Network Overheads (2008/09 to 2012/13)

	Capitalised Network OH (% of Gross Capex less overheads)	Capitalised Network OH (% of Total Opex)
ActewAGL	0%	0%
SA Power Networks	4%	6%
Ausnet	8%	11%
CitiPower	13%	30%
Powercor	12%	16%
United Energy	0%	0%
Frontier DNSP Customer Weighted Average	7%	10%

Source: Advisian Analysis of CA RIN[156]

Therefore the productivity score for all DNSPs must be adjusted to a comparable basis for benchmarking proposes. This is required to take account of differences in the capitalisation practices between DNSPs for Network Overheads.

As with the adjustment for pole top structures, Advisian has applied the five year average proportion of network overheads to total Opex as an adjustment to the productivity scores to establish a consistent basis for assessing the relative Opex productivity of the Australian DNSPs.

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[155] *United Energy, Category Analysis RIN, 2.10 Input Tables*

[156] *These figures exclude any adjustments that are implicit in the 'balancing items' reported by the DNSP's in the category analysis RIN templates as Advisian was not able to determine the value of any specific adjustments from the information provided in the DNSPs accompanying 'Basis of Preparation' documents.*

Again, as the overall adjustments shown in Table 5-4 has been calculated as a proportion of total Opex, it is able to be applied as a downward adjustment to the index scores derived from the Economic Insights SFA CD Model. The resulting productivity scores are shown in Figure 5-10, which illustrates the significant advantage that CitiPower and Powercor receive through their higher capitalisation of network overheads.

Due to the lack of capitalisation of Network Overheads within the AAD information, this results in no change to AAD's base Opex productivity score, but more significant reductions in the relative performance of the frontier businesses, with the exception of United Energy (who also report zero capitalisation of network overheads). In turn, this leads to a change in the calculated customer weighted productivity scores for the "frontier" businesses from 0.86 to 0.77[157].

The effect of this change to the notional frontier has been calculated by Advisian using the AER and Economic insights spreadsheets and results in a $4.64m upward adjustment in the substitute Opex forecast.
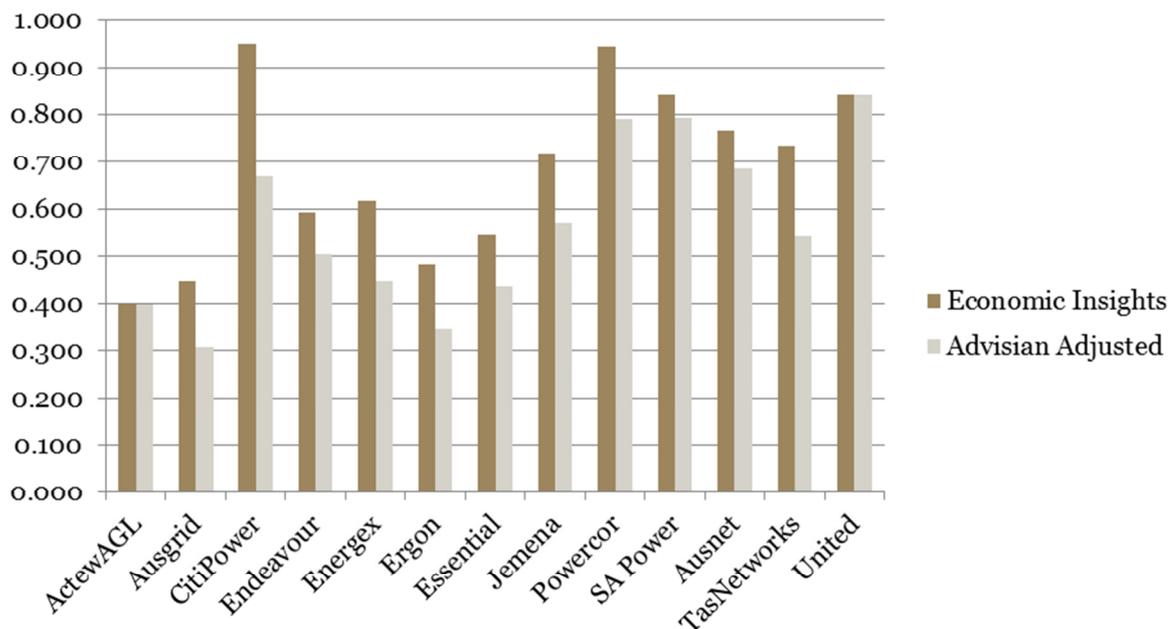
Figure 5-10 Advisian Adjusted Productivity Scores for Capitalisation of Network Overheads
Source: Advisian Analysis of CA RIN[158]

Again, noting the materiality of this factor in the analysis, Advisian recommends that adjustment is made to the productivity results for all businesses to ensure that productivity comparisons can be made on a consistent basis. Table 5-5 summarises Advisian's recommended adjustment for these factors.

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[157] *This has been calculated exclusive of the pole top structure adjustment.*

[158] *No adjustment has been applied to Jemena as Jemena have claimed confidentiality over the detailed replacement costs in the public version of the CA RIN.*

Table 5-5 Advisian Recommended Adjustment for Capitalisation of Network Overheads

Issue	Adjustment $m (% of efficient base)
Network 'Overheads'	**+$4.64m** (15.0%)

Source: Advisian Analysis

Given business specific treatment of these issues, the cumulative effect of our recommended adjustments and the potential for overlap between adjustments should be considered. In particular, the greater number of more specific adjustments reduces the need to rely on the AER's 'miscellaneous' adjustment to capture these differences.

5.4   Allocation of Corporate Overheads

The ability to allocate corporate overheads across larger scope of prescribed, unregulated and alternative control services provides some DNSPs with an inherent Opex advantage that will affect the productivity scores. Whilst the difference in the allocation of corporate overheads does affect the productivity scores, we note that the AER has made a specific adjustment for these factors in its Draft Decision.

Therefore Advisian has focused its analysis on two material areas where the frontier DNSPs enjoy a significant advantage over AAD in relation to Corporate Overheads, these are the AMI Program and the scale of unregulated activities. These are discussed separately in the following sections.

5.4.1   AMI Program

In particular, the Victorian DNSPs have been conducting a Government mandated Mass Roll Out of Advanced Metering Infrastructure (the AMI MRO) over the analysis period that has incurred significant capital and operating expenditure to complete. For the purpose of the benchmarking models, metering has been excluded from the Opex that is reported for standard control services. Therefore the AMI rollout in Victoria provides for an additional exogenous 'efficiency' from the point of the reported standard control services Opex due to the greater volume of expenditure over which corporate overheads can be allocated.

To test the materiality of these factors, Advisian has reviewed the AER approved Cost Allocation Methods for the Victorian Businesses to determine how the corporate overheads are allocated to the AMI project. This is summarised in Table 5-6.

As an indication of the scale of the AMI MRO program within the Victorian DNSPs, United Energy calculated that under the current allocation approach, approximately 81% of costs would be allocated to standard control services, 5.2% to alternative control services and 13.8% to the AMI category[159].

Table 5-6 Allocation of Shared Costs – Victorian DNSPs

	Allocated by
AusNet[160]	Significant non-labour items: *Causal cost driver e.g. Asset value or inventory*

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[159] United Energy, *Cost Allocation Methodology*, 2011, p.8

[160] SP AusNet, *Cost Allocation Method,* 2010, p. 16

	Allocated by
	transactions Non-Project Costed Labour: *Quarterly Activity Based Costing Survey* Management Service Charge: *Quarterly Activity Based Costing Survey*
CitiPower/ Powercor[161]	Costs Shared between DNSPs: *RAB, Distribution Revenue & Customer No* Costs Shared between distribution services: *various causal allocators as follows* • Meter Data Services: *FTE* • Meter Replacement: *Meter Population* • Billing & Revenue Collection: *Expenditure* • Advertising & Marketing: *Expenditure* • Customer Service: *Expenditure* • Regulatory - Corporate Services Fee: *Revenue* • Finance Charges: *Regulated Assets* • Tax: *Profit*
Jemena	*"The shared costs applicable to JEN are allocated to standard control, alternative control, negotiated distribution services and unregulated services based on the proportion of direct costs for each service category to total direct costs"*[162]
United Energy[163]	Standard Control: *Revenue* Alternative Control: *Revenue* AMI OIC: *Revenue*

Source: Advisian Summary of AER Approved CAM

As seen in the table above, shared corporate overheads are typically allocated on the basis of either cost or revenue. Under the Australian building block model for regulation, Opex is more or less equivalent to cost as it is recovered through revenue with no additional margin or return. Therefore Advisian has compared the proportion of Opex incurred over the analysis period for the AMI program against the total Opex. This is shown in Table 5-7

Table 5-7 Proportion of Metering Opex to Total Opex (2009-2013)

	Metering Opex (avg)[164]	Total Opex (avg)[165]	Metering % of Total Opex
ActewAGL	$1,685	$62,977	2.7%
Ausnet	$37,887	$191,556	19.8%
CitiPower	$11,545	$46,898	24.6%
Jemena	$15,122	$64,114	23.6%
Powercor	$23,210	$152,338	15.2%
United Energy	$22,455	$109,973	20.4%
Victorian Customer Weighted Average			19.7%

Source: Advisian Analysis

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[161] CitiPower, *Cost Allocation Method,* 2010 , pp. 21-22, Powercor *Cost Allocation Method,* 2010 , pp. 21-22,

[162] Jemena, *Cost Allocation Methodology,* 2010, p.15

[163] United Energy, *Cost Allocation Methodology*, 2011, p.8

[164] Charges Model spreadsheets submitted with the Victorian DNSPs 2015 Charges Revision Applications

[165] AER's Consolidated EB RIN spreadsheet

On a customer weighted average basis, the Opex associated with the AMI program represents an additional 19.7% of the total standard control services Opex over which corporate overheads are notionally recovered due to an exogenous jurisdictional requirement that affects only Victoria.

When corrected based on the equivalent proportion of AAD metering Opex to total Opex (2.7%) this represents a material and exogenous 17.0% (19.7% - 2.7%) advantage to the Victorian DNSPs in relation to the allocation of corporate overheads that has not been accounted for in the benchmarking models.

Applying this factor to the Opex component of corporate overheads reported by the Victorian businesses allows the issue of the Victorian AMI program to be directly taken into account, as shown in Table 5-8

Table 5-8 Opex Adjustments for Corporate Overheads Allocated to Victorian AMI Program

	AMI % of Total Opex	Expensed Corporate OH's (% of Total Opex)	% Adjustment to Total Opex[166]
ActewAGL	2.7%	21.9%	-
Ausnet	19.8%	11.4%	+1.9%
CitiPower	24.6%	16.2%	+3.6%
Jemena	23.6%	23.7%	+5.0%
Powercor	15.2%	14.7%	+1.9%
United Energy	20.4%	38.9%	+6.9%

Source: Advisian Analysis

Therefore the productivity score for the Victorian DNSPs must be adjusted to a comparable basis for benchmarking proposes. This is required to take account of differences in the ability to allocate a proportion of fixed corporate overheads to the mass roll out of Advanced Metering Infrastructure in Victoria.

Again, as the overall adjustments shown in Table 5-8 has been calculated as a proportion of total Opex, they are able to be applied as a downward adjustment to the index scores derived from the Economic Insights SFA CD Model. The resulting productivity scores are shown in Figure 5-11, which illustrates the material advantage that the Victorian DNSPs receive through the ability to capitalise a greater proportion of corporate overheads to the AMI MRO program.

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[166] (AMI % of Total Opex – AAD Metering % of Total Opex) x Expensed Corporate Overhead % of Total Opex
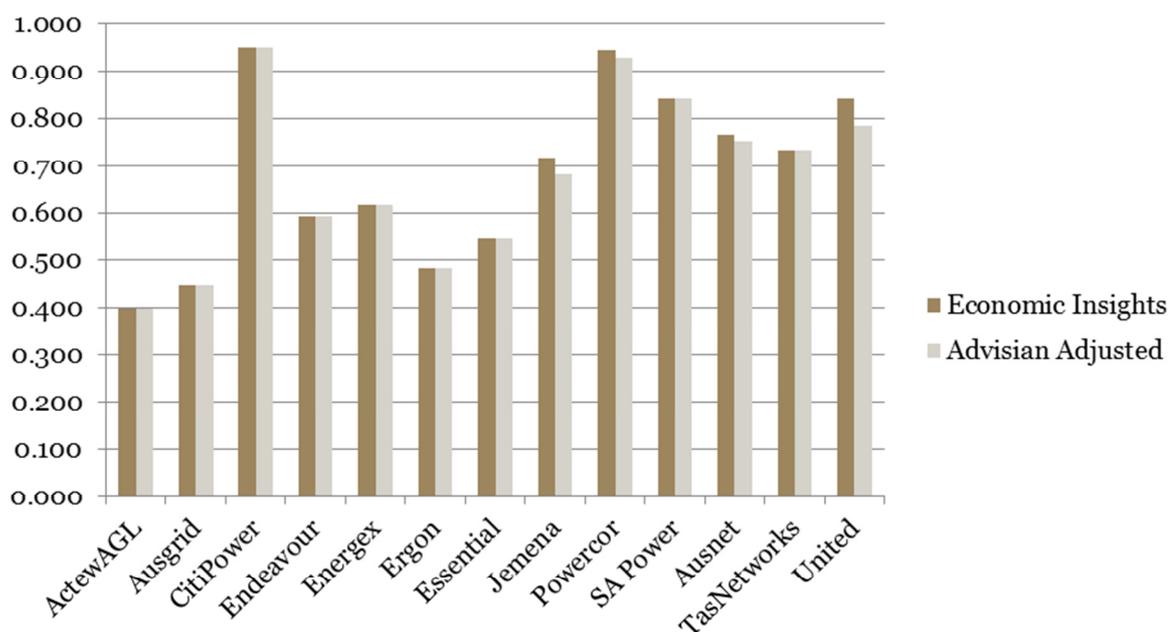
Figure 5-11 Advisian Adjusted Productivity Scores for Victorian AMI Program
Source: Advisian Analysis of CA RIN

Table 5-9 shows Advisian's recommended adjustment to AAD's Opex to account for the expensed component of corporate overheads that have been allocated to the jurisdictional AMI MRO program.

Table 5-9 Advisian Recommended Adjustment for Overhead Allocated to Victorian AMI Program

Issue	Adjustment $m (% of efficient base)
Victorian AMI Program OH	+$0.85m (2.8%)

Source: Advisian Analysis

5.4.2   Unregulated Activities

Advisian recognises that there is also an inherent advantage in relation to the volume of unregulated activities that are undertaken by the "frontier" DNSPs either directly (e.g. SA Power Networks CaMS) or through related businesses (e.g. United Energy/Jemena/Zinfra, Ausnet/Select Solutions, CitiPower/Powercor) which allows relatively fixed corporate overheads to be spread more efficiently across a larger base of activity.

However as the volume or appetite for pursing unregulated revenue is fundamentally an internal matter for individual DNSPs, Advisian does not consider that a specific adjustment for the scale of unregulated activities is appropriate. The related issue of the relative differences in the ability to access to markets for unregulated activities is discussed further in section 6.2.

5.5   Realised Economies of Scale

The assessment of relative productivity of AAD for the purpose of determining the efficient Opex is also influenced by the extent to which other comparator DNSPs are able to realise economies of scale that are not available to AAD. To some extent, this could be argued to be an 'internal' factor on the

basis that in the longer term at least, management has the opportunity to seek greater synergies through mergers or other shared arrangements with neighbouring DNSPs.

Advisian is of the view that this highlights the fundamental issue with the AER's reliance on using absolute productivity measures as a proxy for efficient Opex. DNSPs that are co-located have greater fundamental capacity to realise synergies that lead to greater overall productivity for both businesses. However if the same DNSPs were geographically isolated from other networks they would be unable to access these synergies and the efficient cost operating their respective networks would necessarily be higher.

This is highly relevant to AAD as it:

(a)   represents the smallest DNSP in the NEM by customer numbers;

(b)   is geographically isolated from other networks (other than a sparsely populated portion of the Essential Energy network[167]);

(c)   has limited options to pursue the mergers or other co-operative arrangements that have been, or are being, implemented in Victoria, NSW, Qld or Tasmania;

(d)   is not able to achieve the scale of the operations in other states such as SA due to the small size of the ACT.

The smaller Victorian urban DNSPs, to whom the AER makes direct comparisons have been able to overcome the smaller scale of their networks by realise operating synergies that are simply not available to AAD. When coupled with the significantly higher spatial density of the distribution areas of CitiPower, United Energy and Jemena, a correction is required to the frontier businesses to ensure that AAD is not penalised in its efficient Opex for failing to achieve productivity improvements through measures that are simply not available to it.

Advisian has identified two clear areas of Opex where the co-location of the Victorian networks means that they were realising synergies over the analysis period that were, and remain unavailable to AAD. These are:

▪   Shared management between DNSPs
▪   Shared operations between DNSPs

We note that these factors are unique to AAD, and to a lesser extent TasNetworks distribution, as they represent the smallest networks in the NEM with a broadly comparable line length and customer base to the Victorian urban DNSPs. Both AAD and TasNetworks are geographically isolated networks with limited ability to realise meaningful synergies through cost-sharing arrangements with other co-located DNSPs. The remaining Australian DNSPs are all of a larger scale than the Victorian urban DNSPs and should theoretically be able to realise these benefits internally.

For completeness we have also discussed the extent to which AAD and other businesses have realised the synergies that are available through shared management arrangements with other related parties.

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[167] Essential Energy's main corporate office is located in Port Macquarie, approximately 650km (or 7 hours by road) from Canberra.

5.5.1 Shared Management

Noting the high assessed productivity or both CitiPower and Powercor in the Economic Insights SFA CD model, it is important to realise that these networks effectively operate as a single business (with a combined customer base of over one million) and therefore only a proportion of the fixed management costs required to operate a distribution network is reported for either the CitiPower or Powercor business.

 In this regard, CitiPower and Powercor state in their Cost Allocation Method:

"CitiPower [Powercor] *notes that there is a single management team in the Electricity Networks group which provides services to both CitiPower and Powercor Australia. This means that the costs associated with the Electricity Networks management team providing these services to both businesses must be allocated between them. The cost of these services are pooled and recorded under the following function code categories:*

• System Operations;

• General and Administration;

• Health and Safety;

• Training;

• Motor Vehicle running costs;

• Computer Systems;

• Voice communication; and

• Salary costs.

A three factor formula is then applied to allocate the costs recorded in these function codes between CitiPower and Powercor. The three factor formula is based on an equal weighting of:

• Value of the RAB;

• Distribution revenue; and

• Customer numbers..." [168]

The benefit of a common management team for two networks would be a notional halving in the fixed management requirements for each business. However Advisian recognises that management costs for DNSPs are not entirely fixed will vary to an extent with the scale of a business (volume of assets, number of customers, physical size of the service area). Therefore we recommend that the corporate overhead costs reported as Opex are increased by a factor of 1.5 for both CitiPower and Powercor for the purpose of benchmarking AAD's efficient Opex. This effectively assumes that using a single management team provides synergies of approximately one third of the corporate overhead Opex for each business (when compared to operating two separate DNSPs).

We also note that aspects of the management of the United Energy and Jemena networks were also shared over this period, however due to the contractual arrangements that were in place between

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[168] CitiPower, *Cost Allocation Method,* 2010, p.19

Jemena Asset Management (now Zinfra) and United Energy, it is not possible to make an equivalent adjustment to these DNSPs based on publically available RIN information.

Table 5-10 Adjustment for AAD to Account for CitiPower/Powercor Corporate OH Synergies

	Total Opex	Expensed Corp OH (avg)	Synergies from Shared Management[169]	Synergies % of Total Opex
CitiPower	$46,898	$7,615	$3,808	8.1%
Powercor	$152,338	$22,456	$11,228	7.4%

Source: Advisian Analysis

Therefore the productivity scores for CitiPower and Powercor must be adjusted to a comparable basis for benchmarking purposes to take account of the Corporate Overhead synergies that were available to these businesses over the analysis period but not to AAD.

As the overall adjustments shown in Table 5-10 has been calculated as a proportion of total Opex, they are able to be applied as a downward adjustment to the index scores derived from the Economic Insights SFA CD Model.
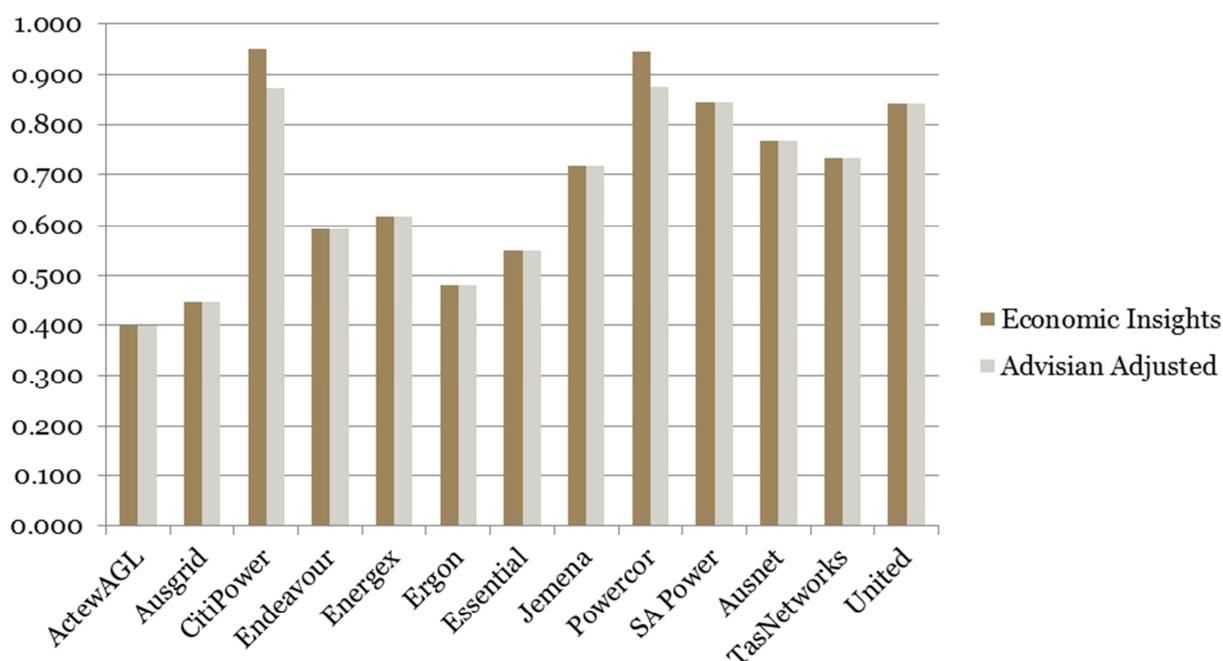
Figure 5-12 Advisian Adjusted Productivity Scores for CitiPower/Powercor Realised Corporate OH Synergies

Source: Advisian Analysis of CA RIN

The resulting productivity scores are shown in Figure 5-12, which illustrates the material advantage that CitiPower and Powercor receive due to the ability to realise synergies through common, co-located management that are not available to small geographically isolated DNSPs such as AAD.

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[169] Calculated as (1.5 x Expensed corporate OH)- Expensed corporate OH

The calculated impact of these adjustments is shown in Table 5-11

Table 5-11 Advisian Recommended Adjustment for Realised CitiPower/Powercor Corporate OH Synergies

Issue	Adjustment $m (% of efficient base)
Realised Synergies CitiPower/Powercor Corp OH	**+$1.08m** (3.5%)

Source: Advisian Analysis

5.5.2   Shared Operations

A similar issue exists with the network operations component of network overheads; however this affects both CitiPower/Powercor and Jemena/United Energy as they all shared control rooms over the analysis period to access co-location synergies that are not available to AAD.

As the combined customer base in both cases is in the order of one million this allows the networks to be operated in a manner consistent with much larger DNSP than AAD.

Consistent with our approach for calculating the scale of CitiPower/Powercor management synergies, we have applied a factor of 1.5[170] to the 2009-2013 average 'Network Operation and Operational Switching' line item reported in the 'Overheads' sheet in the CA RINs to calculate the incremental cost. This reflects that in practice the use of shared operations between two DNSPs will not result in the halving of the combined cost.

Table 5-12 Adjustment for AAD to Account for Victorian Realised Network Operations Synergies

	Total Opex	Network Ops & Switching (avg)	Synergies from Shared Operations[171]	Synergies % of Total Opex
CitiPower	$46,898	$7,615	$3,835	8.2%[172]
Powercor	$46,898	$7,615	$5,087	3.3%
Jemena	$152,338	$22,456	$1,804	2.8%
United Energy	$152,338	$22,456	$1,804[173]	1.6%

Source: Advisian Analysis

As these values are incremental costs that have been calculated to allow for the value of additional synergies that can be realised by the Victorian DNSPs but not AAD, these adjustments do not double count the adjustment for network overheads that is described in section 5.3.3.

Therefore the productivity scores for CitiPower and Powercor and United Energy and Jemena must be adjusted to a comparable basis for benchmarking purposes to take account of the Network Operations Synergies that were available to these businesses over the analysis period but not to AAD.

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[170] And then subtracted the reported value

[171] Calculated as (1.5 x Expensed corporate OH)- Expensed corporate OH

[172] Advisian notes that this figure appears to be affected by the method of allocating shared costs between CitiPower and Powercor on the basis of RAB, Customer Numbers and Distribution Revenue.

[173] United Energy's adjustment has been set to equal Jemena as United Energy reports zero Opex against Network Operations and Switching as this was provided under contract by Jemena over the analysis period.

The overall adjustments shown in Table 5-12 have been calculated as a proportion of total Opex. Therefore they are able to be applied as a downward adjustment to the index scores derived from the Economic Insights SFA CD Model.
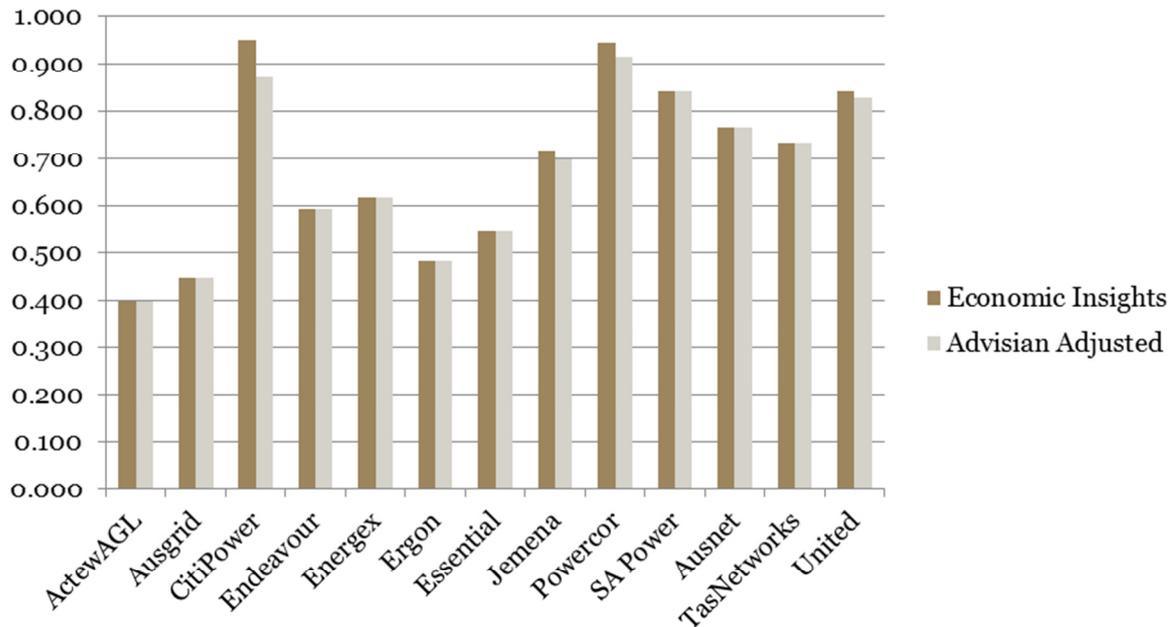
Figure 5-13 Advisian Adjusted Productivity Scores for Victorian Realised Network Operations Synergies
Source: Advisian Analysis of CA RIN

The resulting productivity scores are shown in Figure 5-13which illustrates the material advantage that CitiPower and Powercor receive due to the ability to realise synergies through common, co-located management that are not available to small geographically isolated DNSPs such as AAD.

The calculated impact of these adjustments is shown in Table 5-11

Table 5-13 Advisian Recommended Adjustment for Victorian Realised Operations Synergies

Issue	Adjustment $m (% of efficient base)
Realised Synergies Victorian Network Operations	**+$0.80m** (2.6%)

Source: Advisian Analysis

5.5.3   Shared management with other related parties

For completeness in the consideration of available synergies through shared management or other shared cost agreements Advisian notes that AAD itself accesses synergies through shared corporate functions with other related parties and across other energy networks (e.g. AAD's gas distribution network). As this is common in the industry, there is no inherent benefit to AAD relative to other DNSPs from these arrangements.

Therefore Advisian is of the opinion that no positive or negative adjustment is necessary for AAD or other DNSPs to account for the impact of these cost sharing arrangements. Table 5-14 provides examples of shared management or other cost sharing relationships over the analysis period.

Table 5-14 Examples of NEM Shared Management or Cost Sharing Relationships 2006-2013

DNSP	Example of Relationships
ActewAGL	AAD Gas, Actew Water, AAD Retail
Ausgrid, Essential, Endeavour	Networks NSW
Energex, Ergon	Qld Government, SPARQ
CitiPower, Powercor, SA Power Networks	Spark Infrastructure (SAPN operates with a separate management team to CitiPower/Powercor)
Ausnet Services	Ausnet TNSP, Ausnet Gas
United Energy	Jemena Asset Management (now Zinfra), Jemena Electricity Networks, Multinet Gas
TasNetworks Distribution	TasNetworks TNSP
Jemena	Jemena Asset Management (now Zinfra), Jemena gas, Jemena water

Source: Advisian

5.6   Conclusions – Business Practices

Advisian has considered the key differences in business practices that have not been taken into account in the AER's Opex benchmarking approach and concludes that:

1) the basis for concluding that AAD's vegetation management expense has changed following Advisian's correction of errors in the AER analysis therefore the AER's position on rejecting AAD's revealed opex and applying the benchmark forecast must be reviewed;

2) the AER's method of applying a percentage adjustment for the effect of operating leases and 'capitalisation policy' is flawed and results in the material under-recovery of what are largely fixed costs that have been accepted by the AER;

3) there is a need to adjust all DNSPs reported Opex for a common capitalisation treatment of pole top structures due to the substantially higher volumes of pole top structure replacement activity reported as replacement Capex (as opposed to maintenance) within the "frontier" businesses. In the absence of this adjustment the frontier businesses are advantaged due to reporting practices rather than economic factors.

4) there is a need to adjust all DNSPs reported Opex for a common capitalisation treatment of Network Overheads for the purpose of benchmarking due to AAD's practice of expensing of all of these costs. In the absence of this adjustment AAD is penalised due to reporting practices rather than economic factors.

5) there is a need to adjust the Opex used for benchmarking to reflect the large scale of the Victorian AMI MRO program that provides a material exogenous benefit to the Victorian DNSPs. This allows the Victorian DNSPs to allocate a higher proportion of fixed corporate overheads outside the standard control services costs that are considered in the benchmarking.

6) the Victorian DNSPs have realised economies of scale through common management (CitiPower/Powercor) and shared operations (CitiPower/Powercor, United Energy/Jemena) arrangements that effectively allow the business to operate as much larger businesses of around one million customers. These synergies were available due to the co-location of networks. This impacts AAD uniquely as these synergies are not available in the ACT due to the small size, geographical isolation of the ACT and absence of co-located networks within the same jurisdiction.

Effectively these adjustments correct the Australian DNSPs for material differences that allow total Opex benchmarking comparisons to be made on a more common basis with the reported AAD total Opex. We also observe that the majority of the value of these adjustments relate to accounting rather than economic factors. This fact alone should highlight the need for much greater vigilance to be applied by the AER and its consultants to ensure that the data that is used for benchmarking purposes is genuinely reported on a consistent basis.

In total, these (mainly reporting) adjustments[174] account for $30.25m above the SFA CD efficient base Opex of $30.93 for 2012/13 that has been calculated for AAD[175]. This results in a total efficient Opex of $61.18m when differences in business practices are considered. This in turn represents approximately 83% of AAD's reported 2012/13 Opex[176].

Noting, alongside Advisian's own analysis and concerns regarding the modelling approach:

▪ the relatively large number of adjustments that are needed to bring the Australian DNSPs Opex to a comparable basis with AAD;
▪ the AER's reliance on its incorrect analysis on vegetation management inefficiencies to provide comfort in adopting its Opex benchmarking conclusions as the basis for an alternative forecast,
▪ the AEMC comment that *"…The NSP has the most experience in how a network should be run, as well as holding all of the data on past performance of its network, and is therefore in the best position to make judgments about what expenditure will be required in the future"[177]; and,*
▪ the AER comment that *"the total Opex in a recent year typically best reflects a service provider's current circumstances"[178]*

Advisian concludes that there is a material risk of regulatory error in overlooking significant normalisation factors that affect the Opex benchmarking results (as illustrated by the impact of the accounting treatment of relatively minor asset categories such as pole top structures and

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[174] *Inclusive of the component factors of the AER's 30% allowance for AAD and the adjustments for Technical Factors.*

[175] *Excluding the AER's 30% allowance for AAD*

[176] AER Opex Model, 'Input | Reported Opex' sheet row 48.

[177] ibid. pp. 111-112

[178] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 – Attachment 7: Operating Expenditure*, November 2014, p. 7-7

jurisdictional programs such as the Victorian AMI program where the effect had not fully been 'excluded' from the AER's analysis).

Given the large scale of the adjustments applied by the AER in its Draft Decision for the ACT and NSW DNSPs in both absolute and percentage terms, Advisian is of the view that it would be preferable for the AER to also adopt its conventional application of Base-Step-Trend forecasting to demonstrate the reasonableness and achievability of the Opex benchmarking conclusions.

Table 5-15 Advisian Recommendations – Business Practices

Issue	Adjustment $m (% of efficient base)
AER Jurisdictional Taxes	**+$0.71m** (2.3%)
AER Standard Control Services Connections	**+$1.40m** (4.5%)
AER OH&S	**+$0.15m** (0.5%)
AER Miscellaneous Factors	**+$0.74m** (2.4%)
Backyard Reticulation[179]	**+$2.00m** (6.5%)
Vegetation Management	Review the basis for rejection of AAD's revealed costs
Maintenance	Review the basis for rejection of AAD's revealed costs
Operating Leases[180]	**+$3.00m** (9.7%)
'Capitalisation Policy'[181]	**+$9.90m** (32.0%)
Pole Top Structures	**+$3.32m** (10.7%)
Network 'Overheads'	**+$4.64m** (15.0%)
AMI Corporate OH Allocation	**+$0.85m** (2.8%)
Realised Synergies CitiPower/Powercor Corp OH	**+$1.08m** (3.5%)
Realised Synergies Victorian Network Operations	**+$0.80m** (2.6%)

Source: Advisian Analysis

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[179] *Inclusive of the component included in the AER's Draft Decision (refer to section 5.1)*

[180] *Inclusive of the component included in the AER's Draft Decision*

[181] *Inclusive of the component included in the AER's Draft Decision*

6 Factors Affecting the ACT Network

This section outlines the unique factors that affect the AAD network and business relative to other Australian DNSPs in response to the following questions:

3) *What unique factors affect ActewAGL's distribution network relative to other Australian DNSPs which impact on the amount of forecast Opex necessary to reasonably reflect the Opex criteria in clause 6.5.6(c) of the NER? What is the impact of these factors on ActewAGL's Opex relative to the "top quartile" DNSPs that form the AER's efficiency frontier?*

In the previous sections 4 and 5, Advisian has considered a number of factors that are unique to the ACT network as part of our investigation of the technical and business practices that affect the efficient level of operating expenditure for AAD's network. Rather than repeat discussion on these issues, we have focused this section on investigating the key factors within the ACT that inhibit or advantage AAD in adopting similar practices to the frontier businesses in relation to:

1) the degree of outsourcing; and,

2) the ability to access unregulated revenue through contestable works.

6.1 ACT Contractor Market

The degree of outsourcing impacts on the AER's Category Analysis finding in relation to AAD's apparent 'very high' labour costs[182]. In particular, businesses that outsource a greater proposition of their opex activities were found by the AER to report very low labour costs as follows:

> *"Because this metric excludes contractor costs, contracting policies are likely to affect service providers' relative positions on this metric. This is likely why UED – who over the benchmarking period outsourced almost all of its opex – has such low labour costs per customer compared to everyone else."*

Advisian is concerned that the AER has relied on a metric that is so clearly distorted by reporting practices in order to draw strong conclusions in relation to the relative efficiency of labour costs. By omitting any correction for the labour component of contract costs, the AER is not comparing 'apples with apples' in its Category Analysis. This effectively penalises AAD for not reporting in a manner that is aligned to the 'frontier' businesses rather than for any sound economic reason.

In particular, as part of its Draft Decision the AER has at various points identified that AAD's practices in relation to contracting differ substantially from the practices adopted by businesses that achieve a higher productivity score. In particular the AER has commented on the:

▪ apparent inefficiency of AAD's use of hourly rates contract arrangements for vegetation management works[183];

▪ the desirability of contracting with larger organisations such as Zinfra to access greater economies of scale[184]; and,

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[182] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure,* November 2014, p. 7-70

[183] ibid p. 7-83

- the generally low level of contracting that AAD adopts in relation to its electricity network when compared to the AAD gas distribution network [185].

Notwithstanding the above, the AER has recognised that AAD operates in an environment where there are noted difficulties in attracting and retaining skilled staff to service the network where the regulator comments that:

"ActewAGL does not seem to have excess labour problems like the NSW service providers. In contrast, ActewAGL has provided evidence that it has difficulties attracting and retaining staff"[186]

Efficient Contracting Strategies

Advisian notes that the question of whether network Opex or Capex tasks are carried out by internal or external labour is largely irrelevant to the efficiency of the outcome, other than determining where the costs are reported from an accounting perspective. Significantly, the efficiency (or otherwise) of any given contracting approach is ultimately dependent on how risks are shared and productivity incentives <u>are managed</u> through the life of a contract.

For example:

- in 'boom' market conditions, a low pre-agreed fixed rate is likely to lead to contractors being unable to attract or retain suitable personnel as individuals make personal decisions to pursue higher rates elsewhere. This typically leads to delays in contractors completing work and a reduction in quality and productivity of the work undertaken due to higher levels of staff turnover. Frequently this results in a need to terminate and/or renegotiate the contract, with additional costs arising during the procurement of an alternative contractor (if one exists).

- in 'bust' market conditions, a low pre-agreed fixed rate is likely to be above the rate that alternative contractors (if they exist) are willing to complete the work for. Where fixed price contracts are sought in depressed markets, the agreed rates are frequently insufficient to retain contractor personnel should market conditions improve, leading to the risks entailed with below market pricing in a 'boom' market.

- in markets where there is no or limited competition it is difficult to have confidence that prices are reflective of the cost to provide the service, even where a competitive process have been followed.[187]

- in markets where the volume of work is uncertain or where there are insufficient contractors of sufficient scale or financial capacity to enter into a larger contract, more flexible contracting

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[184] AAD, *Operating and Capital Expenditure 'Site Visit' Clarifications – 2012-19 Subsequent Regulatory Control Period, 3 October* 2014, p. 24.

[185] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, p. 7-78

[186] ibid, p. 7-33

[187] *These markets are typically characterised by a small market size (total volume of work), volatile workload (causing resourcing inefficiency), too little diversity in clients for a contractor to establish a local presence, the need for highly specialised skills, work that is remote from the contractors normal area of operations.*

arrangements with appropriate incentive structures (hourly rates contracts with multiple contractors and inter-contractor performance benchmarking) is not necessarily an inherently inefficient contracting strategy.

Therefore a fixed price, or fixed volume, contract is not guaranteed to provide the most efficient price in all situations. In most cases, it will simply reflect the market prices at the time of negotiation and the contractors implied estimate of the risk that is being passed on through the contract (which may be greater than the DNSPs assessment of the costs to manage the same risk internally).

In all cases Advisian's opinion is that it is primarily the selection of the most appropriate contracting arrangements for the specific market and the expected market conditions that will determine whether any particular contracting approach is efficient or not. This includes consideration of the cost of administering the contract in accordance with the contracting strategy selected.

The ACT Contractor Market

 The ACT market for specialist electrical contractors exhibits a number of factors that are consistent with an underlying need for a smaller overall level of contracting when compared to larger and more established markets. These include:

(a)   the small number of DNSPs that a contractor can serve as AAD represents the only distribution network within the ACT. The neighbouring Essential Energy and TransGrid networks are relatively sparse in the area surrounding the ACT resulting in a relatively unattractive market for specialist contractors in comparison to other capital cities.

(b)   the volume of work is limited due to the small network and relatively high proportion of underground circuits with less frequent planned maintenance and inspection requirements. This means that it is unlikely that a contractor would establish itself in the ACT purely to serve the AAD electrical network.

(c)   the need to retain sufficient in-house capability to act as an 'informed purchaser' of contract services means that a proportion of the work will always need to be conducted internally. In a small market with limited volumes of work, this weakens the case for outsourced delivery.

(d)   the geographical isolation from other potential clients means that AAD would likely need to either issue to the contractor or otherwise pay the contractor for the full cost of specialist plant, equipment and personnel due to the inability to use these resources for alternative clients.

Therefore Advisian is not surprised by the AER's observation that the contracting approaches differ substantially from those adopted by other DNSPs. As there is no other significant network business to share contract resources with in order to achieve higher utilisation benefits, AAD would notionally need to support the specialist contractor workforce on its own, therefore creating a weak case for outsourcing.

Unlike AAD's gas distribution network, where the management has largely been outsourced to Jemena who operate the surrounding NSW gas network and pipeline assets, the AAD electricity distribution network is surrounded by the Essential Energy network. Whilst Jemena does have a local presence to maintain the gas network, Jemena (and Zinfra's) core electrical expertise is physically located in Melbourne where the population affords greater access to skilled resources and the ability to operate more efficiently by using common resources across a greater number of Victorian DNSPs with a greater volume of contract work requirements.

On this basis, Advisian concludes that:

1) no particular contracting strategy is inherently inefficient, provided that it is selected and managed appropriately for the specific market (taking account of the degree of certainty/uncertainty that was present at the time of entering the agreement);

2) there is an inherently weaker case for outsourcing a large proportion of work in the AAD network than in more densely populated areas where contractors can achieve resourcing efficiencies by working with multiple NSP's; and,

3) the contracting environment for AAD's electricity network is materially different to its gas network due to the absence of an established co-located contractor or network owner where mutually beneficial synergies can be realised.

Therefore whilst we do not propose a specific adjustment for the small size and relative immaturity of the ACT contractor market, we note that the incentive nature of the historical and current regulatory framework has always meant that AAD was incentivised to seek efficiency opportunities over the analysis period. The result of these arrangements is the actual revealed Opex reported by AAD.

Therefore, to the extent that AAD is unable to access efficient contractor markets due to geographical isolation, immature contracting market or any other reason, AAD should not be penalised (directly or implicitly through an inappropriate model specification) for simply not being able to access more competitive markets.

6.2   Opportunities for Unregulated Revenue

As with the ACT contractor market, the small size and geographical isolation of the AAD network means that there are inherently fewer viable opportunities for AAD to efficiently generate unregulated revenue through providing services on a contestable basis to other DNSPs. This affects the levels of labour utilisation that can be obtained in the AAD network as it is not uncommon for DNSPs to conduct contestable works using the same (effectively underutilised) resources that are used for regulated works. In fact, this improvement in resource utilisation is a key component of the business case for much of the unregulated work conducted by DNSPs.

As there is less opportunity to establish an unregulated business of significant scale in the ACT that can make better use of AAD's existing resources, AAD should not be penalised (directly or implicitly through an inappropriate model specification) for not being able to generate more unregulated revenue (and hence lower total corporate overheads and total labour costs)[188] due to the allocation of a portion of these costs outside the regulated business.

6.3   Conclusions – ACT Specific Factors

Advisian has not recommended any specific adjustments in relation to factors that are unique to the ACT that have not already been addressed through our recommended adjustments in sections 4 and 5. However we reiterate that the AER's reliance on the Economic Insights model (without informed

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[188] *Due to the allocation of components of these costs to the unregulated businesses*

consideration of factors affecting the ACT) risks incorrectly and systemically penalised AAD for failing to achieve efficiencies that are simply not available to it.

Therefore we urge caution in applying the AER's benchmarking approach without appropriate consideration of the specific market environment of each DNSP, noting that efficient approaches will also change over time. Based on the model specification used by Economic insights and the relative homogeneity within the individual New Zealand and Ontario data sets[189] it is not apparent to Advisian how these ACT specific factors can be appropriately taken into account in the model.

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[189] *both the New Zealand and Ontario businesses essentially provide a large number of data points for businesses that are spread across a total area that is comparable in size to Victoria and subject to the same jurisdictional regulations. Therefore variation in environmental factors and compliance requirements between businesses within each dataset is of marginal significance.*

7 Is the AER's Application of Benchmarking Reasonable?

This section outlines Advisian's opinion on the reasonableness or otherwise of the AER's Draft Decision for AAD's Opex. It responds to the following question from the Letter of Instruction:

5) *Provide an opinion on whether the approach taken by the AER for its proposed reduction to the regulatory Opex allowance is reasonable in the context of the NER requirement that forecast Opex for the regulatory control period reasonably reflect the Opex criteria in clause 6.5.6(c) of the NER.*

Ultimately the decisions on how to apply the Opex benchmarking results in the context of setting the efficient Opex for AAD will come down to the interpretation of the AER's obligation to take into account the specific circumstances of AAD in applying its discretion and developing its alternative forecast under the rules.

To this end, we consider that there are four factors that are relevant to the AER's application of its Opex benchmarking results to AAD. These are:

▪ The requirement to take account of the circumstances of AAD;
▪ The roll forward of the average 2006-2013 base Opex using the Economic Insights cost function rather than the actual assessed productivity scores for the frontier DNSPs in 2013;
▪ The inconsistency between the alternative forecast and the STPIS requirements; and,
▪ The Economic Insights conclusion that there are no significant economies of scale.

These are discussed in section 7.1 to 7.4 below.

7.1 AAD's Circumstances

The first issue in relation to the AER's application of its Opex benchmarking results relates to the extent to which the AER is obliged to consider the circumstances of the DNSP in developing its alternative Opex forecast. In this respect, the AER notes in Attachment 7 to the Draft Decision that:

> "it is important to note the effect of a change to the NER in November 2012 on this point. Previously the NER provided that the total forecast Opex should reasonably reflect the costs that a prudent operator in the circumstances of the service provider would require to achieve the objectives. **The reference to "in the circumstances of the service provider" was deleted from this rule to ensure that the Opex forecast would reasonably reflect the costs of an objectively prudent provider, rather than a provider in the particular circumstances of the service provider concerned.** One of the stated objectives of this change was to ensure that benchmarking could be applied to assess the efficient and prudent expenditure requirements of an objective operator."[190]

Advisian is concerned that this appears to be contrary to the explanation provided by the AEMC in its Rule Determination, as referenced by the AER.

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[190] AER, *Draft Decision ActewAGL Distribution Determination 2014-19 Attachment 7: Operating Expenditure*, November 2014, p. 7-50

*"The Commission is of the view that **the removal of the "individual circumstances" clause does not enable the AER to disregard the circumstances of a NSP in making a decision on Capex and Opex allowances**. Benchmarking is but one tool the AER can utilise to assess NSP proposals… …Should the phrase remain, it appears that the AER's interpretation of it may restrict it from utilising appropriate benchmarking approaches to inform its decision making."*

*The Commission considers that the removal of the "individual circumstances" phrase will clarify the ability of the AER to undertake benchmarking. It assists the AER to determine if a NSP's proposal reflects the prudent and efficient costs of meeting the objectives. **That necessarily requires a consideration of the NSP's circumstances as detailed in its regulatory proposal**." [191]*

This is important because it was the AER's own interpretation that the retention of the 'individual circumstances' clause inhibited its ability to conduct and apply 'benchmarking' in making its regulatory decisions was the key driver for the AEMC accepting its removal. With regard to the existing approaches to setting Opex and Capex allowances, the AEMC noted:

"• The approach to expenditure allowances was set by the AEMC in Chapter 6A in 2006. It includes that the NSP's forecast should be the starting point for the AER's analysis, but the AER is free to use a range of analytical techniques and should consider all material and submissions before it.

• Analysis confirms that the practices of the AER conform to good regulatory practice when compared with other regulators in Australia and overseas, and the Commission's view is that the NER reflects these practices.

• In general, the existing provisions of the NER provide the AER with appropriate discretion to set Capex and Opex allowances at an efficient level, assuming it has adequate information and uses appropriate analytical techniques"[192].

In combination with the specification of the AER's preferred SFA CD model (Customer Numbers, Ratcheted Maximum Demand, Circuit km and % Underground), it is apparent that:

(a)   the AER has not made use of any of the additional information that has been made available through the extensive Economic Benchmarking and Category Analysis RIN processes in forming the alternative forecast, as the factors used in the SFA CD model have historically been provided annually to the AER for some time;

(b)   the AEMC did not consider that the AER was constrained in its ability to use benchmarking prior to the November 2012 rule change; and,

(c)   the AEMC did consider that the AER's historical practices conformed to good regulatory practice when compared to regulators in Australia and overseas.

Apart from introducing the obligation for the AER to conduct and publish benchmarking in the form of the Annual Benchmarking Report, and to have regard to the Annual Benchmarking Report when

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[191] AEMC, *Rule Determination – National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012,*29 November 2012, p. 107

[192] ibid. p.92.

making regulatory determinations, it is not clear that the AEMC considered that a fundamental change in approach to determining Opex allowances was envisioned or was required.

The analysis presented in section 4 and 5 of this report generally accept that the AER has chosen to rely on its Opex benchmarking analysis for the purpose of determining its substitute forecast of efficient Opex for AAD. However, Advisian has augmented the AER's analysis using the additional RIN information provided by the DNSPs to support the AER's benchmarking. This ensures that the underlying distortions to the benchmarking results due to inconsistently reported data are removed (as far as practical) so that the "frontier" DNSPs are truly <u>comparable</u> with AAD in accordance with the AEMC guidance on the final rule that:

> *"…**The NSP has the most experience in how a network should be run, as well as holding all of the data on past performance of its network, and is therefore in the best position to make judgments about what expenditure will be required in the future**. Indeed the NSP's proposal will in most cases be the most significant input into the AER's decision. Importantly, though, it should be only one of a number of inputs. Other stakeholders may also be able to provide relevant information, as will any consultants engaged by the AER. In addition the AER can conduct its own analysis, including using objective evidence drawn from history, and **the performance and experience of comparable NSP's**"[193]*

The issue of comparability, particularly with regard to the international data sets weakens the influence of AAD's performance and experience in deriving the efficiency function which has then been used to determine the AER's substitute 'efficient' Opex forecast.

Ontario Distribution Sector Review Panel Report

In 2012 the Ontario Government established the Ontario Electricity Distribution Sector Review Panel to *"provide expert advice to the government on how to improve efficiencies in the sector with the aim of reducing the financial cost of electricity distribution for electricity consumers"[194]*.

With regard to the Ontario data, the Ontario Electricity Distribution Sector Review Panel does not consider its DNSPs or industry structure is comparable to other provinces within Canada or states in Australia and has recently determined that there is a need to consolidate the existing DNSPs. The report states:

> *"If Ontario was to set out to establish a new electricity distribution system from scratch, it is highly doubtful that it would choose to replicate the current structure. The arrangement of Ontario's distribution system cannot be found anywhere else in Canada. Many other provinces have only a single electricity distributor that is part of a vertically integrated utility handling both the transmission and the distribution of electricity."[195]*

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[193] ibid. pp. 111-112

[194] Ontario Distribution Sector Review Panel, *Renewing Ontario's Electricity Distribution Sector: Putting the Consumer First*, December 2012, 2nd page

[195] ibid, p. 9

Jurisdiction		Average Size (Customers)	Share of Customers Served by Small or Medium Utility
UK		2,921,429	0.0%
Australia	Queensland	989,443	0.0%
Australia	New South Wales	857,977	0.0%
Australia	South Australia	817,300	0.0%
Australia	Victoria	516,420	0.0%
USA	California	336,374	5.4%
Canada	Alberta	235,988	9.4%
Australia	Tasmania	271,750	0.0%
USA	New York	111,662	2.8%
Canada	Ontario	64,522	30.0%

Figure 4: Electricity Distributor Sizes – International Comparisons

Figure 7-1 Comparison of Ontario DNSPs to other Jurisdictions

Source: Ontario Distribution Sector Review Panel[196]

Economic Insights included some analysis regarding the inclusion, or exclusion of businesses (as measured by customer numbers) into the data set and subsequently included a single 'dummy' variable for Ontario. This analysis then included a large number of small Canadian businesses in the data set on the basis of providing more statistically 'stable' results.

Furthermore, the largest two Ontario DNSPs Hydro One Networks and Toronto Hydro are considered by the Ontario Distribution Sector Review Panel to be outliers on the basis of:

> "...their unique circumstances. Hydro One Networks has higher costs because its low overall customer density is spread out over a wide service area. Toronto Hydro also has unique cost pressures. Its aging assets have to serve a dense urban core that has the highest growth rate in multi-residential buildings in North America"[197].

Advisian notes that these businesses are the closest in scale (from a customer number perspective) to the Australian DNSPs. In Advisian's opinion, the AER has clearly not demonstrated that the Ontario DNSPs or the New Zealand DNSPs are comparable to AAD or the other Australian DNSPs.

Therefore we recommend that the factors and analysis identified in the previous sections of this report in relation to the comparability of the benchmark data are carefully considered. Regardless of Advisian's specific application of changes in the AER & Economic Insights spreadsheets, the EB RIN and CA RIN information clearly demonstrate that:

1) the assessment of the relative productivity of Australian DNSPs is highly sensitive to differences in practices within the DNSPs; and,

2) this can be corrected using information that has already been made available to the AER as part of the cost and resource intensive RIN process.

In the absence of a transparent demonstration that the international DNSPs are truly comparable, and that cost data for the three sets of DNSP data is reported on the same basis, with materially the

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[196] *ibid*

[197] *ibid, p.11 footnote 23*

same capitalisation practices applied, our analysis demonstrates that the relative productivity scores obtained from the SFA CD model are not an appropriate basis for determining the level of efficient opex.

7.2   2013 Basis Frontier Benchmark

The second issue with the AER's application of the Opex benchmarking results relates to the use of the average productivity score over the analysis period (2006-2013) rather than using the actual score of the frontier businesses in 2013. This places a significant upward bias in the productivity scores for the South Australian and Victorian DNSPs whose assessed productivity have declined considerably over the period. This has the effect of:

(a)   setting the "frontier" at a level that was not achieved by any of the businesses in 2013

(b)   substantially overstating the distance from the frontier (inefficiency) for all of the non "frontier" businesses.

Using the actual 2013 MPFP productivity index scores contained in the supporting spreadsheets to the Annual Benchmarking Report in preference to the average 2006-2013 scores results in a substantial reduction in the productivity achieved by the frontier businesses. (approximately 5% for United Energy and 14-20% for the other frontier businesses).

Table 7-1 Adjustment for Change in Productivity

	Average Opex PFP (2006-2013)	Opex PFP (2013)	% Change to Index Score
Powercor	1.702	1.423	-19.6%
AusNet	1.320	1.132	-16.6%
CitiPower	1.986	1.647	-20.6%
SA Power Networks	1.726	1.375	-25.6%
United Energy	1.450	1.386	-4.7%
ActewAGL	0.883	0.748	-18.1%
Ergon	0.838	0.963	+13.0%
Energex	1.269	1.096	-15.8%
Ausgrid	0.891	0.980	+9.1%
Endeavour	1.217	1.287	+5.4%
Essential	0.957	0.856	-11.8%
TasNetworks	1.305	1.399	+6.7%

Source: Advisian Analysis

When the percentage adjustments calculated in Table 7-1 are applied to the SFA CD index numbers used to derive the AER's alternative forecast, the net effect for AAD is a modest $0.18m reduction in

Opex due to a decline in in annual Opex PFP that is of a similar magnitude to the frontier DNSPs.
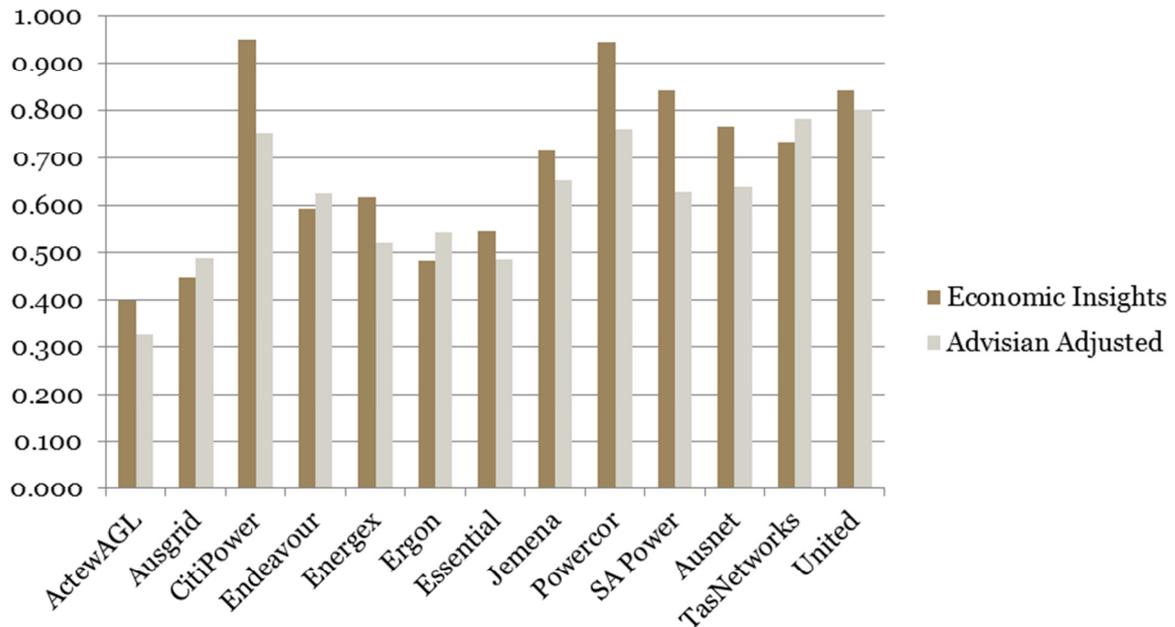
Figure 7-2 Advisian Adjusted Productivity Scores for 2013 Basis Productivity Score
Source: Advisian Analysis of CA RIN

However for the other DNSPs, the adjustment corrects for much of the disparity which arose due to the AER's failure to take into account the declining Opex productivity that has been occurring over the period. This decline in Opex productivity disproportionately affects the "frontier" DNSPs. Advisian's recommended adjustment for the correction of the productivity scores to a 2013 basis is shown below in Table 7-2.

Table 7-2 Advisian Recommended Adjustment for 2013 Basis Productivity Score

Issue	Adjustment $m (% of efficient base)
2013 Basis Productivity Scores	**-$0.18m** (-0.6%)

Source: Advisian Analysis

7.3   Inconsistency Between Opex and the STPIS Targets

The Opex reduction is based on a benchmark of Opex that considers that the businesses are broadly similar with respect to the reliability performance achieved. This is not the case for AAD where both SAIDI and SAIFI measures are at levels similar to CitiPower.

Requiring AAD to maintain reliability at historical levels whilst at the same time reducing Opex on the basis of benchmarks with businesses achieving much lower levels of reliability service areas does not account for the natural relationship between Opex and reliability performance noted in the AER's Benchmarking report[198] and required by the Opex objectives.

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[198] AER, *Electricity Distribution Network Service Providers – Annual Benchmarking Report*, November 2014, pp. 45-46

Advisian considers that no further adjustment is required as this issue has implicitly been taken into account through other adjustments that have the effect of aligning AAD's adjusted Opex more closely with its reported historical experience. In the case that the AER maintains an abnormally low alternative Opex forecast, a separate corresponding adjustment must be made to account directly for differences in relative SAIDI performance between AAD and the Victorian urban networks. This would simply value the differential in reliability performance at the relevant VCR figures for both AAD and the frontier businesses.

7.4 Economies of Scale

In its report to the AER, Economic Insights concluded that there were negligible economies of scale that arose in electricity distribution businesses on the basis of its assessment of the combined Australian, Ontario and New Zealand data sets against the specified model.

Advisian finds it hard to accept this conclusion as we have specifically found examples in section 5.5 of economies of scale that have been realised by the Victorian businesses. In this regard, the shared management team between CitiPower and Powercor and the shared controls rooms of CitiPower/Powercor and Jemena/United Energy are the most pertinent examples of instances where Australian DNSPs are shown to access economies of scale that are not available to AAD.

With regard to the Ontario data, Advisian again refers to the recent work of the Ontario Distribution Sector Review Panel that considers the move from approximately 80 DNSPs (Local Distribution Companies LDC) serving the province to a much smaller number of large distribution companies. In relation to scale efficiencies and trends in recent operating expenditure (OM&A), the report states:

"Data show that there have been significant increases in the OM&A costs of the distribution sector. The OM&A expenses for utilities increased by more than 42% between 2005 and 2011. During the same time the number of customers served by LDCs saw an increase of just 7% and inflation was just 11.6%.

Moreover, when compared to municipalities, LDCs' OM&A costs increased by 36% between 2005 and 2010, while the total operating costs of municipalities increased by just 26%.

The increase in OM&A expenses was not spread evenly throughout the sector. When one looks closer at individual LDCs, it is clear that OM&A costs per customer are generally higher for smaller LDCs.

As Fig. 6 and Fig. 7 [Figure 7-3 and Figure 7-4] *show, OM&A costs follow a general rule: the larger the LDC, the lower the OM&A costs per customer"*[199]

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[199] Ontario Distribution Sector Review Panel, *Renewing Ontario's Electricity Distribution Sector: Putting the Consumer First*, December 2012. p. 11.
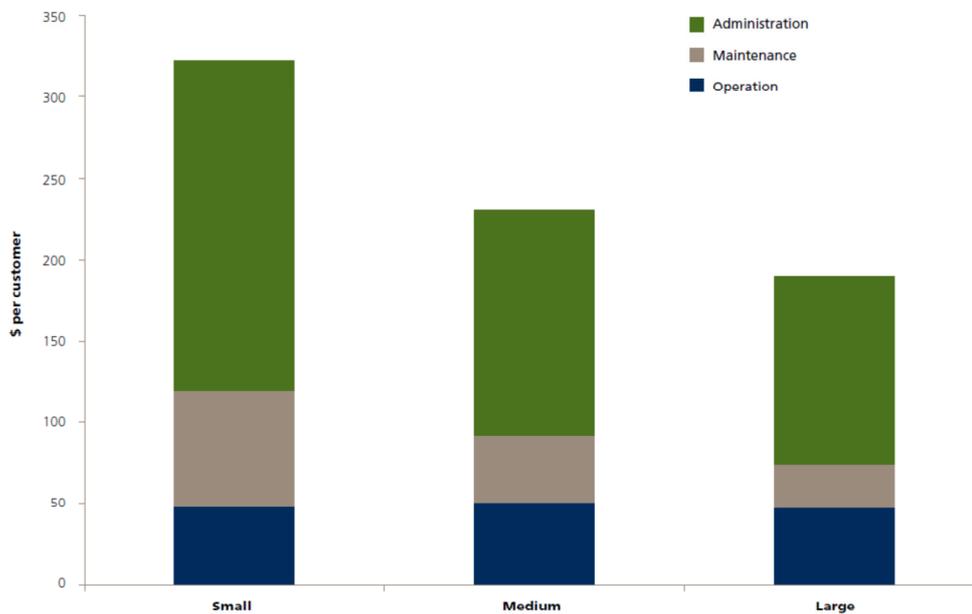
Figure 6: OM&A Costs per Customer for Small, Medium and Large LDCs
Source: Ontario Energy Board, 2011 Yearbook of Electricity Distributors Data

Figure 7-3 Opex Costs by DNSP Size - Ontario DNSPs
Source: Ontario Distribution Sector Review Panel[200]

Significantly, the Panel noted that

> *"The OM&A costs of the two largest utilities in Ontario, Hydro One Networks and Toronto Hydro, are excluded from the charts in Fig. 6 and Fig. 7 because of their unique circumstances. Hydro One Networks has higher costs because its low overall customer density is spread out over a wide service area. Toronto Hydro also has unique cost pressures. Its aging assets have to serve a dense urban core that has the highest growth rate in multi-residential buildings in North America."[201]*

The panel considered the scale efficiencies available and concluded as follows:

> *"This would leave the rest of the province to be served by between 6 and 10 regional distributors. Of the existing LDCs, the Panel expects only one, Toronto Hydro, will remain unchanged as it is already large enough and has contiguous boundaries. It can thus be considered as one of the 6 to 10 regional distributors in southern Ontario. Each new regional distributor in southern Ontario should have a minimum of 400,000 customers."[202]*

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[200] ibid

[201] ibid

[202] ibid, p. 29.
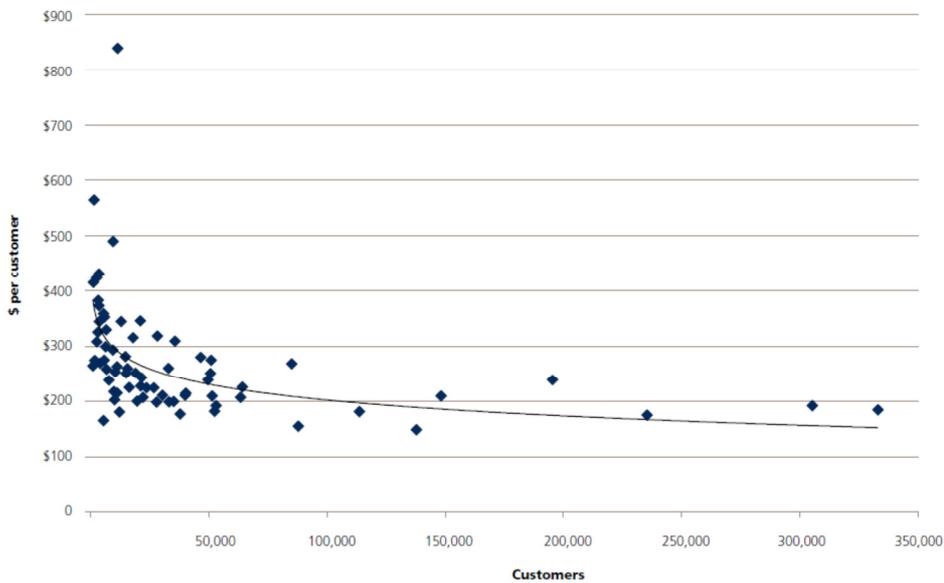
Figure 7: OM&A Costs per Customer by LDC Size
Source: Ontario Energy Board, 2011 Yearbook of Electricity Distributors Data

Figure 7-4 Opex Costs by DNSP Size - Ontario DNSPs
Source: Ontario Distribution Sector Review Panel[203]

Noting the substantial scale efficiencies that have been identified for the Ontario distributors, Advisian is concerned that the Economic Insights concluded that there are no appreciable economies of scale in electricity distribution using the same dataset. As a result, Advisian considers that it is unlikely that the Economic Insights model is appropriately specified to support the significant adjustments that the AER has determined.

7.5   Conclusion – Application of Benchmarking

From our assessment of the AER's application of its benchmarking results (as distinct from the benchmarking process and findings) Advisian considers that the AER's approach is not reasonable on the basis that:

(a)   The benchmarking approach itself does not take into account the circumstances of AAD and the AER's application of ex-post adjustments for operating expenditure factors are shown in this report to be inadequate in both scope and value;

(b)   The AER's 'roll-forward' of an 'analysis period average' using the cost function derived from an analytical methodology that is not designed to (and has been shown not to) account for all material factors, effectively sets benchmarks based on the relative productivity of the DNSP at the midpoint of the analysis period. Since that time, industry productivity has declined, most acutely for the 'frontier' businesses. Consequently, not even the 'frontier' businesses are performing at or above the 'frontier.

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[203] ibid

(c)   The SFA model that has been used to set the alternative base Opex does not take into account the difference in reliability performance or the relative reliability trends reported by the DNSPs (due to the reliance on average data). As AAD has consistently achieved higher reliability levels than other urban and suburban networks of similar linear or spatial density, this puts AAD at a material inherent disadvantage in terms of benchmarking comparability.

(d)   The Economic Insights statistical analysis has found that there are no significant economies of scale evident in the combined Australian, Ontario and New Zealand data set. This conclusion is simply not credible given that:

- Advisian has identified and corrected for specific examples within the frontier businesses; and,

- Ontario is currently restructuring its distribution sector with the specific objective of realising the scale economies that it has identified through its own analysis of the same (Ontario) data set.

Therefore Advisian is of the view that the Economic Insights models, the AER's ex-post adjustments for operating environment factors and the averaging and roll forward methodologies each lack the robustness and credibility necessary to support recommendations of the magnitude contained in the ACT and NSW Draft Decisions.

Furthermore, given that the Economic Insights models have intentionally be specified to provide a measure of relative productivity and not of efficient Opex, it is unreasonable for the AER to attempt to use them for this purpose.

8   Adjustments

This section summarises the adjustments recommended in the preceding sections in response to the following question from the Letter of Instruction:

4)   *What adjustments to base year operating costs does Advisian consider are relevant and necessary to reflect differences in technical characteristics, business practices and other circumstances and what is the value of these adjustments?*

On the basis of the facts presented above for each issue, Advisian's independent analysis of the available information and our expert opinion, Advisian has recommended the following adjustments to the AAD base Opex to account for technical characteristics, business practices and other circumstances that are not accounted for in the AER's model.

Advisian notes that each of these adjustments was calculated on an individual basis and expressed relative to the SFA CD Base Opex calculated from the AER and Economic insights models. When the individual adjustments are applied in combination across AAD and the frontier DNSPs, the relative productivity scores change considerably due to the cumulative effect of the adjustment[204]. Figure 8-1 also shows the cumulative result of applying all of the recommended adjustments to both AAD and the AER's frontier businesses.

Table 8-1 Advisian Recommended Adjustments

Issue	Adjustment $m (% of efficient base)
Advisian Calculated Base Opex	**$30.93** (100.0%)
Issues Identified by the AER in the Draft Decision	
AER Jurisdictional Taxes	**+$0.71m** (2.3%)
AER Standard Control Services Connections	**+$1.40m** (4.5%)
AER OH&S	**+$0.15m** (0.5%)
AER Miscellaneous Factors	**+$0.74m** (2.4%)
Backyard Reticulation[205]	**+$2.00m** (6.5%)
Technical Factors	
SWER Circuit Length	**+$0.38m** (1.2%)

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[204]   As the individual adjustments don't take into account the impact of any preceding adjustment to relative productivity scores, the sum of individual adjustments will tend to understate the total value when multiple adjustments are applied. This arises because, under the AER's analysis approach for AAD, applying a 10% upward adjustment to the 'frontier' productivity score is not equivalent to a 10% increase in AAD's score. For example, increasing the 'frontier' score by 10% (0.86 x 1.1) whilst keeping AAD's score (0.399) constant results in a 9% reduction in AAD's 'efficient' opex, whilst applying a 10% upward adjustment to AAD's score results in a 10% increase in AAD's 'efficient' opex.

As the scale of the adjustment percentage increases, the difference between whether the percentage is applied to the frontier or to AAD increases such that a 30% increase in the 'frontier' score equates to a 23% reduction in AAD's opex, whilst a 30% increase to AAD's score results in a 33% increase. The 'cumulative effect' adjustment included in the table quantifies the magnitude of this issue for the purpose of determining the upper bound of the range arising from our adjustments. (which in turn highlights the inherent imprecision in the AER's approach).

[205] *Inclusive of the component included in the AER's Draft Decision (refer to section 5.1 of this report)*

Issue	Adjustment $m (% of efficient base)
Linear v Spatial Density	Adjustment to model **or** As revealed in the audited base year
Installed Transformer Capacity v Ratcheted Maximum Demand	Adjustment to model **or** As revealed in the audited base year
Reliability	**+$1.26m** (4.1%)
Backyard Reticulation	**+$2.0m** (6.5%)
Business Practices	
Vegetation Management	Review the basis for rejection of AAD's revealed costs
Maintenance	Review the basis for rejection of AAD's revealed costs
Operating Leases[206]	**+$3.00m** (9.7%)
'Capitalisation Policy'[207]	**+$9.90m** (32.0%)
Pole Top Structures	**+$3.32m** (10.7%)
Network 'Overheads'	**+$4.64m** (15.0%)
AMI Corporate OH Allocation	**+$0.85m** (2.8%)
Realised Synergies CitiPower/Powercor Corp OH	**+$1.08m** (3.5%)
Realised Synergies Victorian Network Operations	**+$0.80m** (2.6%)
AER Application Factors	
2013 Basis Productivity Scores	**-$0.18m** (0.6%)
Remove Potential for Double Counting	
Less AER 'Capitalisation Policy' and 'Miscellaneous' adjustment	**-$10.64m** (34.4%)
Total (Sum)	**$50.36m** (62.8%)
Cumulative effect	**+$15.06m** (48.7%)
Total (Cumulative)	**$65.42m** (111.5%)

Source: Advisian Analysis

Advisian acknowledges that there may be some methodological deficiencies in simply applying the sum of multiple percentage adjustments to the index numbers, particularly in the context of the scale of overall adjustment required to the SFA CD results. However to the extent that this is true of our treatment of multiple percentage adjustments, it is also true of the AER's approach.

In addition, as identified for the backyard reticulation, capitalisation practices and operating lease adjustments, the AER's percentage adjustments are calculated on the basis of different denominators (e.g. $12.9m/$73.4m = 17.6% for the operating lease and 'capitalisation policy' adjustment, whilst

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[206] *Inclusive of the component included in the AER's Draft Decision*

[207] *Inclusive of the component included in the AER's Draft Decision*

$0.71m/$30.9m = 2.3% for the energy industry levy adjustment). Therefore whilst Advisian's percentage adjustments have all been calculated on the same base number, the same is not true for the AER's adjustments. Consequently it is mathematically incorrect and ultimately misleading to simply take the sum of the AER's percentage adjustments to arrive at the 30% to derive a productivity adjustment factor for AAD.

We consider Advisian's approach is superior as it allows transparent adjustments to be made that take account of the relative changes in productivity (upwards or downwards) between all DNSPs. In comparison, the AER's approach only considers adjustment to AAD, effectively necessitating the application of a line by line 'bottom up' build of base Opex (through the individual 'operating environment adjustments) from the AER's benchmark 'efficient' Opex for any 'efficiency gap', with no transparency over what is (or is not) included in the base. In our opinion this is a step backwards in regulatory practice as the intention of using benchmarking is to minimise the reliance on 'bottom up' assessments by the regulator. In the extreme case, this hybrid approach will tend to set Opex allowances arbitrarily rather than on the basis of objective data provided by all of the Australian DNSPs to support the benchmarking approach.

Notwithstanding the above, we have noted that there is the potential for overstatement of the total base Opex due to two of AER's accepted operating factor adjustments. These are:

▪ the potential for the AER's $9.9m 'capitalisation policy' adjustment to also account for some factors taken into account by Advisian's normalisation of the frontier DNSPs Opex to a consistent basis with AAD;
▪ the likelihood that the AER's 2.3% 'miscellaneous' adjustment is intended to account (albeit insufficiently) for the specific factors identified in our report.

For this reason, in Table 8-1 we have subtracted the value of these factors ($10.64m) from the total Opex forecasts calculated as either the sum of individual adjustments or on a cumulative basis. We consider that the range bounded by the resulting totals represents the range of efficient Opex outcomes that can reasonably be interpreted from the benchmarking results. Figure 8-1 illustrates the relative effect of these adjustments on the productivity scores for AAD and the frontier businesses (noting that the results have been rebased so that they are expressed relative to the new highest scoring business)

As our total adjustment:

(a) does not take into account factors that are best addressed through improvements to the model specification;

(b) has been calculated with the intention of replicating the AER's approach to demonstrate the materiality of factors that have not appropriately been considered within the AER's own analysis framework; and,

(c) the resulting productivity scores, even after all of our adjustments have been applied, still include identifiable factors that have not been accounted for (such as the exclusive use of concrete/steel Stobie poles by SA Power Networks in preference to wood poles and the adjustment required to bring United Energy's reported overheads to a comparable basis due to the outsourced nature of its business).

Advisian highlights that our total adjustment to productivity scores (the results of which are shown in Figure 8-1) are still likely to understate the relative productivity, *in comparable terms,* between AAD

and the frontier businesses for the purpose of determining the efficient opex for AAD. Notwithstanding this, our adjustments result in a substantial reduction in the 0.46 index point[208] 'productivity gap' that was identified as the basis for the AER's draft decision to a much lower 0.22 index point gap[209]. AAD is also shown to achieve a productivity level that is within the range of the 'frontier' DNSPs when assessed on a *more comparable* basis.

It is for this reason (and the sheer number and scale of adjustments that are required to achieve a comparable basis for benchmarking) that we consider it to be preferable to use the revealed base year opex as the efficient base.
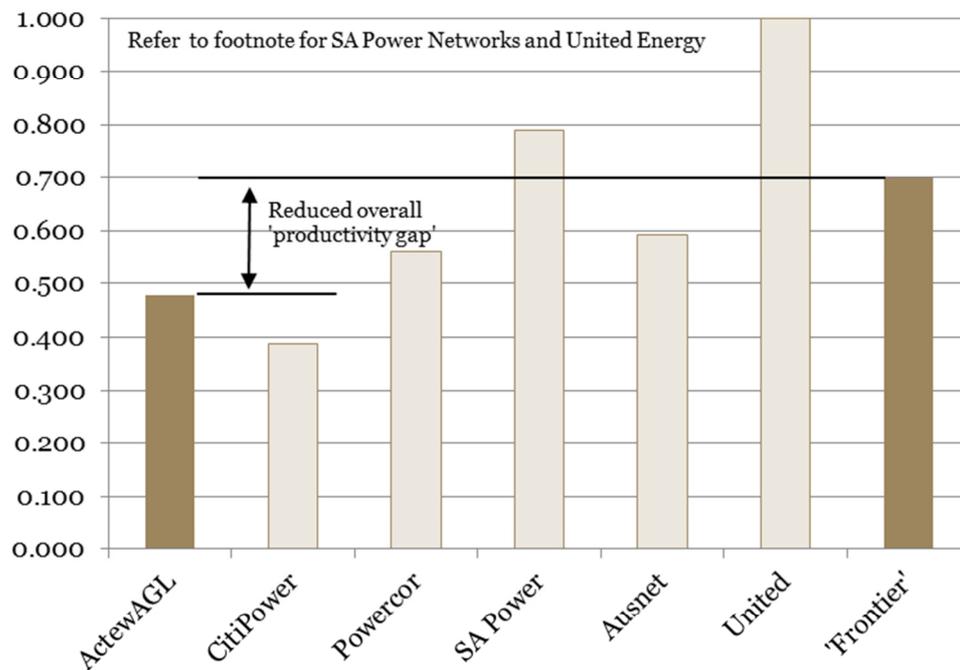
Figure 8-1 Advisian Adjusted Relative Productivity Scores, Inclusive of All Adjustments and Rebased Against the Highest Scoring DNSP[210]
Source: Advisian Analysis

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[208] *Economic Insights Frontier Score (0.86) – Economic Insights AAD Score (0.40)*

[209] *Advisian Adjusted Frontier Score (0.70) – Advisian Adjusted AAD Score (0.48).*

[210] Advisian notes that both SA Power Networks and United Energy (the two highest businesses following our adjustments) are affected by unique factors that have not been able to be taken into account in our analysis. **SA Power Networks** almost exclusively uses 'Stobie Poles' for its network. These are constructed from steel and concrete and are not susceptible to rot or termite attack (but are subject to different modes of deterioration). With a population of around 700,000 poles, these represent a substantial Opex benefit due to reduced inspection requirements/frequency. **United Energy** does not report the capitalisation of any network overheads, as these were typically delivered as part of the contract cost with its asset management and operation and maintenance contracts with Jemena Asset Management (now Zinfra) over the analysis period. Therefore it was not possible to determine the proportion of capitalised 'network overheads' from the publically available RIN information.

9 Conclusions

The AER's Draft Decision for AAD's Opex is largely based on the analysis contained in the Economic Insights report and associated SFA CD model for Opex productivity benchmarking. Whilst benchmarking represents one of the operating expenditure factors, the overarching operating expenditure criteria and objectives must also be taken into account. In our view, the AER's proposed adjustment to AAD's forecast Opex does not satisfy the operating expenditure criteria insofar as it does not represent:

(a) *"the costs that a prudent operator would require to achieve the operating expenditure objectives"* [211]; or

(b) *"a realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives"*[212]

Whilst the AER's proposed adjustment represents a lower cost, and apparently 'more efficient' forecast than the AAD proposal, the first operating expenditure criterion is that the forecast Opex must reasonably reflect *"the efficient costs of achieving the operating expenditure objectives"*[213].

In our opinion, the AER's alternative forecast is insufficient for AAD to achieve the operating expenditure objectives over the 2014/15 to 2018/19 period as the underlying benchmarking approaches do not adequately take into account:

- the technical differences between DNSPs;
- the differences in cost categorisation between DNSPs; and,
- the circumstances that are unique to the ACT electricity distribution network.

As the impact of these factors are not reflected in the AER's alternative Opex forecast, the alternative forecast does not reflect the efficient costs of achieving the operating expenditure objectives for the ACT network.

Therefore Advisian concludes that the AER's benchmarking analysis, comparisons between businesses and selection of the notional efficiency "frontier" is not a reasonable basis for an alternative Opex forecast without a fundamental engineering and commercial assessment of the components of AAD's forecast Opex or otherwise, the transparent normalisation for differences in reporting factors and ability of the businesses to realise synergies through cost sharing arrangements with other DNSPs.

On this basis, Advisian recommends against the use of the AER's benchmarking analysis results as the basis for alternative Opex forecasts for AAD until such time as these factors can be transparently and robustly accounted for in the benchmarking methodology. Instead, Advisian considers that any alternative forecast based on the Opex benchmarking approach should be reconciled to the AAD revealed base year, whether by the AERs historical approach or by demonstration that the AAD business can be operated at the level of Opex determined by the AER. Should the Opex benchmarking approach be used to set AAD's total Opex in the AER's final decision, the inputs for other DNSPs

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[211] *NER 6.5.6 (c) criterion 2*

[212] *NER 6.5.6 (c) criterion 3*

[213] *NER 6.5.6 (c) criterion 1*

must in any case be normalised to be reported on a demonstrably consistent basis with AAD's Opex, taking account of the impact of the issues identified by Advisian on both AAD <u>and the frontier DNSPs.</u>

Advisian has made all the enquiries that Advisian believes are desirable and appropriate and that no matters of significance that Advisian regards as relevant have to Advisian's knowledge been withheld from the Court.

Appendix A

Letter of Instruction
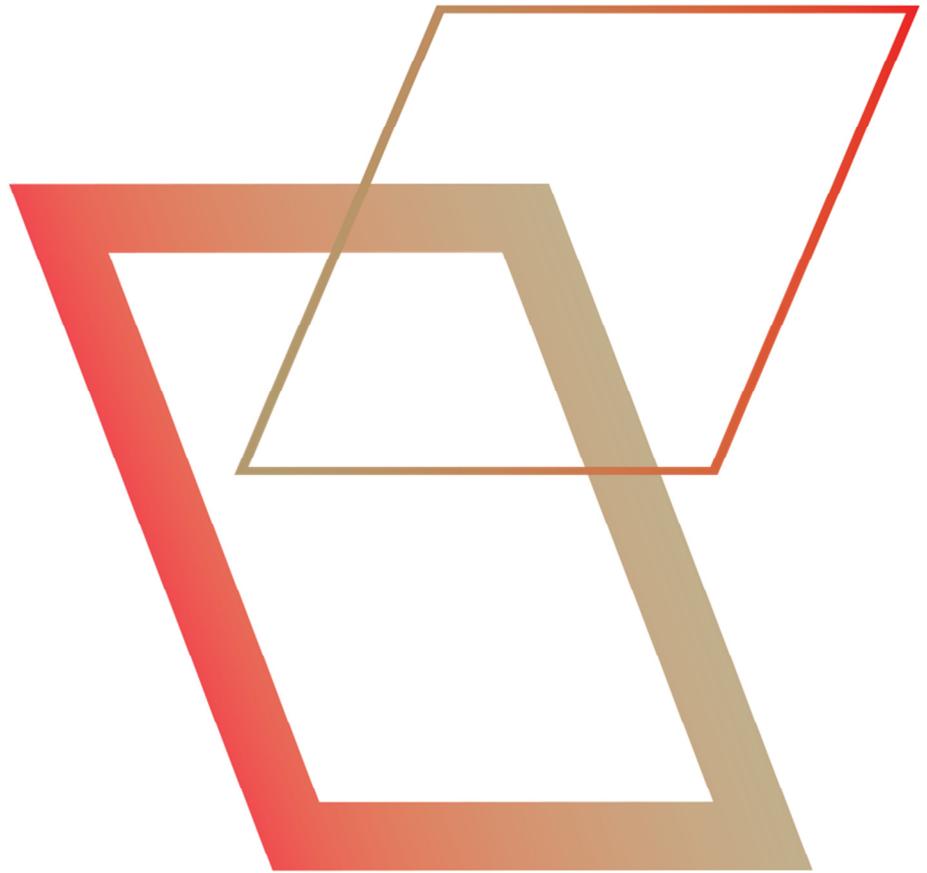
Mr Bill Glyde
Principal
Advisian Pty Ltd
Level 17, 141 Walker St
North Sydney, NSW, 2060

bill.glyde@advisian.com

9 January 2015

Dear Mr Glyde

AER'S USE OF ECONOMIC BENCHMARKING

ActewAGL Distribution (**ActewAGL**) would like to engage Advisian to provide an expert opinion on the Australian Energy Regulator's (**AER's**) use of economic benchmarking for the purpose of its draft decision on the distribution determination for ActewAGL for the 2015/16 to 2018/19 subsequent regulatory control period published by the AER on 27 November 2014 (**Draft Decision**).

1.   PURPOSE

The purpose of this brief is to set out the nature, scope and purpose of the work that ActewAGL is seeking Advisian to undertake. The scope of the work is set out in section 3 below.

2.   BACKGROUND

ActewAGL operates and owns the ACT's electricity distribution network. The AER is responsible for the economic regulation of electricity distribution services in the ACT under the National Electricity Law (**NEL**). The AER is required to make distribution determinations for distribution network service providers

(**DNSPs**), including ActewAGL under the National Electricity Rules (**NER**).[1] The constituent decisions on which such a distribution determination is predicated relevantly include:[2]

- a decision on the annual revenue allowance for the DNSP for each regulatory year of the regulatory control period to which the determination relates; and

- a decision in which the AER either accepts the DNSP's total operating expenditure (**opex**) forecast for that regulatory control period or does not accept that forecast, in which case the AER must determine an estimate of the DNSP's required opex for that period.

The annual revenue allowance for the DNSP for each regulatory year of the regulatory control period must be determined using a building block approach, under which the building blocks relevantly include the forecast opex for that year as accepted or substituted by the AER in making the distribution determination.[3]

In 2012 significant amendments were made to the NER governing the economic regulation of DNSPs through the Australian Energy Market Commission's (**AEMC's**) Rule Determination, *National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012* (**2012 Rule Determination**). As a result of those changes, the AEMC deferred the full regulatory determination process for the 2014-2019 regulatory control period. As part of the transitional arrangements under the NER,[4] on 16 April 2014 the AER determined a placeholder distribution determination for a transitional regulatory control period (1 July 2014 to 30 June 2015) and is in the process of making a distribution determination for ActewAGL for the 2015/16-2018/19 subsequent regulatory control period (1 July 2015 to 30 June 2019).

In making ActewAGL's distribution determination for the subsequent regulatory control period, the AER is required to determine a "notional" annual revenue allowance for the transitional regulatory control period.[5] The AER must adjust ActewAGL's total revenue requirement for the subsequent regulatory control period (1 July 2015 to 30 June 2019) by increasing or decreasing the annual revenue allowance(s) for one or more of the regulatory years of the subsequent regulatory control period.[6] The amount of that adjustment is calculated as the amount of the annual revenue allowance approved for the transitional regulatory control period in its placeholder distribution determination for that period less the amount of the "notional" annual revenue allowance for the transitional regulatory control period determined in the distribution determination for the subsequent regulatory control period (subject to modifications as set out in the AER's Framework and Approach Paper).

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[1] Where we refer in these instructions to provisions in Chapter 6 of the NER we are referring to the provisions in Chapter 6 contained in version 58 of the NER. Clause 11.56.4 of the Savings and Transitional Rules in Chapter 11 of the NER provides that except as specified in that clause, "current Chapter 6" governs the making of a distribution determination for the subsequent regulatory control period for NSW and ACT DNSPs. Clause 11.65.2(a) of the NER provides that references to "current Chapter 6" are to be read as Chapter 6 of the NER as in force immediately after the *National Electricity Amendment (Network Service Provider Expenditure Objectives) Rule 2013* came into force. That Rule came into force on 26 September 2013 and version 58 of the NER was the version of the NER in force from 26 September 2013. Accordingly, the NER currently provides that Chapter 6 in version 58 of the NER applies to the making of distribution determinations for NSW and ACT DNSPs for the subsequent regulatory control period. Accordingly, your expert opinion should also be based on the provisions of Chapter 6 in version 58 of the NER.

[2] Clause 6.12.1(2) and (4) of the NER.

[3] Clause 6.4.3(a)(7) and (b)(7) of the NER.

[4] Division 2 of Part ZW of Chapter 11 of the NER.

[5] Clause 11.56.4(c) of the NER.

[6] Clause 11.56.4(h) and (i) of the NER.

ActewAGL submitted its regulatory proposal for the subsequent regulatory control period (2015/16-2018/19) to the AER in July 2014 (**ActewAGL's Subsequent Regulatory Proposal**).[7] The AER published its draft distribution decision on the regulatory proposal on 27 November 2014. ActewAGL's revised regulatory proposal is due in January 2015 and the AER expects to publish a final decision in April 2015 in respect of the subsequent regulatory control period (1 July 2015 to 30 June 2019).

NER Requirements

The AER is required to accept a DNSP's forecast opex where it is satisfied that the forecast opex for the regulatory control period reasonably reflects the following criteria (**opex criteria**) in clause 6.5.6(c) of the NER being:

- the efficient costs of achieving the opex objectives in clause 6.5.6(a) of the NER (**opex objectives**);

- the costs that a prudent operator would require to achieve the opex objectives; and

- a realistic expectation of the demand forecast and cost inputs required to achieve the opex objectives.

Similarly if the AER is not so satisfied and, accordingly, does not accept the DNSP's forecast of required opex, the AER must estimate the DNSP's required opex that it is satisfied reasonably reflects the opex criteria taking into account the opex factors (clauses 6.5.6(d) and 6.12.1(4)(ii)).

The opex objectives in clause 6.5.6(a) of the NER are to:

- meet or manage the expected demand for standard control services over the regulatory control period;

- comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;

- to the extent that there is no applicable regulatory obligation or requirement in relation to:

  - the quality, reliability or security of supply of standard control services; or

  - the reliability or security of the distribution system through the supply of standard control services,

  to the relevant extent:

  - maintain the quality, reliability and security of supply of standard control services; and

  - maintain the reliability and security of the distribution system through the supply of standard control services; and

- maintain the safety of the distribution system through the supply of standard control services.

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[7] ActewAGL first submitted its regulatory proposal to the AER on 2 June 2014. The AER issued ActewAGL with a notice under clause 6.9.1(a) of the NER, to resubmit its regulatory proposal on the basis that it was not compliant with the NER. On 10 July 2014, ActewAGL resubmitted its regulatory proposal which addressed the deficiencies identified by the AER.

In deciding whether or not it is satisfied that the forecast opex for the regulatory control period reasonably reflects the opex criteria, the AER must have regard to certain factors specified in clause 6.5.6(e) of the NER, including, relevantly:

- the most recent annual benchmarking report that has been published under clause 6.27 of the NER and the benchmark opex that would be incurred by an efficient DNSP over the relevant regulatory control period (clause 6.5.6(e)(4)). Under clause 6.27 of the NER, the AER must prepare and publish an annual benchmarking report which should describe the relative efficiency of each DNSP in providing direct control services over a 12 month period;

- the actual and expected operating expenditure of the DNSP during any preceding regulatory control periods (clause 6.5.6(e)(5));

- the relative prices of operating and capital inputs (clause 6.5.6(e)(6));

- the substitution possibilities between opex and capital expenditure (**capex**) (clause 6.5.6(e)(7)); and

- any other factor the AER considers relevant and which the AER has notified the DNSP in writing, prior to the submission of its revised regulatory proposal under clause 6.10.3 is an operating expenditure factor (clause 6.5.6(e)(12).

In discussing the use of benchmarking in assessing opex and capex allowances under the NER, the AEMC states in its 2012 Rule Determination:[8]

> ..when undertaking a benchmarking exercise, circumstances exogenous to a NSP should generally be taken into account and endogenous circumstances should generally not be considered. In respect of each NSP, the AER must exercise its judgement as to the circumstances which should or should not be included. However exogenous factors to be taken into account are likely to include:
>
> - geographic factors: topography and climate;
>
> - customer factors: density of the customer base (urban v rural), load profile, mix of customers between industrial and domestic;
>
> - network factors: age, mix of underground and overhead lines, though this will depend on the extent to which this is at the election of the NSP; and
>
> - jurisdictional factors: reliability and service standards.
>
> If there are some exogenous factors that the AER has difficulty taking adequate account of when undertaking benchmarking, then the use to which it puts the results and the weight it attaches the results can reflect the confidence it has in the robustness of its analysis.
>
> Endogenous factors not to be taken into account may include:
>
> - the nature of ownership of the NSP;
>
> - quality of management; and
>
> - financial decisions.
>
> It is also expected that similar considerations be made when undertaking the annual benchmarking report.

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[8] Rule Determination, *National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, p113.

AER's Approach to Assessing Expenditure Forecasts

In 2013, following the significant changes to the NER in 2012, the AER undertook a Better Regulation program. As part of that program in November and December 2013 the AER published a number of Guidelines, together with Explanatory Statements, relevant to its assessment of DNSPs' expenditure proposals. Relevantly, in November 2013, as required by clause 6.2.8(a) of the NER, the AER published the following:

- the AER's *Better Regulation Expenditure Forecast Assessment Guideline for Electricity Distribution*, November 2013 (**Expenditure Forecast Assessment Guideline**); and

- the AER's *Explanatory Statement, Expenditure Forecast Assessment Guideline*, November 2013 (**Expenditure Forecast Assessment Explanatory Statement**).

The Expenditure Forecast Assessment Guideline specifies the approach the AER proposes to use to assess the forecasts of opex and capex that form part of the DNSPs' regulatory proposals and the information the AER requires for the purpose of that assessment.[9] The Guideline is not mandatory and does not bind the AER or DNSPs, however, if the AER makes a distribution determination which is not in accordance with the Guideline, the AER must state its reasons for departing from the Guideline in that determination.[10]

AER's approach to assessing opex forecasts

For the purpose of making the distribution determination for ActewAGL for the subsequent regulatory control period, opex forecasts for the transitional and subsequent regulatory control periods will be assessed by the AER having regard to the approach set out in the Expenditure Forecast Assessment Guideline.

In its Expenditure Forecast Assessment Guideline, the AER states that it prefers to follow a "base-step-trend" approach to assessing most opex.[11] Under this approach, the AER uses a "revealed cost" approach to assessing base opex. It assesses whether opex in the base year is efficient and, if necessary, adjusts the DNSP's revealed costs to remove inefficient costs. The AER then accounts for any changes in efficient costs in the base year and each year of the forecast regulatory control period. The AER states that typically it will adjust base year opex by applying an annual rate of change for each year of the forecast regulatory control period (which accounts for changes in real prices, output growth and productivity in that period).[12] In addition, step changes may be added (or subtracted) for any other costs not captured in base opex or the rate of change that are required for forecast opex to meet the opex criteria in the NER.[13]

In describing its proposed general approach to assessing DNSP's forecast expenditure, the AER states in its Expenditure Forecast Assessment Guideline:[14]

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[9] Clause 6.4.5(a) of the NER.

[10] Clause 6.2.8(c) of the NER.

[11] Expenditure Forecast Assessment Guideline, p22.

[12] Expenditure Forecast Assessment Guideline, p23, Expenditure Forecast Assessment Explanatory Statement, p61.

[13] Expenditure Forecast Assessment Guideline, p24. See also Expenditure Forecast Assessment Explanatory Statement, p61.

[14] Expenditure Forecast Assessment Guideline, pp7-8; Expenditure Forecast Assessment Explanatory Statement, p42.

We will typically compare the DNSP's total forecast with an alternative estimate that we develop from relevant information sources. To calculate this alternative estimate we will consider a range of assessment techniques. Some of our techniques will assess the DNSP's forecast at the total level; others will assess components of the DNSP's forecast. Our estimate is unlikely to exactly match the DNSP's forecast. However, by comparing it to the DNSP's forecast, we can form a view as to whether or not we consider the DNSP's forecast reasonably reflects the expenditure criteria.

Therefore, if a DNSP's total capex or opex forecast is greater than the estimates we develop using our assessment techniques, and there is no satisfactory explanation for this difference, we will form the view that the DNSP's estimate does not reasonably reflect the expenditure criteria. In this case, we will substitute our own estimate that does reasonably reflect the expenditure criteria. If our estimate demonstrates that the DNSP's forecast reasonably reflects the expenditure criteria, we will accept the forecast. Whether we accept a DNSP's forecast or do not accept it, we will provide the reasons for our decision.

When we develop alternative estimates as a means of assessing a NSP's proposal, we will generally develop an efficient starting point or underlying efficient level of expenditure. We then adjust this for changes in demand forecasts, input costs and other efficient increases or decreases in expenditure, allowing us to construct a total forecast that we are satisfied reasonably reflects the expenditure criteria.

For recurrent expenditure, we prefer to use revealed (past actual) costs as the starting point for assessing and determining efficient forecasts. If a DNSP operated under an effective incentive framework, actual past expenditure should be a good indicator of the efficient expenditure the NSP requires in the future. The ex-ante incentive regime provides an incentive to improve efficiency (that is, by spending less than the AER's allowance) because DNSPs can retain a portion of cost savings made during the regulatory control period. However, the incentive to spend less than our allowance must not be to the detriment of the quality of the services the DNSP supplies.

Consequently we apply various incentive schemes (such as the efficiency benefit sharing scheme (EBSS), the service target performance incentive scheme (STPIS) and the capital expenditure sharing scheme (CESS)) to provide DNSPs with a continuous incentive to improve their efficiency in supplying electricity services to the standard demanded by consumers.

While we examine revealed costs in the first instance, we must test whether DNSPs have responded to the incentive framework in place. That is, we must determine whether or not the DNSP's revealed costs are efficient. For example, whether the DNSP's past performance was efficient relative to its peers and whether the DNSP has improved its efficiency over time. For this reason, we will assess the efficiency of base year expenditures using our techniques, beginning with economic benchmarking and category analysis, to determine if it is appropriate for us to rely on a DNSP's revealed costs.

...

Our approach for both opex and capex will place greater reliance on benchmarking techniques than we have in the past. We will, for example, use benchmarking to assist us in determining the appropriateness of revealed costs. We will also benchmark DNSPs across standardised expenditure categories to compare relative efficiency.

6

In describing its approach to assessing opex in its Expenditure Forecast Assessment Guideline, the AER states:[15]

> We prefer a 'base-step-trend' approach to assessing most opex criteria. However, when appropriate, we may assess some opex categories using other forecasting techniques, such as an efficient benchmark amount. We will assess opex categories forecast using other forecasting techniques on a case-by-case using the assessment techniques outlined in section 2.4. We will also assess whether using alternative forecasting techniques in combination with a 'base-step-trend' approach produces a total opex forecast consistent with the opex criteria.

The AER discusses its approach to assessing opex in section 5 of its Expenditure Forecast Assessment Explanatory Statement. The AER states:[16]

> Consistent with past practice, we prefer using a revealed cost approach to assess most opex cost categories (which assumes opex is largely recurrent). Specifically we intend to use the 'base-step-trend' approach. If a NSP has operated under an effective incentive framework, and sought to maximise its profits, the actual opex incurred in a base year should be a good indicator of the efficient opex required. However, we must test this, and if we determine that a NSP's revealed costs are not efficient, we will adjust them to remove inefficient costs. Details of our base year assessment approach are below.
>
> Once we have assessed the efficient opex in the base year we then account for any changes in efficient costs in the base year and each year of the forecast regulatory control period. There are several reasons why efficient opex in a regulatory control period could differ from the base year. Typically, we will adjust base year opex for:
>
> - output growth
> - real price growth
> - productivity growth.
>
> An annual 'rate of change' will incorporate these factors. Any other costs base opex and the rate of change do not compensate can be added as a step change. When assessing step changes particular consideration must be given to whether the costs are already compensated for elsewhere in the opex forecast.

The AER states in its Expenditure Forecast Assessment Explanatory Statement that it may adjust base opex to remove inefficient costs for two reasons, being:[17]

- a DNSP's recurrent expenditure is inefficient compared to its peers; and/or

- a DNSP's base year expenditure is not reflective of efficient recurrent expenditure due to a one-off factor in the base year.

In deciding whether a DNSP's expenditure is inefficient, the AER states it will consider:[18]

- the results of its expenditure review techniques, including economic benchmarking, category analysis and detailed engineering review; and

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[15] Expenditure Forecast Assessment Guideline, p22.

[16] Expenditure Forecast Assessment Explanatory Statement, p61.

[17] Expenditure Forecast Expenditure Assessment Explanatory Statement p93.

[18] Expenditure Forecast Expenditure Assessment Explanatory Statement p93.

- the DNSP's proposal and stakeholder submissions.

The AER states in its Expenditure Forecast Assessment Guideline that it will assess opex for the forecast regulatory control period by applying an annual rate of change for each year of the forecast regulatory control period where the annual rate of change for year t is:[19]

$$\text{Rate of change}_t = \text{output growth}_t + \text{real price growth}_t - \text{productivity growth}_t$$

In respect of determining the efficient opex in the base year using various assessment techniques and the relationship with the productivity growth element of the rate of change, the AER states in the Expenditure Forecast Assessment Explanatory Statement:[20]

> We need to be able to decompose our productivity change measure into the sources of productivity change to separately apply the base year adjustment and productivity forecast. We propose to do this by:
>
> - having regard to the partial factor productivity (PFP) differential in the base year together with information from category analysis benchmarking to gauge the scope of inefficiency to be removed by the base year adjustment
>
> - using the PFP change of the most efficient business (or highly efficient businesses as a group) to gauge the scope of further productivity that may be achieved by individual businesses— this assumes that relevant drivers (such as technical change and scale change) and their impact remain the same over the two periods considered (historical versus forecast).
>
> For some NSPs, future productivity gains may be substantially different from what they achieved in the past. For example, inefficient NSPs may significantly improve productivity and become highly efficient at the end of the sample period. This would reduce the potential for them to make further productivity gains in the following period. Similar issues apply to the productivity change achieved by the industry as a whole. If the group includes both efficient and inefficient NSPs, the industry-average productivity change may be higher than what an individual NSP can achieve. To the extent inefficient NSPs are catching up to the frontier, the industry average productivity change will include both the average moving closer to the frontier and the movement of the frontier itself. By decomposing productivity change into catching up to the frontier and frontier shift we can account for these.

AER's benchmarking assessment techniques

The assessment techniques the AER states that it will use for assessing opex and capex include economic benchmarking, category benchmarking and aggregated category benchmarking.[21]

In respect of economic benchmarking, the Expenditure Forecast Assessment Guideline states:[22]

> Economic benchmarking applies economic theory to measure the efficiency of a DNSP's use of inputs to produce outputs, having regard to operating environment factors. It will enable us to compare the performance of a DNSP with its own past performance and the performance of

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[19] Expenditure Forecast Assessment Guideline, p23.

[21] Expenditure Forecast Assessment Guideline, section 2.4.1.

[21] Expenditure Forecast Assessment Guideline, section 2.4.1.

[22] Expenditure Forecast Assessment Guideline, p13.

other DNSPs. We will apply a range of economic benchmarking techniques, including (but not necessarily limited to):

- *multilateral total factor productivity*

- *data envelopment analysis*

- *econometric modelling.*

In respect of category level benchmarking, the Expenditure Forecast Assessment Guideline states:[23]

We will benchmark across DNSPs by expenditure categories on a number of levels including:

- *total capex and total opex*

- *high level categories (drivers) of expenditure (for example customer driven capex or maintenance opex)*

- *subcategories of expenditure.*

We may benchmark further at the following low levels:

- *unit costs associated with given works (for example, the direct labour and material cost required to replace a pole)*

- *unit volumes associated with given works (for example, kilometres of conductor replaced per year).*

In respect of aggregated category benchmarking the Expenditure Forecast Assessment Guideline states:[24]

In addition to detailed category benchmarks we are likely to use aggregated category benchmarks, which capture information such as how much a DNSP spends per kilometre of line length or the amount of energy it delivers. We intend to improve these benchmarks by capturing the effects of scale and density on DNSP expenditures.

In its Expenditure Forecast Assessment Explanatory Statement, the AER states in respect of economic benchmarking and category analysis techniques:[25]

We consider the new assessment techniques will assist the AER's assessment of whether NSPs proposed expenditure is at efficient levels in the following ways:

- *Economic benchmarking techniques assist in assessing the efficiency of NSPs relative to their performance across time and against other NSPs. These techniques develop an efficient production frontier. From this, we can measure a NSP's relative productive performance in terms of its distance from that frontier. The techniques can control for the effects of scale, input mix, and operating environment factors for in measuring technical efficiency (that is, distance from the frontier).*

- *Category or driver-based analysis will assist in determining an efficient level of expenditure in a particular category of expenditure. The techniques included in this analysis include benchmarking, modelling and engineering reviews. We can use this analysis to contrast and compare factors influencing expenditure across NSPs.*

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[23] Expenditure Forecast Assessment Guideline, p13.

[24] Expenditure Forecast Assessment Guideline, p13.

[25] Expenditure Forecast Assessment Explanatory Statement, p13.

In addition, the Expenditure Forecast Assessment Explanatory Statement states in respect of economic benchmarking:[26]

> Economic benchmarking applies economic theory to measure the efficiency of a NSP's use of inputs to produce outputs, having regard to environmental factors. It will enable us to compare the performance of a NSP with its own past performance or the performance of other NSPs.
>
> We propose to take a holistic approach to using economic benchmarking techniques, but intend to apply them consistently. We will determine which techniques to apply at the time of determinations, rather than specify economic benchmarking techniques in our Guideline. This will allow us to refine our techniques over time.
>
> In determinations, we will use economic benchmarking models based on their intended use, and the availability and quality of data. Some models could be used to cross-check the results of other techniques. At this stage, it is likely we will apply multilateral total factor productivity (MTFP), data envelopment analysis (DEA) and an econometric technique to forecast opex. We anticipate including economic benchmarking in annual benchmarking reports.
>
> We are likely to use economic benchmarking to (among other things):
>
> 1. measure the rate of change in, and overall efficiency of, NSPs. This will provide an indication of the efficiency of historical expenditures and the appropriateness of their use in forecasts.
>
> 2. develop a top down total cost forecast of total expenditure.
>
> 3. develop a top down forecast of opex taking into account:
>
>   *   the efficiency of historical opex
>
>   *   the expected rate of change for opex.

The AER expands on its approach to economic benchmarking in Attachment A to the Expenditure Forecast Assessment Guideline and outlines its economic benchmarking data requirements in Attachment B to the Expenditure Forecast Assessment Guideline. We recommend that you review those Attachments.

The Expenditure Forecast Assessment Explanatory Statement states in respect of category level benchmarking:[27]

> Category level benchmarking allows us to compare expenditure across NSPs for categories at various levels of expenditure. It can inform us, for example, of whether a NSP's:
>
> *   base expenditure can be used for trend analysis
>
> *   forecast unit costs are likely to be efficient
>
> *   forecast work volumes are likely to be efficient
>
> *   forecast expenditure is likely to be efficient.
>
> Category level benchmarking may also provide information to NSPs on where they may achieve efficiencies in their operations. For these reasons, we consider category benchmarking is justified as it should improve the effectiveness of our assessment and may assist NSPs in improving their operations over time.

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[26] Expenditure Forecast Assessment Explanatory Statement, pp78-79.

[28] This information is available at http://www.aer.gov.au/node/24311 .

The AER outlines its proposed approach to assessing the different categories of opex and capex in section C of its Expenditure Forecast Assessment Explanatory Statement. We recommend that you review that Attachment.

AER's Economic benchmarking and category analysis reports

Consistent with its stated approach in its Expenditure Forecast Assessment Guideline and Expenditure Forecast Assessment Explanatory Statement, for the purposes of assessing DNSPs' expenditure forecasts (including opex forecasts) for their forthcoming regulatory control periods the AER has sought benchmarking and category analysis information from DNSPs. To this end the AER issued final regulatory information notices for economic benchmarking requirements on 28 November 2013 and final regulatory information notices for category analysis data requirements in March 2014.

ActewAGL's category analysis data for 2008-13 is included in its Subsequent Regulatory Proposal. In addition ActewAGL provided information to the AER in response to its benchmarking regulatory information notice.[28]

The AER released a draft *Electricity distribution network service providers, Annual benchmarking report* to ActewAGL and other DNSPs on a confidential basis in August 2014. The AER published its final *Electricity distribution network service providers, Annual benchmarking report* in November 2014.

The AER released a public version of its draft category analysis benchmarking metrics for DNSPs on 29 August 2014.

ActewAGL's approach to forecasting opex

For the 2014-19 regulatory period, ActewAGL has used the fourth year (2012-13) of the previous regulatory control period as the base year for forecasting opex where using a base year approach. Further details of ActewAGL's forecasting approach are contained in ActewAGL's Subsequent Regulatory Proposal (see section 8.7, from page 222).

AER's use of benchmarking in its draft ACT distribution decision

The AER concluded in the Draft Decision that it was not satisfied ActewAGL's forecast opex reasonably reflected the opex criteria. Accordingly, the AER rejected the forecast opex included in ActewAGL's building block proposal. The AER substituted ActewAGL's total opex forecast with the AER's total opex forecast, which it considered reasonably reflected the opex criteria.[29] The AER's draft decision in respect of opex is contained in Attachment 7 to the Draft Decision.

In assessing ActewAGL's forecast opex, the AER generally followed the approach set out in its Expenditure Forecast Assessment Guideline and Expenditure Forecast Assessment Explanatory Statement. Like ActewAGL, the AER used 2012-13 as the base year for its opex forecast, subject to its considerations in respect of efficiency adjustments.[30]

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[28] This information is available at http://www.aer.gov.au/node/24311 .

[29] Overview to Draft Decision, p51 and Attachment 7, p7-7.

[30] Attachment 7, p7-36.

The AER concluded that the main difference between its opex forecast and ActewAGL's forecast was the portion of opex in the base year that was efficient.[31] The AER's detailed analysis of ActewAGL's base year opex is contained in Appendix A to Attachment 7 to the Draft Decision.

In assessing base year opex, under clause 6.5.6(e)(12) of the NER the AER took into account the following two opex factors in addition to the factors specified in clauses 6.5.6(e)(4) to 6.5.6(e)(10):[32]

- the AER's benchmarking data sets including, but not limited to:

  o data contained in any economic benchmarking RIN, category analysis RIN, reset RIN or annual reporting RIN;

  o any relevant data from international sources; and

  o data sets that support econometric modelling and other assessment techniques consistent with the approach in the AER's Expenditure Forecast Assessment Guideline,

  as updated from time to time; and

- economic benchmarking techniques for assessing benchmark efficient expenditure including stochastic frontier analysis and regressions utilising functional forms such as Cobb Douglas and Translog.

The AER tested the efficiency of ActewAGL's historical opex using a combination of assessment techniques, including economic benchmarking. For the purpose of its Draft Decision and its distribution determinations in respect of NSW DNSPs, the AER engaged Economic Insights Pty Ltd (**Economic Insights**) to assist with the application of economic benchmarking and advise on:[33]

- whether the AER should make adjustments to base opex for the NSW and ACT DNSPs based on the results from economic benchmarking models; and

- the productivity change to be applied to forecast opex for the NSW and ACT DNSPs.

In its report, Economic Insights use a range of economic benchmarking methods to assess the relative opex cost efficiency of Australian DNSPs, including a Cobb Douglas stochastic frontier analysis opex cost function model, Cobb Douglas and Translog least squares econometrics (LSE) opex cost function models and multilateral total factor productivity (MTFP) and mutilateral partial factor productivity (MPFP) indexes.[34]

In assessing base year opex in the Draft Decision, the AER relied on the analysis in the Economic Insights Report to compare ActewAGL to its peers using those benchmarking techniques. The benchmarking results are described in Appendix A of Attachment 7 to the Draft Decision. The AER found that the benchmarking analysis undertaken by Economic Insights revealed that ActewAGL spends opex about 40 per cent as efficiently as the most efficient service providers in the NEM (CitiPower and Powercor) on

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[31] Overview to Draft Decision, p51.

[32] Attachment 7, p7-11 and p7-24.

[33] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014 (**Economic Insights Report**), piv. While the Draft Decision refers to an Economic Insights Report of October 2014 (see for example, footnote 35 of Appendix 7), the 17 November 2014 report is the report provided on the AER's website in connection with the Draft Decision. Accordingly, the references in this letter are to that report.

[34] Economic Insights Report, piv and Draft Decision, pp7-52 to 7-61.

four different measures.[35] The AER considered that other simpler benchmarking techniques such as partial performance indicators and category analysis corroborated those results.[36]The AER also examined potential sources of inefficiency or high costs that might explain the gap in performance between ActewAGL and its peers. This included consideration of ActewAGL's labour and workforce practices and vegetation management.[37]

Following its analysis of ActewAGL's forecast opex, the AER concluded that it was satisfied that it did not reasonably reflect the opex criteria and, accordingly, an adjustment was necessary. On the advice of Economic Insights the AER used results from its preferred benchmarking model, the Cobb Douglas Stochastic Frontier Analysis model, as a starting point for determining an alternative estimate of what it considered reasonably reflected base year opex.[38] However, rather than mechanistically applying the efficiency adjustment predicted by the model, the AER made three adjustments to the "raw" benchmarking results in favour of ActewAGL. The AER describes those adjustments in Attachment 7 to the Draft Decision as follows:[39]

> Rather than using the National Energy Market (NEM) frontier service provider, CitiPower, as the benchmark for efficiency comparisons, the first adjustment is to set a lower benchmark based on an average of the efficiency scores of the most efficient service providers in the NEM. This reduces the benchmark efficiency target by 9 percentage points to 0.86 from 0.95.

> The second adjustment is to modify the benchmark efficiency target to account for operating environment factors specific to the ACT. We are satisfied that a 30 per cent operating environment adjustment is appropriate for ActewAGL. This effectively reduces the benchmark efficiency target by 20 percentage points to 0.66.

> Additionally we have made a third adjustment because the Cobb Douglas SFA model efficiency scores represent ActewAGL's average efficiency for the benchmarking period. We have applied a trend to move the substitute base opex from a forecast of the average amount for the 2006 to 2013 period to a forecast for 2012–13, the base year. In trending the average amount forward, we have used essentially the same rate of change method we use to determine the trend component of our base step trend methodology. For this reason, the percentage reduction differs to the average efficiency score.

The AER also relied on economic benchmarking and the Economic Insights Report in determining the rate of change for opex. In assessing the output change component of the rate of change formula, the AER chose the same output change measures and weightings used in the Economic Insights Report.[40] Further, the AER based its forecast productivity on analysis in the Economic Insights Report and the AER's assessment of overall productivity trends for the forecast period.[41]

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[35] Overview to Draft Decision, p52 and Attachment 7, pp7-26 to 7-27.

[36] Overview to Draft Decision, p52 and Attachment 7, pp7-29 to 7-31, pp7-61 to 7-64 and p7-70.

[37] Overview to Draft Decision, p52 and Attachment 7 pp7-31 to 7-33 and pp7-77 to 7-89.

[38] Attachment 7, p 7-19, p7.27.

[39] Attachment 7, p7-27. See also Attachment 7, pp7-123 to 7-125. Further, the AER describes its analysis in respect of operating environment factors that require adjustments to the benchmarking results at pp7-90 to 7-122 of the Attachment 7 to the Draft Decision.

[40] Attachment 7, pp7-129 to 7-130 and pp7-138 to 7-139.

[41] Attachment 7, pp7-130 and pp7-139 to 7-143.

3. SCOPE OF WORK

Advisian is to provide ActewAGL with an expert report which addresses the following:

1. What are the fundamental technical differences between the ACT electricity distribution network and distribution networks in other states that form the top quartile of the AER's reported "efficiency frontier"? Comment on the impact of these technical differences on ActewAGL's opex relative to the "top quartile" distribution networks.

2. What differences in business practices exist between ActewAGL and other Australian DNSPs that affect how the reported opex and capex figures should be interpreted for benchmarking purposes? What is the impact of these differences in business practices on ActewAGL's opex relative to the "top quartile" DNSPs that form the AER's efficiency frontier?

3. What unique factors affect ActewAGL's distribution network relative to other Australian DNSPs which impact on the amount of forecast opex necessary to reasonably reflect the opex criteria in clause 6.5.6(c) of the NER? What is the impact of these factors on ActewAGL's opex relative to the "top quartile" DNSPs that form the AER's efficiency frontier?

4. What adjustments to base year operating costs does Advisian consider are relevant and necessary to reflect differences in technical characteristics, business practices and other circumstances and what is the value of these adjustments?

5. Provide an opinion on whether the approach taken by the AER for its proposed reduction to the regulatory opex allowance is reasonable in the context of the NER requirement that forecast opex for the regulatory control period reasonably reflect the opex criteria in clause 6.5.6(c) of the NER.

6. Any other matters Advisian considers relevant.

For the purpose of undertaking this work, we will provide you with a copy of the documents listed in Attachment A to this letter.

4. EXPERT WITNESS

ActewAGL anticipates providing a copy of Advisian's report to the AER in response to the AER's Draft Decision in respect of its Subsequent Regulatory Proposal.

To this end, ActewAGL has attached a copy of the Federal Court of Australia's Practice Note "Expert Witnesses in Proceedings in the Federal Court of Australia" (Attachment B). The Practice Note contains useful direction regarding the steps that should be taken by expert witnesses to ensure the veracity of their reports. ActewAGL requires Advisian to comply with the Practice Note in preparing its report.

A list of all documents provided to Advisian, as well as those documents relied on by Advisian, should be included in the expert report and those documents should be annexed to the report or, in the alternative, provided to ActewAGL if they were not provided to Advisian by ActewAGL.

In addition, you should attach a copy of your CV containing your qualifications and relevant experience to your expert report.

5. TIMING

ActewAGL requests Advisian to deliver its final report by 16 January 2015.

6. CONTACT

Usman Saadat, Manager of Regulatory Affairs, will be the day to day contact for Advisian in relation to the AER's benchmarking approach. Usman's contact details are:

Usman Saadat
Manager
Regulatory Affairs
ActewAGL
Phone: 02 6248 3806
Email: Usman.Saadat@actewagl.com.au

Please contact Usman if you have any questions regarding the preparation of your report.

Yours sincerely

David Graham

Director, Regulatory Affairs and Pricing

Attachment A

List of documents

1. ActewAGL's regulatory proposal for the subsequent regulatory control period (2015/162018/19) (resubmitted 10 July 2014).

2. AER, *Draft decision ActewAGL distribution determination 2015/16 to 2018/19* published on 27 November 2014 (**Draft Decision**), Overview.

3. AER, Draft Decision, Attachment 7: Operating Expenditure.

4. AER, Draft Decision, Economic Insights – benchmarking draft decision data sets - November 2014.

5. AER, Draft Decision, opex base year adjustment modelling files - November 2014.

6. AER, Draft Decision, opex model - November 2014.

7. AER, Draft Decision, category analysis metrics - November 2014.

8. AER, *Electricity distribution network service providers, Annual benchmarking report*, November 2014.

9. Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014.

10. Chapter 6 and Chapter 10 in version 58 of the National Electricity Rules.

11. Division 2 of Part ZW and Part ZY of Chapter 11 of the National Electricity Rules.

12. AER, *Better Regulation Expenditure Forecast Assessment Guideline for Electricity Distribution*, November 2013.

13. AER, *Final Regulatory Information Notice for Economic Benchmarking Requirements*, 28 November 2013

14. AER, *Better Regulation Explanatory Statement, Regulatory Information Notices to Collect Information for Economic Benchmarking*, November 2013.

Attachment B

Federal Court's Practice Note
"Expert Witness Proceedings in the Federal Court of Australia"

Appended separately.

Appendix B

Curriculum Vitae

Advisian

WorleyParsons Group

Bill Glyde
Principal

Overview

Bill has over 40 years' experience in electrical distribution, trading and generation. He has built on his early engineering experience to provide a bridge between the technical/ operational aspects and the commercial/customer service side of electrical supply. He has extensive experience in electricity pricing, forecasting, regulatory management, power purchasing, sales contracting and trading prior to joining Evans & Peck.

Bill has recently been joint lead consultant on reviews of the Northern Territory and Port Moresby Power Systems. These reviews have focused on providing a platform for significant reform of the systems going forward.

Since joining Evans & Peck, Bill acted as technical advisor to the Queensland Government's Independent Review of Electricity distribution and Service Delivery in the 21st Century. He was then retained by Government to oversee the implementation of the recommendations arising from that review, including formulation of policy and legislation relating to service standards, reliability and planning.

He has consulted extensively to the distribution and transmission sector in most Australian States, and much of this work has found its way into regulatory submissions. He has recently assisted Grid Australia in their response to the current Productivity Commission review of electricity issues.

Other consulting assignments have included the negotiation of transmission network support arrangements, including assistance with the application of the regulatory test applied under National Electricity Rules, negotiation of power purchase and connection arrangements relating to power projects, strategic advice on coal, gas and wind power station acquisition and development and ongoing reviews of reliability and planning standards.

Areas of Expertise

- Commercial Development
- Strategic Advice
- Commercial Due Diligence
- Forecasting
- Contract Negotiation

- Feasibility Analysis
- Regulatory Assistance
- Reliability Analysis
- Risk Analysis
- Project Management

Relevant Experience

Principal │ Advisian │ 2004 – Present

Development of Energy Sector Business

- Review of Northern Territory Power System including provision of independent forecasts
- Review of Port Moresby Power System
- Review of Western Power State of the Infrastructure report and Wood Pole performance
- Technical advisor to Independent Review of Qld's electricity distribution companies
- Strategic review – electricity network businesses
- Regulatory Assistance – Qld, SA, Tas, NSW, Vic, WA and NZ Network Revenue Reset
- Commercial due diligence – asset acquisitions.

General Manager, Manager, Business Development/Manager Trading │ Enertrade │ 2002 – 2004

- Structured deals including gas, network support and major electricity sale contracts
- Development of CSM/pipeline and base load power station in Townsville

Bill Glyde

Principal

- Management of Power Purchase Agreements relating to 2680 MW capacity.

Manager, Retail Markets/National Sales Manager │ NorthPower │ 1996 - 2000

- Contestable electricity Sales Strategy Development and Implementation in four states
- Franchise price formulation and implementation, including liaison with Independent Pricing and Regulatory Tribunal.

Manager, Energy Trading, Manager – Demand Management and Pricing/Engineer, Electricity Utilisation, Engineer, Pricing and Load Research │ Energy Australia │ 1983 – 1996

- Sales/demand forecasting including econometric modelling
- Pricing policy development and implementation, including rollout of TOU pricing
- Liaison with National Grid Management Council (NGMC), including membership of Market Trading Working Group (responsible for market design)
- Wholesale purchasing including initial vesting contracts, competitive contracts and power purchase agreements
- Load Research, including first end use local survey of residential energy consumption
- Demand management policy formulation and implementation
- Load research including commercial load analysis product
- Performed economic modelling and forecasting role.

Qualifications & Affiliations

- Bachelor of Engineering (Electrical) with Honours - NSW Institute of Technology
- Master of Commerce - University of NSW
- Master of Engineering Science (Partial Completion)
- Graduate - Australian Institute of Company Directors

Work History

2004 – Current	Principal, Advisian (formerly Evans & Peck), Brisbane
2002 – 2004	General Manager, Manager, Business Development/Manager Trading, Enertrade
1996 - 2000	Manager, Retail Markets/National Sales Manager, NorthPower
1983 – 1996	Manager, Energy Trading, Manager – Demand Management and Pricing/Engineer, Electricity Utilisation, Engineer, Pricing and Load Research, Energy Australia

Advisian
WorleyParsons Group

Evan Mudge
Associate

Overview

Evan has provided strategic consulting services to infrastructure clients across the Australia-Pacific region relating to major project investments, economic regulation, strategic asset management, risk management and project/capital governance frameworks.

With over 10 years of experience spanning over 25 Australian regulatory determinations, Evan has personally reviewed over $10b in capital expenditure on energy infrastructure and identified scope and cost efficiencies of over $2b. He has also assisted network businesses to prepare and optimise business cases for major ($100m+) and strategic infrastructure projects. His broad experience across project, contract and commercial management, engineering design, environmental approvals, pricing and economic regulation enables him to bring a unique combination of strategic thinking, commercial focus and pragmatism to his engagements.

Areas of Expertise

- Regulatory Advice
- Asset Strategy
- Cost Advisory
- Capital Program Review

- Risk Analysis
- Project Analysis & Evaluation
- Business Case Preparation
- Planning & Scheduling

Relevant Experience

Associate │ Advisian │ 2012 - Present

- Manage the preparation of TransGrid's response to the Economic Benchmarking and Revenue Reset Regulatory Information Notices that are required to support TransGrid's Revenue Proposal for the 2014/15 to 2018/19 period.
- Expert regulatory advice to regulated networks in NSW, Tasmania, Victoria, Queensland and ACT relating to cost estimation methodologies, replacement capex modelling, advanced metering infrastructure and regulatory submissions.
- Assessment of relative expenditure performance, asset intensity and the infrastructure burden placed on customers for each network serving the national electricity market.
- Explanation of the relative reliability performance trends of Australian electricity networks. Included comparison of different policy drivers and jurisdictional influences on reliability.
- Development of solar thermal commercialisation strategy and risk management plan for an Australian renewable energy technology developer.
- Development of contract management tools and performance incentive scheme for the primary coal haulage contract for a major coal-fired power station in NSW.

Consultant │ Asset & Regulatory Strategy │ Parsons Brinckerhoff │ 2008 – 2012

- Evaluate capital investment in energy network assets including reviewing over $10b in forward expenditure portfolios for the Australian Energy Regulator, Economic Regulation Authority of WA and network businesses (including Jemena, ActewAGL, United Energy, CitiPower/Powercor and ETSA Utilities) across all states of Australia, New Zealand and the Pacific. Recommended investment program adjustments totalling over $2b.
- Expert regulatory advice to energy networks including an independent assessment of the AER's Repex model as part of the Victorian Electricity Distribution Price Review.
- Provide business case advice and analysis to support strategic initiatives such as Ausgrid's successful bid for the $100m Federal Smart Grid Smart City program funding, investigating the

optimal ownership model for electricity network communications assets in the NBN and providing an independent review of project costs for the largest transmission line project in WA ($300m).

- Due diligence evaluation of generation assets and associated contractual arrangements to support potential acquisition, including review of fuel supply arrangements for the NSW governments Gentrader divestment for a top tier energy generator-retailer.

- Advise Papua New Guinean Independent Public Business Corporation on a remedial strategy to address generation and transmission reliability issues affecting the economic development of the Lae, Madang and Highlands regions of the country.

- Energy (electricity, gas, carbon, network) procurement advice for major infrastructure operations such as Sydney Airport, Fremantle Ports, Sydney Metro Authority and major generation facilities.

Business Analyst and Commercial Manager │Gridx Power │ 2007 – 2008

- Provide technical and commercial analysis of innovative energy generation projects and communicating business/project risks and opportunities to executive management, client representatives, project finance partners and potential equity investors, including:

- Negotiate fuel pricing arrangements, power purchase agreements, capital contributions, tariffs, equipment procurement and financing arrangements for innovative cogeneration/trigeneration (heat/power/cooling) projects.

- Quantify the financial, carbon and energy efficiency benefits and development of business case to facilitate investment decision making for the business/finance partners and clients.

- Optimise plant operation and equipment sizing (electricity/thermal and export sales) for optimal commercial and risk management outcomes.

- Develop pricing and contract terms in conjunction with the client's consultants to facilitate acceptable trade-offs between technical efficiency and commercial viability.

- Monitor wholesale and retail gas and electricity markets to ensure tariffs, operating schedules and business model remained viable in increasingly volatile markets.

- Provide commercial input to regulatory matters, including changes to the National Electricity Rules.

Research Engineer │ Sustainable Energy │ Bassett Applied Research (AECOM)│ 2006 – 2007

Conducted industry leading analysis of energy and carbon efficient building design initiatives using advanced numerical modelling techniques. Also undertook complex acoustical and vibration analysis to facilitate environmental planning and assessment requirements for major infrastructure projects.

Qualifications & Affiliations

- Bachelor of Engineering (Hons), University of Technology Sydney
- Master of Applied Finance, Macquarie University

Work History

2012 - Present	Associate, Advisian (formerly Evans & Peck)
2008 - 2012	Consultant – Asset & Regulatory Strategy, Parsons Brinckerhoff
2007 - 2008	Business Analyst and Commercial Manager, Gridx Power
2006 – 2007	Research Engineer – Sustainable Energy, Bassett Applied Research (AECOM)
2004 - 2005	Mechanical Engineer, GHD Mining & Industry

Appendix C

List of Reference Documents

Below is a list of the reference documents provided by ActewAGL Distribution.

1) ActewAGL's regulatory proposal for the subsequent regulatory control period (ActewAGL's regulatory proposal for the subsequent regulatory control period (2015/162018/19) (resubmitted 10 July 2014).

2) AER, *Draft Decision ActewAGL distribution determination 2015/16 to 2018/19* published on 27 November 2014 (**Draft Decision**), Overview.

3) AER, Draft Decision, Attachment 7: Operating Expenditure.

4) AER, Draft Decision, Economic Insights productivity files - November 2014.

5) AER, Draft Decision, Opex base year adjustment modelling files - November 2014.

6) AER, Draft Decision, Opex model - November 2014.

7) AER, *Electricity distribution network service providers, Annual benchmarking report*, November 2014.

8) Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014.

9) Chapter 6 and Chapter 10 in version 58 of the National Electricity Rules.

10) Division 2 of Part ZW and Part ZY of Chapter 11 of the National Electricity Rules.

11) AER, *Better Regulation Expenditure Forecast Assessment Guideline for Electricity Distribution*, November 2013.

12) AER, *Final Regulatory Information Notice for Economic Benchmarking Requirements*, 28 November 2013.

13) AER, *Better Regulation Explanatory Statement, Regulatory Information Notices to Collect Information for Economic Benchmarking*, November 2013.

Further documents referenced by Advisian are listed below. An electronic copy of these documents has been provided to ActewAGL Distribution.

1) 2009 Victorian Bushfires Royal Commission, *Response of the Municipal Association of Victoria ("MAV") and 77 Municipal Councils to the possible recommendation of the Royal Commission in relation to electric line clearance and hazardous trees*, 8 June 2010

2) AAD, *Operating and Capital Expenditure 'Site Visit' Clarifications – 2012-19 Subsequent Regulatory Control Period*, 3 October 2014

3) AAD, *STPIS Reliability Incentive Rates 2015-2019*, 30 May 2014

4) AEMC, *Rule Determination – National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 29 November 2012

5) AEMO, *Value of Customer Reliability Review Final Report*, September 2014

6) AER, *Benchmarking Fact sheet*, November 2014

7) AER, *Category Analysis Benchmarking Metrics for DNSP's*, 19 August 2014

8)   AER, *Consolidated EB RIN spreadsheet*

9)   AER DNSPs Economic Benchmarking RINS

10)   AER DNSPs Category Analysis RINs

11)   AER, *EBT DNSP PPI.xls*

12)   AER*, Final Decision ActewAGL Distribution Determination 2009-10 to 2013-14,* April 2009

13)   Advisian spreadsheet, *Advisian Opex Model Adjustments – January 2015.xlsm*

14)   CitiPower, *Cost Allocation Method,* 2010

15)   Economic Insights, *Economic Insights AER DNSP MTFP & MPFP 10Nov2014.xls*

16)   Economic Insights, *Opex base year adjustment_NSWACT_14Nov2014_final.xlsx*

17)   Evans & Peck, *Review of factors contributing to variations in operating and capital costs structures of Australian DNSPs*, November 2012

18)   Huegin Consulting, *Ergon Energy Expenditure Benchmarking Partial productivity and cost driver analysis and comparisons*, 17 October 2014

19)   Hydro One, *Annual Report 2013*

20)   Jemena, CitiPower, Powercor, AusNet, United Energy*, Transmission Connection Planning Report,* 2013

21)   Jemena, *Cost Allocation Methodology*, 2010

22)   London Economics, PowerNex Associates, *Density Study Results Stakeholder Consultation – Prepared for Hydro One Networks Inc.* October 19 2011

23)   National Electricity Rules, Version 65, 1 October 2014

24)   New Zealand Ministry for Primary Industries website http://www.biosecurity.govt.nz/publications/biosecurity-magazine/issue-82/aus-termites

25)   Ontario Distribution Sector Review Panel, *Renewing Ontario's Electricity Distribution Sector: Putting the Consumer First*, December 2012

26)   Powercor, *Cost Allocation Method*, 2010

27)   Qld Department of Natural Resources, Mines and Energy, *Detailed Report of the Independent Panel – Electricity Distribution and Service Delivery for the 21st Century*, July 2004

28)   SP AusNet, *Cost Allocation Method*, 2010

29)   The Lines Company Website, http://www.thelinescompany.co.nz/network

30)   United Energy, *Cost Allocation Methodology*, 2011 y