



**FINAL DECISION**  
**ActewAGL distribution**  
**determination**  
**2015–16 to 2018–19**

**Attachment 6 – Capital**  
**expenditure**

April 2015

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## Note

This attachment forms part of the AER's final decision on ActewAGL's revenue proposal 2015–19. It should be read with other parts of the final decision.

The final decision includes the following documents:

Overview

Attachment 1 - Annual revenue requirement

Attachment 2 - Regulatory asset base

Attachment 3 - Rate of return

Attachment 4 - Value of imputation credits

Attachment 5 - Regulatory depreciation

Attachment 6 - Capital expenditure

Attachment 7 - Operating expenditure

Attachment 8 - Corporate income tax

Attachment 9 - Efficiency benefit sharing scheme

Attachment 10 - Capital expenditure sharing scheme

Attachment 11 - Service target performance incentive scheme

Attachment 12 - Demand management incentive scheme

Attachment 13 - Classification of services

Attachment 14 - Control mechanism

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## Shortened forms

Shortened form	Extended form
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
augex	augmentation expenditure
capex	capital expenditure
CCP	Consumer Challenge Panel
CESS	capital expenditure sharing scheme
CPI	consumer price index
DRP	debt risk premium
DMIA	demand management innovation allowance
DMIS	demand management incentive scheme
distributor	distribution network service provider
DUoS	distribution use of system
EBSS	efficiency benefit sharing scheme
ERP	equity risk premium
Expenditure Assessment Guideline	Expenditure Forecast Assessment Guideline for electricity distribution
F&A	framework and approach
MRP	market risk premium
NEL	national electricity law
NEM	national electricity market
NEO	national electricity objective
NER	national electricity rules
NSP	network service provider
opex	operating expenditure
PPI	partial performance indicators
PTRM	post-tax revenue model
RAB	regulatory asset base
RBA	Reserve Bank of Australia
repex	replacement expenditure
RFM	roll forward model

Shortened form	Extended form
RIN	regulatory information notice
RPP	revenue and pricing principles
SAIDI	system average interruption duration index
SAIFI	system average interruption frequency index
SLCAPM	Sharpe-Lintner capital asset pricing model
STPIS	service target performance incentive scheme
WACC	weighted average cost of capital



## 6 Capital expenditure

Capital expenditure (capex) refers to the capital expenses incurred in the provision of standard control services. The return on and of forecast capex are two of the building blocks that form part of ActewAGL's total revenue requirement.<sup>1</sup>

This Attachment sets out our final decision on ActewAGL's proposed total forecast capex. Further detailed analysis is in the following appendices:

- Appendix A - Assessment Techniques
- Appendix B - Assessment of capex drivers
- Appendix C - Demand
- Appendix D - Consumption
- Appendix E - Real material cost escalation

### 6.1 Final decision

We are not satisfied that ActewAGL's revised total forecast capex of \$343.9 million (\$2013–14) for the 2014–2019 period reasonably reflects the capex criteria. We have substituted our estimate of ActewAGL's total forecast capex for the 2014–2019 period. We are satisfied that our substitute estimate of \$310.6 million (\$2013–14) reasonably reflects the capex criteria. Table 6-1 outlines our final decision.

**Table 6-1 Our final decision on ActewAGL's total forecast capex (million \$2013–14)**

	2014–15	2015–16	2016–17	2017–18	2018–19	Total
ActewAGL's revised proposal	74.5	63.6	72.8	69.4	63.5	343.9
AER final decision	72.3	61.1	65.3	56.5	55.4	310.6
Difference	-2.2	-2.4	-7.5	-13.0	-8.1	-33.3
Percentage difference (%)	-3%	-4%	-10%	-19%	-13%	-10%

Source: ActewAGL Regulatory Proposal; AER analysis

Note: Numbers may not add up due to rounding.

A summary of our reasons and findings that we present in this Attachment are set out in Table 6-2.

These reasons include our responses to stakeholders' submissions on ActewAGL's revised regulatory proposal. In the table we present our reasons largely in relation to

<sup>1</sup> NER, clause 6.4.3(a).

'capex drivers' such as augex and repex. This reflects the way in which we tested ActewAGL's proposed total forecast capex. Our testing used techniques tailored to the different capex drivers taking into account the best available evidence. The outcomes of some of our techniques revealed that some aspects of ActewAGL's proposal such as non-network capex, were consistent with the NER requirements in that they reasonably reflect the efficient costs of a prudent operator as well as a realistic expectation of the demand forecasts and cost inputs required to achieve the capex objectives. We found that other aspects of ActewAGL's proposal associated with some capex drivers, in particular repex and non-network expenditure, revealed inefficiency and were inconsistent with the NER requirements. Consequently, our findings on repex largely explain why we are not satisfied with ActewAGL's proposed total forecast capex.

Our findings on the capex associated with specific capex drivers are part of our broader analysis and are not intended to be considered in isolation. Our final decision concerns ActewAGL's total forecast capex for the 2014-19 period. We do not approve an amount of forecast expenditure for each capex driver. However, we do use our findings on the different capex drivers to arrive at a substitute estimate for total capex because as a total, this amount has been tested against the NER requirements. We are satisfied that our estimate represents total forecast capex that as a whole reasonably reflects all aspects of the capex criteria.

**Table 6-2 Summary of AER reasons and findings**

Issue	Reasons and findings
Forecasting methodology, key assumptions and past capex performance	<p>Our concerns with ActewAGL's forecasting methodology and key assumptions are material to our view that we are not satisfied that its proposed total forecast capex reasonably reflects the capex criteria.</p> <p>Despite the presence of some top down assessment techniques, we conclude that ActewAGL's forecasting methodology predominately relies upon a bottom-up build (or bottom-up assessment) to estimate the forecast expenditure and that the top-down constraints imposed by its governance process are insufficient for us to be able to conclude that the forecasts are prudent and efficient. Bottom up approaches have a tendency to overstate required allowances as they do not adequately account for inter-relationships and synergies between projects or areas of work. In the absence of a strong top-down challenge of the aggregated total of bottom-up projects, simply aggregating such estimates is unlikely to result in a total forecast capex allowance that we are satisfied reasonably reflects the capex criteria.</p> <p>In constructing our alternative estimate we have addressed the concerns we have with ActewAGL's forecasting methodology and key assumptions. Specifically, we have undertaken a top down assessment by applying our assessment techniques of economic benchmarking, trend analysis and an engineering (technical) review. We have also addressed the deficiencies in ActewAGL's key assumptions about forecast materials escalation rates and labour escalation rates..</p>
Augmentation capex	<p>We do not accept ActewAGL's revised proposed augex of \$67.5 million. We have instead included in our alternative estimate forecast augex of \$47 million (\$2013-14). In coming to this view, we:</p> <ul style="list-style-type: none"> <li>consider that ActewAGL's forecast of \$22.7 million for the Molonglo zone substation is not justified on the basis of the information provided by ActewAGL and our analysis. Instead, we have included a forecast of \$2.3 million to extend the Woden feeder because our analysis suggests this is the most cost effective solution to supply the expected growth in the Molonglo district during the 2014-19 period.</li> </ul>

- accept ActewAGL's forecast expenditure for the zone substation earth grid upgrade, Gold Creek 11kV switchboard extension and Mitchell zone substation land purchase based on the further evidence it provided in its revised proposal.

Customer connections capex

We accept Actew AGL's revised proposal of \$77.6 million for customer connections capex and \$25.2 million (\$2013-14) proposed customer contributions forecast. We consider that Actew AGL's proposed connections capex is consistent with key indicators of construction activity in the ACT. Additionally, we accept Actew AGL's decision to remove customer-initiated replacements and relocation services to ensure that customers should fund individual services for which they solely benefit.

Asset replacement capex (repex)

We do not accept ActewAGL's revised proposed repex forecast of \$112.3 million (\$2013-14), excluding overheads. We have instead included in our alternative estimate an amount of \$104.6 million (\$2013-14), excluding overheads. Our estimate is 6.8 per cent lower than ActewAGL's revised proposal. This reduction reflects the outcomes of our predictive modelling and review of ActewAGL's major repex projects.

We are satisfied our alternative estimate reasonably reflects the capex criteria. It includes:

1. \$76.6 million of expenditure for five modelled asset categories that is based on ActewAGL's own 'business as usual' asset management practices, its current tolerance for risk and its proposed forecast unit costs;
2. ActewAGL's proposed forecast repex of \$6.9 million for supervisory control and data acquisition (SCADA), and \$9.6 million for other assets, in addition to \$11.5 million for overhead conductors and pole top structures that reflects an increase in repex for pole top structures which is offset by a decrease in opex

Non-network capex

We accept ActewAGL's revised non-network capex proposal of \$57.3 million (\$2013-14). This forecast is slightly higher than ActewAGL's initial proposal, which we accepted in our draft decision, as it corrects for errors identified by ActewAGL in its initial non-network capex proposal. ActewAGL has forecast a significant reduction in non-network capex in the 2014–2019 period.

Capitalised overheads

We accept ActewAGL's proposed capitalised overheads of \$52.2 million on the basis of information that it provided that its total overheads are fixed.

Logically, we consider that reductions in ActewAGL's total forecast expenditure should see some reduction in the size of overheads. However, without sufficiently robust evidence of this, we have not made such an adjustment.

Real cost escalators

We are not satisfied that ActewAGL's revised proposed real material cost escalators (leading to cost increases above CPI) which form part of its total forecast capex reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period. We maintain our view, as set out in our draft decision, that zero per cent real cost escalation is reasonably likely to reflect the capex criteria including that it is likely to reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period.

Consistent with our position in the draft decision, our approach to real materials cost escalation does not affect the proposed application of labour and construction cost escalators which apply to ActewAGL's forecast capex for standard control services.

We do not accept ActewAGL's labour cost escalators in its revised proposal. We have applied the approach to labour escalation as set out in Attachment 7.

Source: AER analysis

We consider that our overall capex forecast addresses the revenue and pricing principles. In particular, we consider that ActewAGL has been provided a reasonable opportunity to recover at least the efficient costs it incurs in:<sup>2</sup>

- Providing direct control network services,
- Complying with its regulatory obligations and requirements.

As set out in appendix B we are satisfied that our overall capex forecast is consistent with the NEO in that our decision promotes efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity. Further, in making our final decision, we have specifically considered the impact our decision will have on the safety and reliability of ActewAGL's network. We consider this capex forecast is sufficient for a prudent and efficient service provider in ActewAGL's circumstances to be able to maintain the safety, service quality, security and reliability of its network consistent with its current obligations.

## 6.2 ActewAGL's revised proposal

ActewAGL's revised regulatory proposal includes a total forecast capex of \$341.0 million (\$2013–14) for the 2014–2019 period. This is 41 per cent higher than our draft decision, and 8 per cent lower than ActewAGL's initial regulatory proposal.

Figure 6-1 shows the difference between ActewAGL's initial proposal, its revised proposal and our draft and final decisions for the 2014–2019 period, as well as the actual capex that ActewAGL spent during the 2009–2014 regulatory control period. ActewAGL submits the reasons for the reduction between its initial and revised proposal are due to:<sup>3</sup>

- A reduction in augex of \$17.5 million, due to revised demand forecasts which indicate that a third transformer at the Belconnen zone substation is not likely to be required during the 2014-19 period, and the inclusion of updated cost estimates for the Molonglo zone substation and the zone substation earth grids refurbishment project.
- A reduction in the total capex forecast of \$5.2 million attributed to revised cost escalators.
- A proportionate reduction in capitalised overheads of \$4.1 million associated with a reduced capital works program for the 2014–19 period .
- An increase in non-network capex of \$4.2 million to reflect the corporate cost allocation associated with Operating Systems Replacement Program (OSRP) phase 2 that was omitted from the forecast of ICT expenditure and non-network capex.

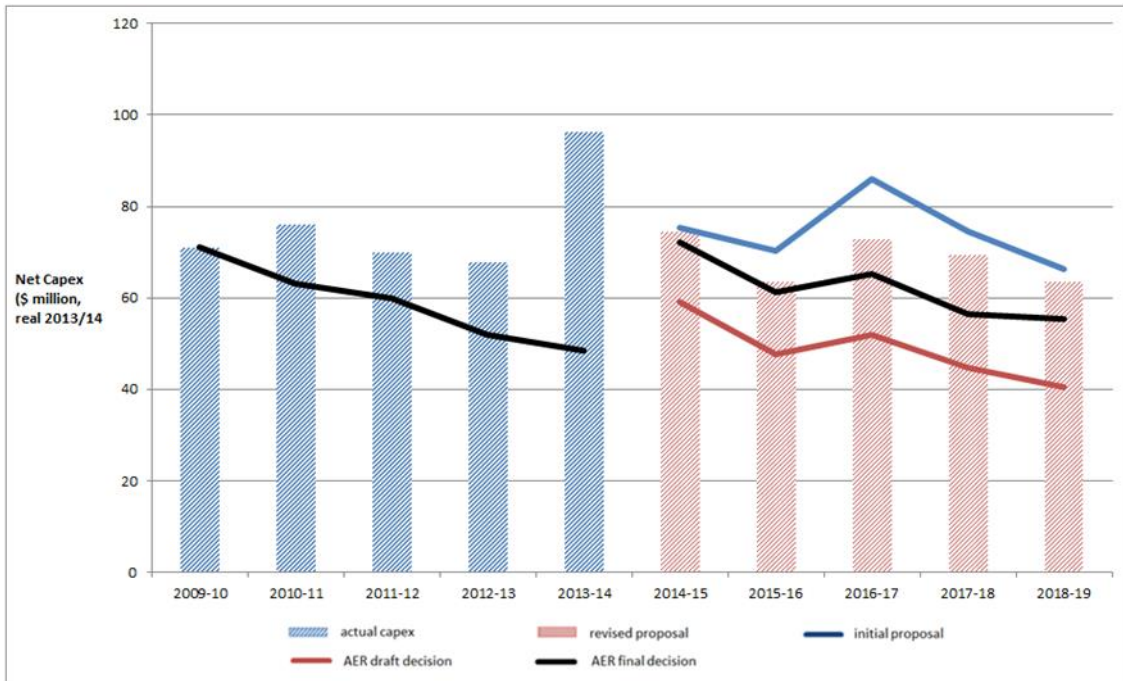
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<sup>2</sup> NEL, sections 7A.

<sup>3</sup> ActewAGL Revised regulatory proposal, January 2015, p. 276.

- A reduction in relocations capex of \$3.1 million that should have been classified as alternative control services in ActewAGL's initial regulatory proposal.
- Inclusion of vehicle disposals of \$2.9 million previously omitted from ActewAGL's initial regulatory proposal .
- A decrease in total capex of \$2.5 million to reflect the adjustment in CPI between ActewAGL's initial regulatory proposal (3.25 per cent) and this revised proposal (2.71 per cent).

**Figure 6-1 ActewAGL's total actual and forecast capex 2009–2019**



Source: AER analysis

### 6.3 Assessment approach

This section outlines our approach to capex assessments. It sets out the relevant legislative and rule requirements, outlines our assessment techniques, and explains how we build an alternative estimate of total forecast capex against which we compare that proposed by the service provider. The starting point of our assessment is the information provided by ActewAGL in its revised proposal. At the same time as ActewAGL submitted its proposal, it also submitted its response to our RIN. We have also sought further clarification from ActewAGL of some aspects of its revised proposal through information requests.

Our assessment approach involves two key steps:

- First, our starting point for building an alternative estimate is ActewAGL's revised proposal.<sup>4</sup> We apply our various assessment techniques, both qualitative and quantitative, to assess the different elements of ActewAGL's proposal at the total level and at the capex driver level such as its proposed augmentation expenditure and replacement expenditure. This analysis not only informs our view on whether ActewAGL's proposal reasonably reflects the capex criteria set out in the NER<sup>5</sup> but it also provides us with an alternative forecast that does meet the criteria. In arriving at our alternative estimate, we have had to weight the various techniques used in our assessment.
- Second, having established our alternative estimate of the *total* forecast capex, we can test ActewAGL's proposed total forecast capex. This includes comparing our alternative estimate total with the service provider's proposal total. If there is a difference between the two, we may need to exercise our judgement as to what is a reasonable margin of difference.

If we are satisfied that ActewAGL's proposal reasonably reflects the capex criteria, we accept it. If we are not satisfied, the NER require us to put in place a substitute estimate which we are satisfied reasonably reflects the capex criteria. Where we have done this, our substitute estimate is based on our alternative estimate.

The capex criteria are:

- the efficient costs of achieving the capital expenditure objectives
- the costs that a prudent operator would require to achieve the capital expenditure objectives
- a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.

The AEMC noted that '[these criteria broadly reflect the NEO [National Electricity Objective]'.<sup>6</sup> The capital expenditure objectives (capex objectives) referred to in the capex criteria, are to:<sup>7</sup>

- meet or manage the expected demand for standard control services over the period
- comply with all regulatory obligations or requirements associated with the provision of standard control services
- to the extent that there are no such obligations or requirements, maintain service quality, reliability and security of supply of standard control services and maintain the reliability and security of the distribution system

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<sup>4</sup> AER, Expenditure Forecast Electricity Distribution Guideline, November 2013, p. 9; see also AEMC, Economic Regulation Final Rule Determination, pp. 111 and 112.

<sup>5</sup> NER, cl. 6.5.7(c).

<sup>6</sup> AEMC Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, 29 November 2012, p. 113 (AEMC Economic Regulation Final Rule Determination).

<sup>7</sup> NER, clause 6.5.7(a).

- maintain the safety of the distribution system through the supply of standard control services.

Importantly, our assessment is about the total forecast capex and not about particular categories or projects in the capex forecast. The Australian Energy Market Commission (AEMC) has described our role in these terms:<sup>8</sup>

It should be noted here that what the AER approves in this context is expenditure allowances, not projects.

In deciding whether we are satisfied that ActewAGL's proposed total forecast capex reasonably reflects the capex criteria, we have regard to the capex factors. The capex factors are:<sup>9</sup>

- the AER's most recent annual benchmarking report and benchmark capex that would be incurred by an efficient distribution network service provider (distributor) over the relevant regulatory control period
- the actual and expected capex of the distributor during the preceding regulatory control periods
- the extent to which the capex forecast includes expenditure to address the concerns of electricity consumers as identified by the distributor in the course of its engagement with electricity consumers
- the relative prices of operating and capital inputs
- the substitution possibilities between operating and capital expenditure
- whether the capex forecast is consistent with any incentive scheme or schemes that apply to the distributor
- the extent to which the capex forecast is referable to arrangements with a person other than the distributor that, in the opinion of the AER, do not reflect arm's length terms
- whether the capex forecast includes an amount relating to a project that should more appropriately be included as a contingent project
- the extent to which the distributor has considered, and made provision for, efficient and prudent non-network alternatives.
- In addition, the AER may notify the distributor in writing, prior to the submission of its revised regulatory proposal, of any other factor it considers relevant.<sup>10</sup> We have not had regard to any additional factors in this final decision for ActewAGL.

In taking these factors into account, the AEMC has noted that:<sup>11</sup>

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<sup>8</sup> AEMC Economic Regulation Final Rule Determination, p. vii.

<sup>9</sup> NER, clause 6.5.7(e).

<sup>10</sup> NER, clause 6.5.7(e)(12).



...this does not mean that every factor will be relevant to every aspect of every regulatory determination the AER makes. The AER may decide that certain factors are not relevant in certain cases once it has considered them.

For transparency and ease of reference, we have included a summary of how we have had regard to each of the capex factors in our assessment at the end of this attachment.

More broadly, we also note that in exercising our discretion, we take into account the revenue and pricing principles which are set out in the NEL.<sup>12</sup>

## **Expenditure Assessment Guidelines**

The rule changes the AEMC made in November 2012 require us to make and publish an Expenditure Forecast Assessment Guideline for Electricity Distribution, released in November 2013 (Expenditure Guideline).<sup>13</sup> We undertook extensive consultation with stakeholders in the preparation of the Expenditure Guideline. The Expenditure Guideline sets out the AER's proposed general approach to assessing capex (and opex) forecasts. The rule changes also require us to set out our approach to assessing capex in the relevant framework and approach paper. For ActewAGL, our framework and approach paper (published in January 2014) stated that we would apply the Guideline, including the assessment techniques outlined in it.<sup>14</sup> We may depart from our Expenditure Guideline approach and if we do so, we need to explain why. In this determination we have not departed from the approach set out in our Expenditure Guideline.

We note that the RIN data forms part of a distributor's regulatory proposal.<sup>15</sup> In our Expenditure Guidelines we set out that we would "require all the data that facilitate the application of our assessment approach and assessment techniques" and the RIN we issued in advance of a service provider lodging its regulatory proposal would specify the exact information required.<sup>16</sup> Accordingly, we consider that our intention to materially rely upon the RIN data was made clear as part of the Expenditure Guidelines.

### **6.3.1 Building an alternative estimate of total forecast capex**

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<sup>11</sup> AEMC, Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, 29 November 2012, p. 115.

<sup>12</sup> NEL, sections 7A and 16(2).

<sup>13</sup> AEMC, Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, 29 November 2012, p. 114 and AER Expenditure Forecast Electricity Distribution Guideline.

<sup>14</sup> AER, ActewAGL Framework and approach paper, p.35.

<sup>15</sup> NEL, clause 6.8.2(c2) and (d).

<sup>16</sup> AER, Expenditure Forecast Electricity Distribution Guideline, p. 25.



Our starting point for building an alternative estimate is ActewAGL's revised proposal.<sup>17</sup> We then considered its performance in the previous regulatory control period to inform our alternative estimate. We also reviewed its proposed forecast methodology and its reliance on key assumptions that underlie its forecast.

We have maintained in our final decision the use of the specific techniques that we used in our draft decision. Many of our techniques encompass the capex factors that we are required to take into account. Further details on each of these techniques is included in Appendix A and Appendix B.

Some of these techniques focus on total capex; others focus on high level, standardised sub-categories of capex. Importantly, the techniques that focus on sub-categories are not conducted for the purpose of determining at a detailed level what projects or programs of work the service provider should or should not undertake. They are but one means of assessing the overall total forecast capex required by the service provider. This is consistent with the regulatory framework and the AEMC's statement that the AER does not approve specific projects but rather an overall revenue requirement that includes total capex forecast.<sup>18</sup> Once we approve total revenue, which will be determined by reference to our analysis of the proposed capex, the service provider is then able to prioritise its capex program given the prevailing circumstances at the time (such as demand and economic conditions that impact during the regulatory period). Some projects or programs of work that were not anticipated may be required. Equally likely, some of the projects or programs of work that the service provider has proposed for the regulatory control period may not ultimately be required in the regulatory period. We consider that a prudent and efficient service provider would consider the changing environment throughout the regulatory control period and make sound decisions taking into account their individual circumstances.

As explained in our Guidelines:

Our assessment techniques may complement each other in terms of the information they provide. This holistic approach gives us the ability to use all of these techniques, and refine them over time. The extent to which we use each technique will vary depending on the expenditure proposal we are assessing, but we intend to consider the inter-connections between our assessment techniques when determining total capex ... forecasts. We typically would not infer the findings of an assessment technique in isolation from other techniques.<sup>19</sup>

In arriving at our estimate, we have had to weight the various techniques used in our assessment. How we weight these techniques will be determined on a case by case basis using our judgement as to which techniques are more robust, in the particular

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<sup>17</sup> AER, Expenditure Forecast Electricity Distribution Guideline, p. 9; see also AEMC, Economic Regulation Final Rule Determination, pp. 111 and 112.

<sup>18</sup> AEMC, Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, 29 November 2012, p. vii.

<sup>19</sup> AER, Expenditure Forecast Electricity Distribution Guideline, p. 12.

circumstances of each assessment. By relying on a number of techniques and weighting as relevant, we ensure we can take into consideration a wide variety of information and can take a holistic approach to assessing the proposed capex forecast.

Where our techniques involve the use of a consultant, to the extent that we accept our consultants' findings, we have set this out clearly in this final decision and they form part of our reasons for arriving at our final decision on overall capex. In all cases where we have relied on the findings of our consultants, we have done so only after carefully reviewing their analysis and conclusions, and evaluating these in the light of the outcomes from our other techniques and our examination of the distributor's proposal.

We also need to take into account the various interrelationships between the total forecast capex and other components of a service provider's distribution determination. The other components that directly affect the total forecast capex are forecast opex, forecast demand, the service target performance incentive scheme, the capital expenditure sharing scheme, real cost escalation and contingent projects. We discuss how these components impact the total forecast capex in 6.4.5.

Underlying our approach are two general assumptions:

- The capex criteria relating to a prudent operator and efficient costs are complementary such that prudent and efficient expenditure reflects the lowest long-term cost to consumers for the most appropriate investment or activity required to achieve the expenditure objectives.<sup>20</sup>
- Past expenditure was sufficient for ActewAGL to manage and operate its network in that previous period, in a manner that achieved the capex objectives.<sup>21</sup>

After applying the above approach, we arrive at our alternative estimate of the total capex forecast.

### **6.3.2 Comparing the service provider's proposal with our alternative estimate**

Having established our alternative estimate of the total forecast capex, we can test ActewAGL's proposed total forecast capex. This includes comparing our alternative estimate with its proposal. ActewAGL's forecast methodology and its key assumptions may explain any differences between our alternative estimate and its proposal.

As the AEMC foreshadowed, we may need to exercise our judgement in determining whether any 'margin of difference' is reasonable.<sup>22</sup>

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<sup>20</sup> AER Expenditure Forecast Electricity Distribution Guideline, pp. 8 and 9.

<sup>21</sup> AER Expenditure Forecast Electricity Distribution Guideline, p. 9.

<sup>22</sup> AEMC, Economic Regulation Final Rule Determination, p. 112.

The AER could be expected to approach the assessment of a NSP's expenditure (capex or opex) forecast by determining its own forecast of expenditure based on the material before it. Presumably this will never match exactly the amount proposed by the NSP. However there will be a certain margin of difference between the AER's forecast and that of the NSP within which the AER could say that the NSP's forecast is reasonable. What the margin is in a particular case, and therefore what the AER will accept as reasonable, is a matter for the AER exercising its regulatory judgment.

We have not relied solely on any one technique to assist us in forming a view as to whether we are satisfied that a service provider's proposed forecast capex reasonably reflects the capex criteria. We have drawn on a range of techniques as well as our assessment of other elements that impact upon capex such as demand and real cost escalators.

Our decision concerns ActewAGL's total forecast capex and we are not approving specific projects. It is important to recognise that the service provider is not precluded from undertaking unexpected capex works, if the need arises, and despite the fact that such works did not form part our assessment in this determination. We consider that a prudent and efficient service provider would consider the changing environment throughout the regulatory control period and make sound decisions taking into account their individual circumstances to address any unanticipated issues. Our assessment of a total capex forecast does not constrain a service provider's actual spending – either as a cap or as a requirement that the forecast be spent on specific projects or activities. It is conceivable that a service provider might wish to expend particular capital expenditure differently or in excess of the total capex forecast set out in our this decision. Our decision does not constrain it from doing so.

The regulatory framework has a number of mechanisms to deal with unanticipated expenditure needs. Importantly, where unexpected events leads to an overspend of the approved capex forecast, a service provider does not bear the full cost, but rather bears 30 per cent of this cost, if the expenditure is found to be prudent and efficient. Further, for significant unexpected capex, the pass-through provisions provide a means for a service provider to pass on such expenses to customers where appropriate.

This does not mean that we have set our alternative estimate below the level where ActewAGL has a reasonable chance to recover its efficient costs. Rather, we note that ActewAGL is able to respond to any unanticipated issues that arise during the 2014-19 regulatory control period and in the event that the approved total revenue underestimates the total capex required, ActewAGL has significant flexibility to allow it to meet its safety and reliability obligations.

Conversely, if we overestimate the amount of capex required, the stronger incentives put in place by the AEMC in 2012 should lead to a distributor spending only what is efficient, with the benefits of the underspend being shared between the distributor and consumers.

## **6.4 Reasons for final decision**

We applied the assessment approach set out in section 6.3 to ActewAGL. We are not satisfied that ActewAGL's total forecast capex reasonably reflects the capex criteria. We compared ActewAGL's capex forecast to a capex forecast we constructed using the approach and techniques outlined in Appendix A and Appendix B. ActewAGL's proposal is materially higher than ours. We are satisfied that our alternative estimate reasonably reflects the capex criteria.

Table 6-3 sets out the capex amounts by capex driver that we have included in our alternative estimate of ActewAGL's total forecast capex for the 2014–2019 period.

**Table 6-3 Our assessment of required capex by capex driver (\$ million 2013–14)**

Category	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Augmentation	7.2	8.9	14.7	8.7	7.5	47.1
Connections	16.2	15.6	13.8	15.0	17.0	77.6
Replacement	20.4	21.8	21.8	21.1	19.5	104.6
Reliability and Quality Improvements	1.3	1.2	2.3	1.6	0.2	6.7
Non-Network	23.5	10.5	8.1	6.0	9.2	57.3
Capitalised overheads	10.2	10.0	11.1	10.9	10.1	52.3
Materials escalation adjustment	-0.7	-0.8	-1.1	-0.8	-1.2	-4.5
<b>TOTAL GROSS CAPEX (includes capcons)</b>	<b>78.2</b>	<b>67.2</b>	<b>70.7</b>	<b>62.5</b>	<b>62.3</b>	<b>341.0</b>
capcons	5.1	5.1	4.5	4.9	0.0	25.2
Capitalised overheads capcons	0.9	1.0	0.9	1.1	1.3	5.2
<b>NET CAPEX (excludes capcons)</b>	<b>72.3</b>	<b>61.1</b>	<b>65.3</b>	<b>56.5</b>	<b>55.4</b>	<b>310.6</b>

Source: AER analysis

Note: Numbers may not add up due to rounding.

Our assessment of ActewAGL's forecasting methodology, key assumptions and past capex performance is discussed in the section below.

Our assessment of capex drivers is in Appendix B. This sets out the application of our assessment techniques to the capex drivers, and the weighting we gave to particular techniques. We used our reasoning in the appendices to form our alternative estimate.

### 6.4.1 Key assumptions

The NER require ActewAGL to include in its regulatory proposal the key assumptions that underlie its proposed forecast capex and a certification by its directors that those

key assumptions are reasonable.<sup>23</sup> ActewAGL's key assumptions are set out in its regulatory proposal.<sup>24</sup>

We have assessed ActewAGL's key assumptions in the appendices to this capex attachment.

## 6.4.2 Forecasting methodology

ActewAGL is required to inform us about the methodology it proposes to use to prepare its forecast capex allowance before it submits its regulatory proposal.<sup>25</sup> It is also required to include this information in its regulatory proposal.<sup>26</sup> The main points of ActewAGL's forecasting methodology are set out in its regulatory proposal.<sup>27</sup>

In its revised proposal, ActewAGL provided additional details regarding its forecast methodology stating that it undertook an assessment of total system expenditure, which incorporates many aspects of a 'top-down assessment' methodology.<sup>28</sup> ActewAGL submits this was achieved by:<sup>29</sup>

- undertaking a trend analysis against expenditure in past regulatory control periods;
- considering all potential capex-opex trade-offs;
- applying appropriate capital governance and risk management procedures; and
- ensuring expenditure forecasts suffice to meet all relevant regulatory requirements.

In our draft decision, we identified two aspects of ActewAGL's forecasting methodology which indicated that its methodology is not a sufficient basis on which to conclude that its proposed total forecast capex reasonably reflects the capex criteria. These were:

- ActewAGL's forecasting methodology applies a bottom-up build (or bottom-up assessment) to estimate the forecast expenditure for all its capex categories (except for information and communications technology).<sup>30</sup>
- ActewAGL's cost-benefit evaluation of each of its capital projects or programs reveals that its underlying risk assessment is excessively conservative.<sup>31</sup>

ActewAGL considers the AER's adverse conclusions regarding its forecasting methodology are unfounded.<sup>32</sup> ActewAGL considers that it has demonstrated that it:<sup>33</sup>

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<sup>23</sup> NER, clauses S6.1.1(4) and (5); ActewAGL, Regulatory Proposal, Attachments A6 and F4.

<sup>24</sup> ActewAGL, *Regulatory Proposal*, p 54; ActewAGL, Regulatory Proposal, Attachment 0.06.

<sup>25</sup> NER, clauses 6.8.1A and 11.56.4(o); ActewAGL, Electricity Distribution Network Expenditure Forecasting Methodology, November 2013.

<sup>26</sup> NER, clause S6.1.1(2); ActewAGL, Regulatory Proposal, June 2014, pp 161–166 and Attachment B19.

<sup>27</sup> ActewAGL, *Regulatory Proposal*, January 2015, Attachment B9.

<sup>28</sup> ActewAGL, *Revised Regulatory Proposal*, January 2015, p.284.

<sup>29</sup> ActewAGL, Revised Regulatory Proposal, January 2015, p.284.

<sup>30</sup> AER, Draft Decision ActewAGL distribution determination 2015-2019, November 2014, Attachment 6, pp. 6-19.

<sup>31</sup> AER, Draft Decision ActewAGL distribution determination 2015-2019, November 2014, Attachment 6, p. 6-20.

<sup>32</sup> ActewAGL, Revised Regulatory Proposal, January 2015, p. 283.

<sup>33</sup> ActewAGL, Revised Regulatory Proposal, January 2015, p.273.

undertook a top-down, holistic assessment, including trend analysis and an assessment of capex/opex trade-offs, of its capex forecasts proposed in its regulatory proposal for the subsequent regulatory period on the basis of bottom up build, and its network planning criteria are appropriate and deliver comparable results with those of other distributors operating in the NEM.

ActewAGL also disagrees that a top-down assessment is a critical factor in assessing efficiency. ActewAGL considers that top down assessment techniques, such as trend analysis that rely on historic expenditure, are likely to provide limited evidence of the efficiency of forecast capex given the generally non-recurrent and lumpy nature of capex. It submits that this is particularly so for augex for which the economic justification for individual projects and work areas that underlies a bottom up build is critical to assessing efficiency.<sup>34</sup>

We re-examined ActewAGL's forecasting approach and acknowledge that elements of a top down assessment were applied in the formulation of its regulatory proposal. This has partially alleviated our concerns with ActewAGL's forecasting approach. However, despite the presence of some top down assessment techniques, ActewAGL's forecasting methodology predominately relies upon a bottom-up build (or bottom-up assessment) to estimate the forecast expenditure for all its capex categories (except for information and communications technology). Bottom up approaches have a tendency to overstate required allowances as they do not adequately account for inter-relationships and synergies between projects or areas of work. Simply aggregating such estimates is unlikely to result in a total forecast capex allowance that we are satisfied reasonably reflects the capex criteria. We therefore maintain our view that its methodology is not a sufficient basis on which to conclude that its proposed total forecast capex reasonably reflects the capex criteria. Our review and findings reflects the submission made by the National Generators Forum:<sup>35</sup>

Historically, regulatory assessments of capital expenditure programs have predominantly incorporated bottom up assessments of a sample of projects and / or programs, with minimal top down assessment of the overall level of capex, underlying drivers and impacts on network prices. Given the substantial information asymmetry between distributors and regulators, past approaches have had limited success in determining an efficient overall level of capex for NSW distributors. It is far more difficult for a regulator to reject capital expenditure proposals on an individual project-by-project basis compared to setting a top down overall efficient level of capex within which distributors can prioritise individual projects.

### 6.4.3 Interaction with the STPIS

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<sup>34</sup> ActewAGL, Revised Regulatory Proposal, January 2015,pg. 284.

<sup>35</sup> National Generators Forum, Submission to the Revenue Determinations (2014–2019) of the NSW Distribution Network Service Providers, p. 9.

We consider that our approved capital expenditure forecast is consistent with the setting of targets under the STPIS. In particular, we consider that the capex allowance should not be set such that there is an expectation that it will lead to ActewAGL systematically under or over performing against its STPIS targets. We consider our approved capex forecast is sufficient to allow a prudent and efficient service provider in ActewAGL's circumstances to maintain performance at the targets set under the STPIS. As such, it is appropriate to apply the STPIS as set out in attachment 11.

In making our final decision, we have specifically considered the impact our decision will have on the safety and reliability of ActewAGL's network. We consider our substitute estimate is sufficient for ActewAGL to maintain the safety, service quality and reliability of its network consistent with its obligations. In any event, our provision of a total capex forecast does not constrain a service provider's actual spending – either as a cap or as a requirement that the forecast be spent on specific projects or activities. It is conceivable that a service provider might wish to expend particular capital expenditure differently or in excess of the total capex forecast set out in our decision. Our decision does not constrain it from doing so. Under our analysis of specific capex drivers, we have explained how our analysis and certain assessment techniques factor in safety and reliability requirements.

ActewAGL submitted it has assessed the likely implications of the AER's draft decision on safety, quality, reliability and security of the network and considers that the draft decision will raise the level of risk of operating the network in the period 2015-2019 so as to potentially lead to catastrophic failure of the network and endanger the safety of the public.<sup>36</sup>

As set out in Section 6.4.2 we consider that inappropriately low risk tolerances and lack of rigour in the forecasting approach has led ActewAGL to over forecast the work required in the forthcoming regulatory control period. Accordingly, with proper prioritisation of its capital program ActewAGL will be able manage the safety and reliability of its network. This is evidenced in our augex and repex analysis as set out in appendix B.

#### **6.4.4 ActewAGL's capex performance**

We have looked at a number of historical metrics of ActewAGL's capex performance against that of other distributors in the NEM. We have also compared ActewAGL's proposed forecast capex allowance against historical trends. These metrics are largely based on outputs of the annual benchmarking report and other analysis undertaken using data provided by the distributors for the annual benchmarking report. This includes ActewAGL's relative partial and multilateral total factor productivity (MTFP) performance, capex and RAB per customer and maximum demand, and ActewAGL's historic capex trend.

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<sup>36</sup> ActewAGL, Revised Regulatory Proposal, January 2015, pg. 276

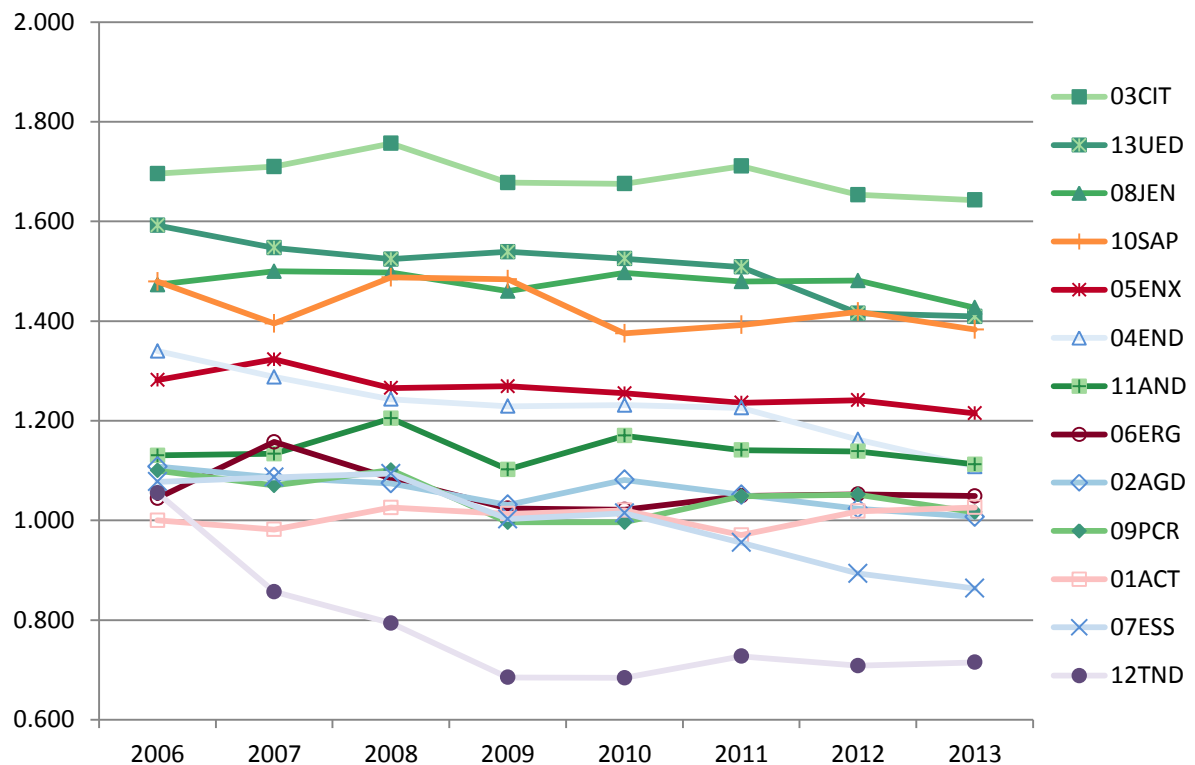


We note that the NER sets out that we must have regard to our annual benchmarking report.<sup>37</sup> This section shows how we have taken it into account. We consider this high level benchmarking at the overall capex level is suitable to gain an overall understanding of ActewAGL's proposal in a broader context. However, in our capex assessment we have not relied on our high level benchmarking metrics set out below other than to note that these metrics generally support the outcomes of our other techniques - which demonstrate that ActewAGL has room to find some efficiencies in its capex program. We have not used this analysis deterministically in our capex assessment.

#### 6.4.4.1 Partial factor productivity of capital and multilateral total factor productivity

Figure 6-2 shows a measure of partial factor productivity of capital taken from our benchmarking report. This measure incorporated the productivity of transformers, overhead lines and underground cables. ActewAGL is broadly consistent with Ausgrid and Endeavour, and a number of the Victorian distributors, but is significantly lower than the remaining Victorian and South Australian distributors.

**Figure 6-2 Partial factor productivity of capital (transformers, overhead and underground lines)**



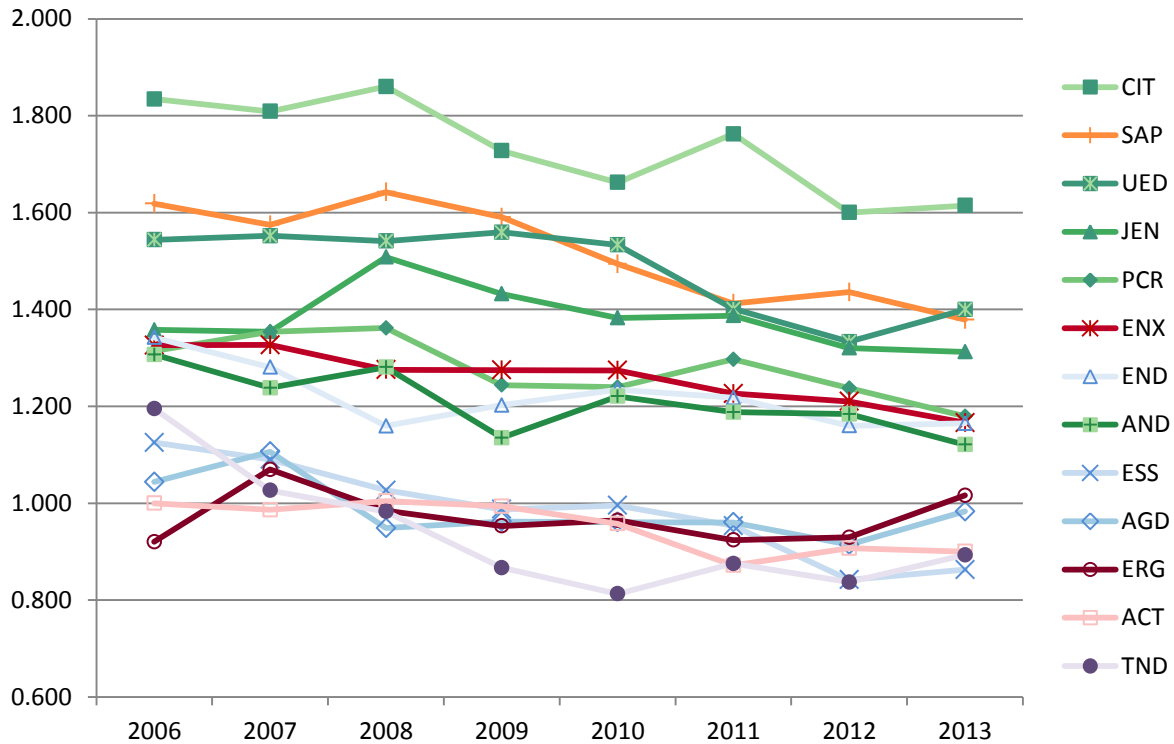
Source: AER annual benchmarking report.

<sup>37</sup> NER, cl. 6.5.7(e)(4).



Figure 6-3 shows that ActewAGL recorded the third lowest level of MTFP in the NEM across the distributors. MTFP measures how efficient a distributor is in terms of its inputs (costs) and outputs (energy delivered, customer numbers, ratcheted maximum demand, reliability and circuit line length). Across all of these measures, the Victorian and South Australian distributors significantly outperformed ActewAGL.

**Figure 6-3 Multilateral total factor productivity**

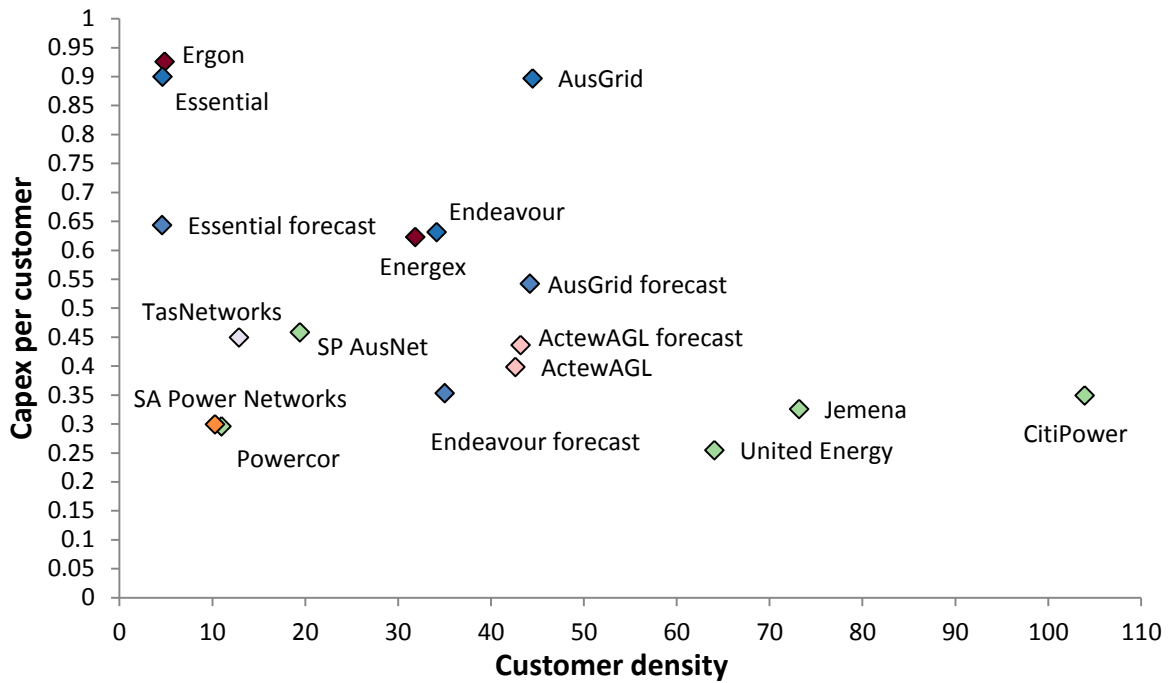


Source: AER annual benchmarking report.

#### 6.4.4.2 Relative capex efficiency metrics

Figure 6-4 and Figure 6-5 show capex per customer and per maximum demand, against customer density. Capex is taken as a five year average for the years 2008-12. For the NSW distributors and ActewAGL, we have also included the proposed capex of these service providers for the 2014–2019 period. We have considered capex per customer as it reflects the amount consumers are charged for additional capital investments. Figure 6-4 shows that ActewAGL had a lower capex per customer than the NSW distributors for the 2008-2012 period. ActewAGL's capex per customer will increase slightly for the 2014–2019 period based on their proposed forecast capex. However, ActewAGL's forecast capex per customer is still higher than with the Victorian and South Australian distributors. ActewAGL's proposed forecast capex for the 2014–2019 period would have to reduce by approximately 24 per cent in order for its capex per customer to be comparable to that the average \$3,300 per customer achieved by the Victorian and South Australian distributors in 2008-2012.

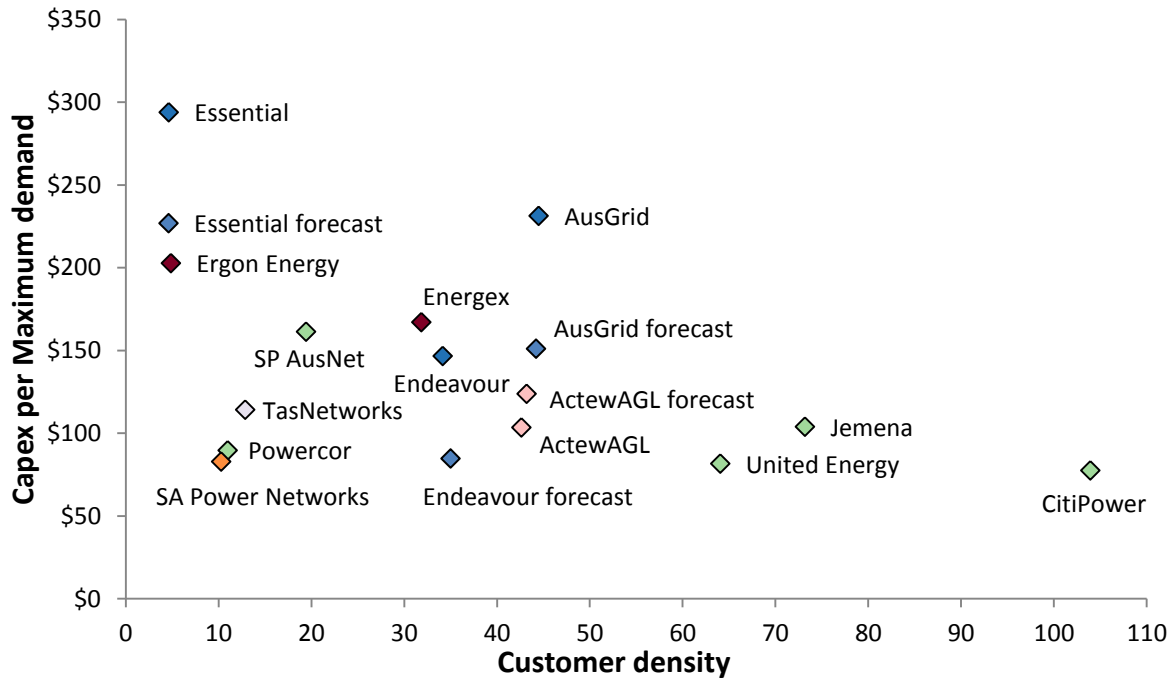
**Figure 6-4 Capex per customer (000s, \$2013-14), against customer density**



Source: AER analysis.

Figure 6-5 similarly shows that ActewAGL had a lower capex per maximum demand than the NSW distributors for the 2008-2012 period. ActewAGL's forecast capex per maximum demand is forecast to increase in the next period. ActewAGL's proposed forecast capex for the 2014–2019 period would have to reduce by approximately 19 per cent in order for its capex per maximum demand to be comparable to the average of \$99,500 per maximum demand achieved by the Victorian and South Australian distributors in 2008–2012.

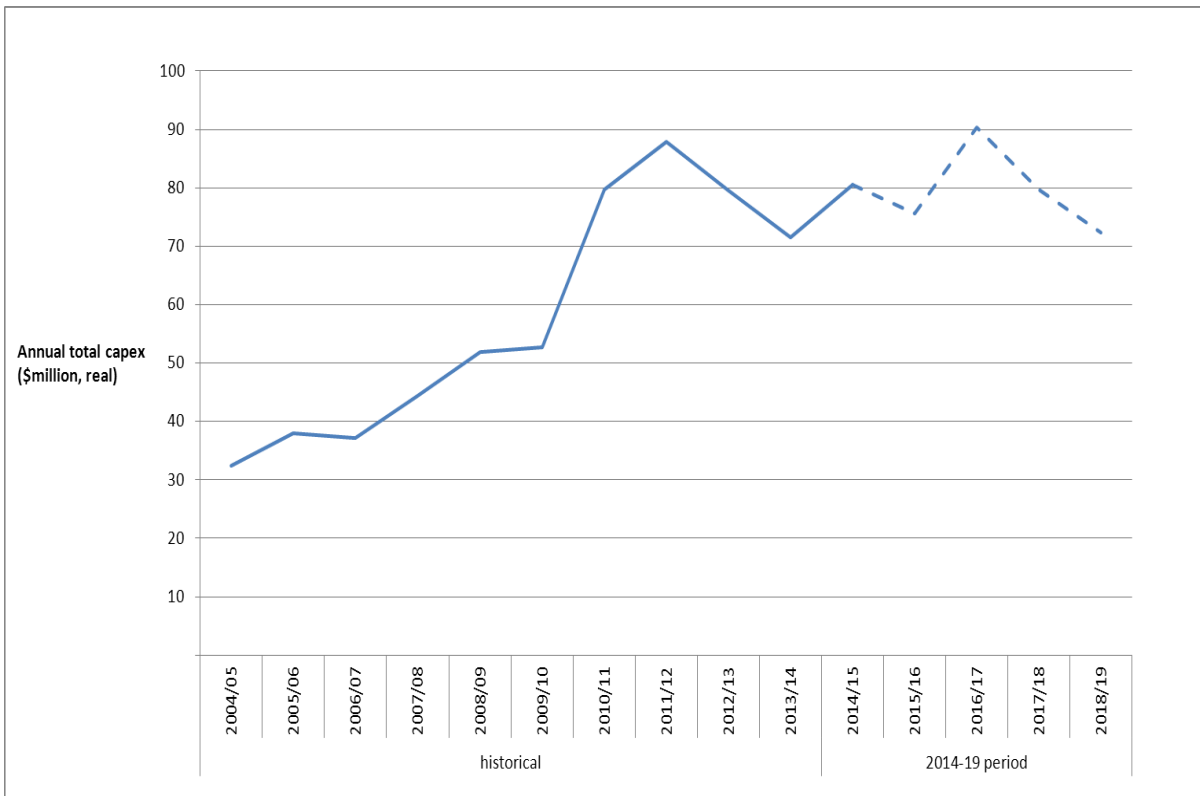
**Figure 6-5 Capex per maximum demand (000s, \$2013-14), against customer density**



Source: AER analysis.

We have also considered ActewAGL's historical capex performance. Figure 6-6 shows actual historic capex and proposed capex between 2001-12 and 2018-19. This figure shows that ActewAGL's average proposed capex for the 2014–2019 period is slightly higher than the previous period, and substantially higher than the historical average.

**Figure 6-6 ActewAGL total capex (including overheads)—historical and forecast for 2014–2019 period**



Source: Historical: ACT ICRC Regulatory Accounts (prior to 2010/11) and AER Annual RINs (2010/11 to 2013/14)  
 2014-19 period: ActewAGL Reset RIN, Table 2.1.1 - Standard control services capex).

We have considered the submissions raised by all parties in response to our benchmarking and trend analysis approaches. We generally conclude that our benchmarking approaches and specifications are appropriate and that the underlying data is sufficiently robust. A full consideration of these submissions is set out in Attachment 7. We do accept that due to the lumpy nature of capex that it is less suited to benchmarking than opex. This was reflected in our draft decision in that we did not rely upon this high level benchmarking in a deterministic manner for capex. To the degree that we have relied upon benchmarks at the category level, this is set out in the relevant appendix.

### 6.4.5 Interrelationships

There are a number of interrelationships between ActewAGL's total forecast capex for the 2014–2019 period and other components of our decision. We have taken these interrelationships into account in coming to our draft decision. Table 6-4 summarises these other components and their interrelationships with ActewAGL's total forecast capex.

**Table 6-4 Interrelationships between total forecast capex and other components**

Other component	Interrelationships
Total forecast opex	<p>There are elements of ActewAGL's total forecast opex that are related to its total forecast capex. These are:</p> <ul style="list-style-type: none"> <li>the labour cost escalators that we approved in Attachment 7</li> <li>the amount of maintenance opex that is reflected in ActewAGL's opex base year that we approved in Attachment 7.</li> </ul> <p>The labour cost escalators are related with capex because ActewAGL's total forecast capex includes expenditure for capitalised labour. Maintenance opex is also related to capex, although we did not approve a specific amount of maintenance opex as part of assessing ActewAGL's total forecast opex. This is because the amount of maintenance opex that is reflected in ActewAGL's opex base in part determines the extent to which ActewAGL needs to spend repex during the 2014–2019 period.</p>
Forecast demand	<p>Forecast demand is related to ActewAGL's total forecast capex. Growth driven capex, which includes augex and customer connections capex, is typically triggered by a need to build or upgrade a network to address changes in demand or to comply with quality, reliability and security of supply requirements. Hence, the main driver of growth-related capex is maximum demand and its effect on network utilisation and reliability.</p>
Capital Expenditure Sharing Scheme (CESS)	<p>The CESS is related to ActewAGL's total forecast capex. In particular, the effective application of the CESS is contingent on the approved total forecast capex being efficient, or that it reasonably reflects the capex criteria. As we note below, this is because any efficiency gains or losses are measured against the approved total forecast capex. In addition, in future distribution determinations we will be required to undertake an ex post review of the efficiency and prudence of capex, with the option to exclude any inefficient capex in excess of the approved total forecast capex from ActewAGL's regulatory asset base. In particular, the CESS will ensure that ActewAGL bears at least 30 per cent of any overspend against the capex allowance. Similarly, if ActewAGL can fulfil their objectives without spending the full capex allowance, it will be able to retain 30 per cent of the benefit of this. In addition, if an overspend is found to be inefficient through the ex post review, ActewAGL risks having to bear the entire overspend.</p>
Service Target Performance Incentive Scheme (STPIS)	<p>The STPIS is related to ActewAGL's total forecast capex, in so far as it is important that it does not include any expenditure for the purposes of improving supply reliability during the 2014–2019 period. This is because such expenditure should be offset by rewards provided through the application of the STPIS.</p> <p>Further, the forecast capex should be sufficient to allow ActewAGL to maintain performance at the targets set under the STPIS. The capex allowance should not be set such that there is an expectation that it will lead to ActewAGL systematically under or over performing against its targets.</p>
Contingent project	<p>A contingent project is related to ActewAGL's total forecast capex. This is because an amount of expenditure that should be included as a contingent project should not be included as part of ActewAGL's total forecast capex for the 2014–2019 period.</p> <p>We did not identify any contingent projects for ActewAGL during the 2014–2019 period.</p>

Source: AER analysis.

### 6.4.6 Consideration of the capex factors

In deciding whether or not we are satisfied ActewAGL's forecast reasonably reflects the capex criteria, we have had regard to the capex factors when applying our assessment techniques to the total proposed capex forecast, and where relevant, to

different sub-categories of proposed expenditure. Table 6-5 summarises how we have taken into account the capex factors.

**Table 6-5 AER's consideration of the capex factors**

Capex factor	AER consideration
The most recent annual benchmarking report and benchmarking capex that would be incurred by an efficient distributor over the relevant regulatory control period	We have had regard to our most recent benchmarking report in assessing ActewAGL's proposed total forecast capex and in determining our alternative estimate for the 2014–2019 period. This can be seen in the metrics we used in our assessment of ActewAGL's capex performance.
The actual and expected capex of the ActewAGL during any preceding regulatory control periods	<p>We have had regard to ActewAGL's actual and expected capex during the 2009–2014 and preceding regulatory control periods in assessing its proposed total forecast.</p> <p>This can be seen in our assessment of ActewAGL's total capex performance. It can also be seen in our assessment of the forecast capex associated with the capex drivers that underlie ActewAGL's total forecast capex.</p> <p>For non-network related capex, we rely on trend analysis to arrive at an estimate that meets the capex criteria.</p>
The extent to which the capex forecast includes expenditure to address concerns of electricity consumers as identified by ActewAGL in the course of its engagement with electricity consumers	We have had regard to the extent to which ActewAGL's proposed total forecast capex includes expenditure to address consumer concerns that have been identified by ActewAGL. On the information available to us, including submissions received from stakeholders, we have been unable to identify the extent to which ActewAGL's proposed total forecast capex includes capex that address the concerns of its consumers that it has identified.
The relative prices of operating and capital inputs	We have had regard to the relative prices of operating and capital inputs in assessing ActewAGL's proposed real cost escalation factors for materials. We discuss this in Appendix E.
The substitution possibilities between operating and capital expenditure	We have had regard to the substitution possibilities between opex and capex. We have considered whether there are more efficient and prudent trade-offs in investing more or less in capital in place of ongoing operations. See our discussion about the interrelationships between ActewAGL's total forecast capex and total forecast opex in Table 6-4 above.
Whether the capex forecast is consistent with any incentive scheme or schemes that apply to ActewAGL	We have had regard to whether ActewAGL's proposed total forecast capex is consistent with the CESS and the STPIS. See our discussion about the interrelationships between ActewAGL's total forecast capex and the application of the CESS and the STPIS in Table 6-4 above.
The extent to which the capex forecast is referable to arrangements with a person other than the distributor that do not reflect arm's length terms	We have had regard to whether any part of ActewAGL's proposed total forecast capex or our alternative estimate that is referable to arrangements with a person other than ActewAGL that do not reflect arm's length terms. We did not identify any parts of ActewAGL's proposed total forecast capex or our alternative estimate that is referable in this way.
Whether the capex forecast includes an amount relating to a project that should more appropriately be included as a contingent project	We have had regard to whether any amount of ActewAGL's proposed total forecast capex or our alternative estimate that relates to a project that should more appropriately be included as a contingent project. We did not identify any such amounts that should more appropriately be included as a contingent project.
The extent to which ActewAGL has considered and made provision for efficient and prudent non-	We have had regard to the extent to which ActewAGL made provision for efficient and prudent non-network alternatives as

network alternatives

part of our assessment of the capex associated with the non-network capex driver. We discuss this further in Appendix B.

Any other factor the AER considers relevant and which the AER has notified ActewAGL in writing, prior to the submission of its revised regulatory proposal, is a capex factor

We did not identify any other capex factor that we consider relevant.

Source: AER analysis.

## 6.5 Clarification of numerical differences

In our draft decision, we allocated ActewAGL's 'balancing item' across the expenditure driver categories. In developing the RIN templates we had included provision for a balancing item to allow businesses to remove the double counting of expenditure that might be included in more than one driver. In our draft decision we considered it necessary to allocate the balancing item across the expenditure categories for the purposes of deriving a substitute forecast. The table below shows how this balancing item was allocated across the expenditure category in the draft decision.

Table 6-6 sets out a reconciliation of all stages of our decision making process presented on a consistent basis. This information is provided to assist stakeholders in comparing forecasts across the decision making process.

**Table 6-6 Allocation of balancing item to driver**

\$ million (\$2013/14)	Initial Proposal	Initial Proposal (after allocating balancing item)	Draft Decision	Revised Proposal	Final Decision
Augmentation	95.5	99.5	61.7	67.5	47.1
Connections	78.8	91.4	91.4	77.2	77.6
Replacement	114.5	132.3	98.6	112.3	104.6
Reliability improvement	0.0	0.0	0.0	6.7	6.7
Non-Network	37.9	37.9	37.9	57.3	57.3
Capitalised overheads	52.2	52.2	7.6	52.3	52.3
Materials escalation adjustment	0.0	0.0	-11.8	0.0	-4.5
Balancing item	34.5	0.0	0.0	0.0	0.0
<b>TOTAL GROSS CAPEX</b>	<b>413.3</b>	<b>413.3</b>	<b>285.4</b>	<b>373.7</b>	<b>341.0</b>
Capcons	40.7	40.7	41.2	25.2	25.2
Capitalised overheads capcons	0.0	0.0	0.0	4.6	5.2
<b>TOTAL NET CAPEX</b>	<b>372.6</b>	<b>372.6</b>	<b>244.2</b>	<b>343.9</b>	<b>310.6</b>

Source: AER analysis



# A Assessment techniques

This appendix describes the assessment approaches we have applied in assessing ActewAGL's proposed forecast capex. The extent to which we rely on each of the assessment techniques is set out in Appendix B.

The assessment techniques that we apply in capex are necessarily different from those we apply in the assessment of opex. This is reflective of differences in the nature of the expenditure being assessed. As such, we use some assessment techniques in our capex assessment that are not suitable for assessing opex and vice versa. We set this out in our Expenditure Assessment Guideline where we stated:<sup>38</sup>

Past actual expenditure may not be an appropriate starting point for capex given it is largely non-recurrent or 'lumpy', and so past expenditures or work volumes may not be indicative of future volumes. For non-recurrent expenditure, we will attempt to normalise for work volumes and examine per unit costs (including through benchmarking across distributors) when forming a view on forecast unit costs.

Other drivers of capex (such as replacement expenditure and connections works) may be recurrent. For such expenditure, we will attempt to identify trends in revealed volumes and costs as an indicator of forecast requirements.

The assessment techniques that we have used to assess ActewAGL's capex are set out below.

## A.1 Economic benchmarking

Economic benchmarking is one of the key outputs of our annual benchmarking report. We are required to consider economic benchmarking as it is one of the capex factors under the NER.<sup>39</sup> Economic benchmarking applies economic theory to measure the efficiency of a distributor's use of inputs to produce outputs, having regard to environmental factors.<sup>40</sup> It allows us to compare the performance of a distributor against its own past performance, and the performance of other distributors. Economic benchmarking helps us to assess whether a distributor's capex forecast represents efficient costs.<sup>41</sup> As stated by the AEMC, 'benchmarking is a critical exercise in assessing the efficiency of a NSP'.<sup>42</sup>

A number of economic benchmarks from the annual benchmarking report are relevant to our assessment of capex. These include measures of total cost efficiency and

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<sup>38</sup> AER, Expenditure Assessment Guideline p.8.

<sup>39</sup> NER, cl. 6.5.7(e)(4).

<sup>40</sup> AER, Explanatory Statement: Expenditure Forecasting Assessment Guidelines, November 2013.

<sup>41</sup> NER, cl. 6.5.7(c).

<sup>42</sup> AEMC, Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, 29 November 2012, p. 25.

overall capex efficiency. In general, these measures calculate a distributor's efficiency with consideration given to its inputs, outputs and its operating environment. We have considered each distributor's operating environment in so far as there are factors that are outside of a distributor's control but which affect a distributor's ability to convert inputs into outputs.<sup>43</sup> Once such exogenous factors are taken into account, we expect distributors to operate at similar levels of efficiency. One example of an exogenous factor that we have taken into account is customer density. For more on how we have forecast these measures, see our annual benchmarking report.<sup>44</sup>

In addition to the measures in the annual benchmarking report, we have considered how distributors have performed on a number of overall capex metrics, including capex per customer, and capex per maximum demand. We have calculated these economic benchmarks based on actual data from the previous regulatory control period.

The results from the economic benchmarking give an indication of the relative efficiency of each of the distributors, and how this has changed over time.

## A.2 Trend analysis

We have considered past trends in actual and forecast capex. This is one of the capex factors to which we are required to have regard under the NER.<sup>45</sup>

Trend analysis involves comparing distributors forecast capex and work volumes against historic levels. Where forecast capex and volumes are materially different to historic levels, we have sought to understand what has caused these differences. In doing so, we have considered the reasons given by the distributors in their proposals, as well as changes in the circumstances of the distributor.

In considering whether a distributor's capex forecast reasonably reflects the capex criteria, we need to consider whether the forecast will allow the distributor to meet expected demand, and comply with relevant regulatory obligations.<sup>46</sup> Demand and regulatory obligations (specifically, service standards) are key drivers of capex. More onerous standards will increase capex, as will growth in maximum demand. Conversely, reduced service obligations or a decline in demand will likely cause a reduction in the amount of capex required by a distributor.

Maximum demand is a key driver of augmentation or demand driven expenditure. As augmentation often needs to occur prior to demand growth being realised, forecast rather than actual demand is relevant when a distributor is deciding what augmentation projects will be required in an upcoming regulatory control period. However, to the extent that the forecast demand changes, a distributor should incorporate this updated information and reassess the need for the projects. Growth in a distributor's network

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<sup>43</sup> AEMC, Economic Regulation Final Rule Determination, p.113. Exogenous factors could include geographic factors, customer factors, network factors and jurisdictional factors.

<sup>44</sup> AER, Annual Benchmarking Report, 2014.

<sup>45</sup> NER, cl. 6.5.7(e)(5).

<sup>46</sup> NER, cl. 6.5.7(a)(3).

will also drive augmentation and connections related capex. For these reasons it is important to consider how trends in capex (and in particular, augex and connections) compare with trends in demand (both maximum demand and customer numbers).

For service standards, there is generally a lag between when capex is undertaken (or not) and when the service improves (or declines). This is important in considering the expected impact of an increase or decrease in capex on service levels. It is also relevant to consider when service standards have changed and how this has affected a NSP's capex requirements.

We have looked at trends in capex across a range of levels including at the total capex level, for growth related capex, for replacement capex, and for each of the categories of capex, as relevant. We have also compared these with trends in demand and changes in service standards over time.

### **A.3 Category analysis**

Expenditure category level analysis allows us to compare expenditure across NSPs, and over time, for various levels of capex:

- overall costs within each category of capex
- unit costs, across a range of activities
- volumes, across a range of activities
- asset lives, across a range of asset classes which we have used in assessing repex.

Using standardised reporting templates, we have collected data on augex, repex, connections, non-network capex, overheads and demand forecasts for all distributors in the NEM. The use of standardised category data allows us to make direct comparisons across distributors. Standardised category data also allows us to identify and scrutinise different operating and environmental factors that affect the amount and cost of works performed by distributors, and how these factors may change over time.

### **A.4 Predictive modelling**

Predictive modelling uses statistical analysis to determine the expected efficient costs over the regulatory control period associated with the demand for electricity services for different categories of works. We have two predictive models:

- the repex model
- the augex model ( used in a qualitative sense)

The use of the repex and augex models is directly relevant to assessing whether a distributor's capex forecast reasonably reflects the capex criteria.<sup>47</sup> The models draw

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<sup>47</sup> NER, cl. 6.5.7(c).

on actual capex incurred by a distributor during the preceding regulatory control period. This past capex is a factor that we must take into account.<sup>48</sup>

The repex model is a high-level probability based model that forecasts asset replacement capex (repex) for various asset categories based on their condition (using age as a proxy), and unit costs. In instances where we consider a distributor's proposed repex does not conform to the capex criteria, we have used this (in combination with other techniques where appropriate) to generate a substitute forecast. The augex model is used to forecast the amount of augmentation driven by increases in maximum demand.

The augex model compares utilisation thresholds with forecasts of maximum demand to identify the parts of a network segment that may require augmentation.<sup>49</sup> The model then uses capacity factors to calculate required augmentation, and unit costs to derive an augex forecast for the distributor over a given period.<sup>50</sup> In this way, the augex model accounts for the main internal drivers of augex that may differ between distributors, namely peak demand growth and its impact on asset utilisation. We can use the augex model to identify general trends in asset utilisation over time as well as to identify outliers in a distributor's augex forecast.<sup>51</sup> We have not relied heavily on the augex model for this reset. This is because much of the augex in the 2009–2014 period was due to compliance with the design standard in the licence conditions rather than reflecting growth in demand. We consider the augex model will be applied to a greater degree in future determinations. This is likely to occur when demand driven augex is a more material driver of expenditure.

## A.5 Engineering review

We have engaged engineering consultants, EMCa, to assist with our review of distributors' capex proposals. This has involved reviewing distributor's processes, and specific projects and programs of work.

In particular, in respect of augex and repex, our engineering consultants considered whether the distributor's:

- Forecast is reasonable and unbiased, by assessing whether the distributor's proposed capex is a reasonable forecast of the unbiased efficient cost of maintaining performance at the required or efficient service levels.
- Risk management is prudent and efficient, by assessing whether the distributor manages risk such that the cost to the customer of achieving the capex objectives at the required or efficient service levels is commensurate with the customer value provided by those service levels.

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<sup>48</sup> NER, cl. 6.5.7(e)(5).

<sup>49</sup> Asset utilisation is the proportion of the asset's capability under use during peak demand conditions.

<sup>50</sup> For more information, see: AER, Guidance document: AER augmentation model handbook, November

<sup>51</sup> AER, 'Meeting summary – distributor replacement and augmentation capex', Workshop 4: Category analysis work-stream – Replacement and demand driven augmentation (Distribution), 8 March 2013, p. 1.

- Costs and work practices are prudent and efficient, by assessing whether the distributor uses the minimum resources reasonably practical to achieve the capex objectives and maintain the required or efficient service levels.

These factors relate directly to our assessment of whether the distributor's proposal reflects the efficient costs that a prudent operator would require to achieve the capex objectives:<sup>52</sup>

- If a capex forecast is reasonable and unbiased, the forecast should reflect the efficient costs required to meet the capex objectives. That is, there should be no systemic biases which result in a forecast that is greater than or less than the efficient forecast. Further, the forecast should be reasonable in that it reflects what a prudent operator would incur to achieve the capex objectives.
- If the distributor's risk management is prudent and efficient, the distributor's forecast is likely to reflect the costs that a prudent and efficient operator would require to achieve the capex objectives. A prudent and efficient operator would consider both the probability of a risk eventuating and the impact of the risk (if it were to occur) in determining whether to undertake work to mitigate the risk.<sup>53</sup>
- If the distributor's costs and work practices are prudent and efficient, the distributor will have the appropriate governance and asset management practices to ensure that the distributor has determined a prudent and efficient capex forecast that is based on a realistic expectation of the demand forecast and cost inputs required to achieve the capex objectives.

The engineering consultants applied a sampling approach in considering the above factors. Where this revealed concerns about systemic issues, we asked the engineers to take a broader sample and to quantify the likely impact of these biases.

In some cases we have also reviewed specific capex projects or programs of work to determine whether these meet the capex criteria. These reviews have been undertaken in respect of particular capex categories including for non-network capex and have included the assessment of:

- the options the distributor investigated to address the economic requirement (for example, for augmentation projects the review should have included an assessment of the extent to which the distributor considered and provided for efficient and prudent non-network alternatives<sup>54</sup>)
- whether the timing of the project is efficient
- unit costs and volumes, including comparisons with relevant benchmarks

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<sup>52</sup> NER, cl. 6.5.7(c).

<sup>53</sup> This approach is supported by NERA Economic Consulting, see NERA, Economic Interpretation of cl. 6.5.6 and 6.5.7 of the National Electricity Rules, Supplementary Report.

<sup>54</sup> NER, cl. 6.5.7(c)(10).

- whether the project should more appropriately be included as a contingent project<sup>55</sup>
- deliverability of the project, given other capex and opex works
- the relative prices of operating and capital inputs and the substitution possibilities between operating and capital expenditure<sup>56</sup>
- the extent to which the capex forecast is referable to arrangements with a person other than the distributor that, in the opinion of the AER, do not reflect arm's length terms<sup>57</sup>, where relevant
- the extent to which the capex forecast includes expenditure to address the concerns of electricity consumers as identified by the distributor in the course of its engagement with electricity consumers.<sup>58</sup> This is most relevant to core network expenditure (augex and repex) and may include the distributor's consideration of the value of customer reliability (VCR) standard or a similar appropriate standard.

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<sup>55</sup> This principally relates to augex. See NER, cl. 6.5.7(e)(9A).

<sup>56</sup> This principally relates to augex. See NER, cl. 6.5.7(e)(6) and (e)(9A).

<sup>57</sup> NER, cl. 6.5.7(e)(9).

<sup>58</sup> NER, cl. 6.5.7(e)(5A).

## **B Assessment of forecast capex drivers**

We present our detailed analysis of the sub-categories of ActewAGL's revised forecast capex for the 2014–2019 period in this Appendix. These sub-categories reflect the drivers of forecast capex over the 2014–2019 period. These drivers are augmentation capex (augex), customer connections capex, replacement capex (repex), reliability improvement capex, capitalised overheads and non-network capex.

As we discuss in the capex attachment, we are satisfied that ActewAGL's proposed total forecast capex reasonably reflects the capex criteria. In this appendix we set out further analysis in support of this view. This further analysis also explains the basis for our alternative estimate of ActewAGL's total forecast capex that we are satisfied reasonably reflects the capex criteria. In coming to our views and our alternative estimate we have applied the assessment approach that we discuss in appendix A.

This appendix sets out our findings and views on our overall alternative estimate which forms the basis of our substitute estimate, as well as our analysis of each sub-category of capex. The structure of this appendix is:

Section B.1: alternative estimate

Section B.2: forecast augex

Section B.3: forecast customer connections capex, including capital contributions

Section B.4: forecast repex

Section B.6: forecast capitalised overheads

Section B.7: non-network capex

Section B.8: demand management.

In each of sections B.1 - B.7 we examine seven sub-categories of capex which we include in our alternative estimate. For each such sub-category, we explain why we are satisfied the amount of capex that we include in our alternative estimate reasonably reflects the capex criteria.

### **B.1 Alternative estimate**

Having examined ActewAGL's proposal, we formed a view on our alternative estimate of the capex required to reasonably reflect the capex criteria. Our alternative estimate is based on our assessment techniques, explained in section 6.3 and Appendix B. Our weighting of each of these techniques, and our response to ActewAGL's submissions on the weighting should be given to particular techniques, are set out under the capex drivers below.

We consider ActewAGL will be able to maintain both its average reliability level and meet its minimum reliability standards within our approved capex forecast. We are satisfied that our alternative estimate reasonably reflects the capex criteria.

## B.2 AER findings and estimates for augmentation expenditure

### B.2.1 Position

Our alternative estimate of required augex for ActewAGL for the 2014–19 period is \$47.08 million (\$2013–14). This differs to ActewAGL's revised forecast of \$67.48 million (\$2013–14, excluding overheads).

Our forecast is based on an acceptance of all elements of ActewAGL's revised augex forecast, with the exception that our estimate is based on a different forecast of the costs associated with efficiently meeting new demand growth in the Molonglo area during the 2014–19 period. When combined with the rest of our capex decision, this forecast provides ActewAGL with a reasonable opportunity to recover at least the efficient costs of building its network to meet network capacity and reliability requirements.

Table B-1 compares forecasts across the decision making process between the initial proposal and our final decision.

**Table B-1 ActewAGL augex forecasts comparisons (\$2013–14, million, excluding overheads)**

	2014-15	2015-16	2016-17	2017-18	2018-19	Total
ActewAGL initial augex forecast	12.73	16.22	32.06	24.18	14.34	99.53
AER draft decision	12.27	10.53	17.67	13.92	7.33	61.72
Revised Proposal	7.23	8.91	19.36	19.08	12.90	67.48
AER final forecast	7.23	8.91	14.69	8.71	7.54	47.08

Source: AER analysis; ActewAGL Revised Proposal

### B.2.2 Revised Proposal for augex

In its revised proposal, ActewAGL has reduced its proposed augex forecast from \$99.5 million (\$2013–14) in its initial proposal to \$67.48 million (\$2013–14). ActewAGL submits that this is due to:

- revised demand forecasts which indicate that a third transformer at the Belconnen zone substation is not likely to be required in the 2014–19 period



- the inclusion of updated cost estimates for the Molonglo zone substation and the zone substation earth grids refurbishment project.<sup>59</sup>

In our draft decision, our forecast estimate of \$61.7 million (\$2013–14) differed to the forecast proposed by ActewAGL in its initial proposal. In particular, we did not include ActewAGL's proposed forecasts for the following five major augmentation projects:

- Molonglo zone substation and associated feeders—\$24.6 million (\$2013–14)
- Belconnen zone substation—\$12.7 million (\$2013–14)
- Zone substation earth grid upgrade—\$2.619 million (\$2013–14)
- Gold Creek 11 kV switchboard extension—\$0.77 million (\$2013–14)
- Mitchell zone substation—\$0.6 million (\$2013–14).

Our draft decision invited ActewAGL to provide further justification for these projects. In its revised forecast, ActewAGL withdrew the Belconnen zone substation proposal and provided further information in support of the remaining four projects. We consider the further information ActewAGL submitted in section B.2.4.

In its revised proposal, ActewAGL also submitted information on other matters raised in our draft decision. These concerned the:

- slight fall in the utilisation rate of substations between 2008–09 and 2012–13 and the increase in the utilisation of high-voltage feeders across the same period<sup>60</sup>
- value of customer reliability (VCR)
- use of unserved energy in project justifications.

We have addressed these points below in section B.2.3.

### **B.2.3 AER approach**

Our approach to assessing ActewAGL's forecast augex in the draft decision was to first apply trend analysis and then conduct a detailed review of five major projects that covered approximately 45 per cent of the proposed forecast. In this final decision, we have maintained this approach and further clarified the extent to which these techniques are reflected in our alternative estimate.

It is important to note that despite our assessment techniques for ActewAGL's augex forecast being based on individual project review, our final decision does not approve funding for individual projects. Indeed, the NER do not provide for us to set an augex forecast or an individual project allowance. The only constituent decision the AER makes on capex is a single forecast covering the relevant regulatory control period.

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<sup>59</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 275.

<sup>60</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 34.

From there, the requirement is on the distributor to balance its operating and capital expenditure to meet its obligations.

### Trend analysis

In our draft decision, as in this final decision, we use our trend analysis both as a starting point for our further engineering evaluation, and as a cross-check on our overall augex estimate following the outcome of our engineering evaluation. Our trend analysis is not used deterministically in forecasting required augex.

As set out in our draft decision, our trend analysis showed that ActewAGL had initially proposed a slight increase in augex when compared to expenditure during the 2009-14 regulatory control period.<sup>61</sup> ActewAGL in its initial proposal submitted that this reflects the continuation of augex commenced in 2009-14 which followed a sustained period of low investment.<sup>62</sup>

ActewAGL in its revised proposal stated that our trend analysis provided no support for our decision to reduce its augex. It submitted that in fact its revised augex forecast (from \$94.6 million (\$2013–14) to \$67.48 million (\$2013–14)) is now lower than actual capex in the previous period.<sup>63</sup> We accept that its revised forecast is lower than actual augex from the previous period. As set out above, our trend analysis is used as a starting point to consider whether trends in forecast augex are consistent with other high-level indicators such as system demand and utilisation rates, as discussed below.

### Utilisation rates

In our draft decision, we did not make any specific adjustments on the basis of average utilisation rates although we drew some observations on likely excess capacity. In this final decision, we also have not made any adjustments based on our utilisation analysis.

In our draft decision, we noted that ActewAGL's average utilisation of both substations and high-voltage feeders had not changed materially between 2008–09 and 2012–13 — there was a slight fall in utilisation for substations and an increase in utilisation for feeders.<sup>64</sup> ActewAGL's revised proposal submitted that average utilisation rates were "inadequate, in any event, to support any conclusion about the technical and economic feasibility of meeting a demand constraint at any given point on the network".<sup>65</sup> We agree with ActewAGL's submission. To further clarify, where our draft decision suggested that ActewAGL investigate meeting demand through utilising spare capacity

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<sup>61</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 30.

<sup>62</sup> ActewAGL, *Regulatory proposal: 2015–19 Subsequent regulatory control period Distribution services provided by the ActewAGL Distribution electricity network in the Australian Capital Territory*, 2 June 2014 (resubmitted 10 July 2014), p. 183.

<sup>63</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 301.

<sup>64</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 30.

<sup>65</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 293.

on adjacent substations or feeders it was with reference to specific substations or feeders and in the knowledge of their current loadings.<sup>66</sup>

Average utilisation rates are useful in order for us, as well as stakeholders, to gain a broader understanding of trends over time particularly against aggregated augex trends. In some cases, this information may inform our estimate of augex. However, for both in our draft and in this final decision for ActewAGL, we have not relied on our findings on utilisation for this purpose.

## Unserviced energy

In regard to unserved energy calculations, our draft decision explained our concern with ActewAGL's application of its Distribution Network Augmentation Standard. We noted that the standard, written and applied by ActewAGL, uses a deterministic planning criteria that results in ActewAGL augmenting zone substations when it expects the maximum demand 10 per cent POE forecast to exceed the substation's two hour emergency rating.<sup>67</sup>

Our comments on unserved energy calculations were limited to a description of the changes to the ACT *Electricity Distribution Supply Standards Code (2013)* and the interactions with the internal standard that ActewAGL uses for planning.<sup>68</sup> In this final decision our concern remains that the standard prepared by ActewAGL does not give effect to the presumed intent of the changes to the ACT *Electricity Distribution Supply Standards Code (2013)*. These changes sought to remove the straight deterministic approach to planning. Similar changes have been made to the planning standards in NSW to encourage the greater use of cost benefit analyses in network planning.

As part of its revised proposal, ActewAGL submitted a report by its consultant, Jacobs Group Australia (Jacobs), which responded to our comments on ActewAGL's system security and planning criteria. As set out by Jacobs, the Victorian distribution businesses have utilised a full probabilistic planning methodology for many years.<sup>69</sup> Jacobs also note that there are differences in the way in which substation ratings are determined by the Victorian distributors when they apply their unserved energy calculations and ActewAGL's use of a two-hour emergency rating. Jacobs suggest that the use of a two hour emergency rating may mean that ActewAGL is operating within

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<sup>66</sup> See for example AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 40 in relation to the Latham zone substation and AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p.37 in relation to the Woden zone substation.

<sup>67</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 34.

<sup>68</sup> The only other reference in our draft decision to unserved energy was in relation to the justification for the Belconnen zone substation project. This project has now been withdrawn by ActewAGL. So while we retain our concerns with the lack of cost benefit assessment within the ActewAGL planning processes, these have not had an impact on the augex forecast that we have included in our alternative estimate.

<sup>69</sup> Jacobs, *Review of AER Draft Decision - Augex*, January 2015, p. 10.

the same 'risk zone' as the Victorian distribution businesses.<sup>70</sup> Our view, however, is that these operational differences are not at issue. Of relevance is whether it is appropriate for ActewAGL to continue to apply a deterministic standard given policy changes both within the ACT and in other jurisdictions.

Jacobs also submit that ActewAGL does utilise probabilistic criteria in its planning.<sup>71</sup> To further assess this, we again reviewed the material provided in ActewAGL's initial proposal, its Distribution Network Augmentation Standard and the Jacobs report submitted with the revised proposal. The initial proposal states that a deterministic standard is used to identify areas where system capacity may be exceeded, with a risk based assessment used to determine the priority and timing of augmentation.<sup>72</sup> While it is not clear how this risk assessment is carried out, it is clear that the need for an augmentation project is justified in the first instance by reference to a deterministic standard. The Distribution Network Augmentation Standard supports this, with all of the standards contained in the document being expressed deterministically. While some of the planning inputs used by ActewAGL have some form of probability attached to them (for example, assumptions on a minimum wind speed for conductor ratings), the resulting planning standards are still deterministic.

The only reference in the standard to probabilistic cost benefit analysis is a reference in section 6.3.1 of the standard, which states that 'feeders in urban areas must have a minimum of two effective feeder ties to meet two-for-three arrangement where it is economically achievable.'<sup>73</sup> 'Economically achievable' may include consideration of cost-benefit analysis. However, is not a defined term in the standard nor is there an explanation as to how the calculation to determine the economic achievability of a project should be undertaken.

Jacobs also offer views on the correct approach to meeting the capex criteria in the NER.<sup>74</sup> Jacobs acknowledge that there is a role for unserved energy modelling in certain circumstances, but submit that we are seeking 'to impose a new and additional augmentation capex factor during the determination process.' We do not accept Jacob's position. This is because it is important that full and robust justifications for projects and programs form part of any regulatory proposal. For some projects this will include an assessment of the costs and benefits of a project, as noted by Jacobs.<sup>75</sup>

Ultimately, while our review of these standards have not had a bearing on our estimate of augex in this final decision, we do expect that ActewAGL would review their processes and documentation and ensure that they are consistent with the intent of

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<sup>70</sup> Jacobs, *Review of AER Draft Decision - Augex*, January 2015, p. 10.

<sup>71</sup> Jacobs, *Review of AER Draft Decision - Augex*, January 2015, p. 5.

<sup>72</sup> ActewAGL, *Regulatory proposal: 2015–19 Subsequent regulatory control period Distribution services provided by the ActewAGL Distribution electricity network in the Australian Capital Territory*, 2 June 2014 (resubmitted 10 July 2014), p. 122.

<sup>73</sup> ActewAGL, *Distribution Network Augmentation Standard, Revision 1*, 26 May 2014.

<sup>74</sup> Jacobs, *Review of AER Draft Decision - Augex*, January 2015, p. 12 and 14.

<sup>75</sup> Jacobs, *Review of AER Draft Decision - Augex*, January 2015, p. 14.

jurisdictional policy and industry best practice. Accordingly, we welcome ActewAGL's statement in its revised proposal that it will consider applying these types of analyses to suitable projects to optimise the timing of capex.<sup>76</sup>

### **Values of Customer Reliability (VCR)**

As set out in the STPIS attachment, we have maintained our view that it is appropriate to use the AEMO VCR estimate in the calculation of the need and timing of augex projects. For ActewAGL, the NSW VCR, which also covers the ACT, is the relevant AEMO estimate.

In the draft decision, we noted our expectation that ActewAGL would identify the impact of AEMO's lower VCR on its augex (and other expenditure) forecasts in its revised regulatory proposal. ActewAGL's revised proposal did not identify any such adjustments and submitted that their planning processes result in the risk of customer outages and unserved energy being inherently taken into account without the need for discrete calculations using the VCR.<sup>77</sup>

Our assessment of the planning criteria and use of unserved energy are considered in the sections above. We maintain our view in this final decision that the most appropriate VCR estimate for ActewAGL is the NSW/ACT AEMO estimate. However, our review of the sample of projects discussed in section B.2.4 did not reveal any projects that were sensitive to the lower AEMO VCR estimate. Therefore, in this final decision as it relates to the augex forecast, we have not made any explicit adjustment for the updated VCR estimates published by AEMO. Future reviews will again test the sensitivity of forecasts to changes in the VCR and the application of the most recent estimate of VCR.

### **Engineering Review**

ActewAGL made submissions in its revised proposal on the nature of the engineering review undertaken by our technical staff.<sup>78</sup> We consider the methodology applied is satisfactorily set out in Appendix A and that our reasoning in the draft decision sufficiently sets out the analysis and the basis for our conclusions. As ActewAGL submit, a site visit was not conducted. It is not always necessary or practicable to conduct site visits. In this instance, given the limited number of projects subject to a detailed project review, it was possible to conduct an assessment without a site visit.

## **B.2.4 Review of ActewAGL's major augex projects**

### **Molonglo zone substation**

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<sup>76</sup> ActewAGL *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 309.

<sup>77</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 293.

<sup>78</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, pp. 309-310.

For the reasons set out below, our alternative estimate does not include the \$22.7 million (\$2013–14) proposed by ActewAGL for the construction of the Molonglo substation. We have instead included a forecast of \$2.3 million (\$2013–14) in our alternative estimate which reflects the cost estimated by ActewAGL to supply the Molonglo district via a Woden feeder during the 2014–19 period.

We note that ActewAGL had proposed a pass through event for the Molonglo substation, in the event that we did not include forecast expenditure for it in the augex forecast. However, given our assessment and conclusion that expected demand in the Molonglo valley can be met in the 2014–19 period through alternatives options, a pass through event is not required.

ActewAGL's initial regulatory proposal included \$24.6 million (\$2013–14) to establish a new Molonglo zone substation to service projected growth in the Molonglo valley area.<sup>79</sup> In our draft decision, we acknowledged the potential growth in the Molonglo Valley area in the long-term, and that ActewAGL would have to service that growth.

In summary, we found that while there may be a long-term need for additional capacity in the Molonglo area, we were concerned that:

- ActewAGL's risk and options analysis was inadequate
- ActewAGL had not adequately justified the timing of the project
- The forecast project costs were high and incorporated inefficient practices.

In response, ActewAGL has delayed the timing of the project by one year, which results in the required expenditure for the 2014–19 period being reduced to \$24.3 million (\$2013–14). As shown in Table B-2, this total cost includes three feeder projects that provide an initial 8.6MVA supply to the Molonglo area before the completion of the Molonglo substation. Our assessment in this section relates only to the \$22.7 million (\$2013–14) associated with the construction of the substation, access road and Molonglo feeder. The costs of the other three feeder projects are not considered here as they are required whether Molonglo substation construction starts as proposed or at a later date. We note that under ActewAGL's preferred option another \$2.1 million (\$2013–14) is required in 2020 for an additional Molonglo feeder.

**Table B-2 Costings of ActewAGL Preferred Option (2014–19)**

ActewAGL Preferred	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Molonglo ZST			4.1	10.4	6.2	20.7
Access Road			0.5			0.5
11kv Molonglo Feeder					1.4	1.4

<sup>79</sup> ActewAGL, *Regulatory proposal: 2015–19 Subsequent regulatory control period Distribution services provided by the ActewAGL Distribution electricity network in the Australian Capital Territory*, 2 June 2014 (resubmitted 10 July 2014), p. 184.



<b>Sub-total</b>			<b>4.6</b>	<b>10.4</b>	<b>7.6</b>	<b>22.7</b>
Hilder feeder extension	0.4					0.4
Streeton Feeder Extension	0.4					0.4
Black Mountain upgrade			0.9			0.9
<b>Total</b>	<b>0.8</b>	<b>0.0</b>	<b>5.5</b>	<b>10.4</b>	<b>7.7</b>	<b>24.3</b>

Source: ActewAGL Proposed Molonglo District Supply Solution, p 15

Note: Numbers may not add up due to rounding.

We accept the expected demand from the Molonglo Valley during the 2014–19 period. Approximately 9.2MVA of capacity is expected to be required in the Molonglo valley by the end of the 2014–19 period. Based on the demand information provided by ActewAGL, the 8.6MVA supply provided by the Hilder and Streeton feeder extensions and the Black Mountain upgrade will be exhausted by early 2019.<sup>80</sup>

ActewAGL presented four options to meet the expected demand from the Molonglo Valley during the 2014–19 period, including three alternative options to the construction of the substation. ActewAGL assessed all three alternatives as being unacceptable for the reasons set out below. The four options are:

- Do nothing - this would place ActewAGL in breach of its obligation to provide a reliable and secure supply to the Molonglo District (option 1)<sup>81</sup>
- Supply the Molonglo area with the construction of a new substation, beginning in 2016–17 and being commissioned in time for the summer peak of 2019–20 (option 2, ActewAGL's preferred option)
- Augment feeders and continue to supply the area from existing capacity in the Woden, Civic and Latham substations (option 3) - this has a higher net present value (NPV) than ActewAGL's preferred option 2
- Increase capacity at the Woden zone substation and extend supply to the Molonglo Valley (option 4) - this has a higher NPV than ActewAGL's preferred option 2.<sup>82</sup>

Our analysis has focussed on reviewing the options that ActewAGL has considered to meet demand from the Molonglo Valley during the 2014–19 period. For the purpose of conducting our analysis, we have accepted the costings and technical feasibility of the options presented by ActewAGL.

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<sup>80</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, Attachment D6 (Proposed Molonglo District Supply Solution), p 9.

<sup>81</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, Attachment D6 (Proposed Molonglo District Supply Solution), p 10.

<sup>82</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, Attachment D6 (Proposed Molonglo District Supply Solution), p 22.

We requested and were provided with ActewAGL's Net Present Value (NPV) spreadsheet that underpinned its analysis of its four options. For consistency of assumptions, modelling techniques and technical inputs, we have used this spreadsheet to conduct our own analysis. We agree that of the options selected for comparison by ActewAGL, option 2 has the lowest NPV of the costs to consumers at \$21.8 million (\$2013–14). However, ActewAGL has only costed option 3 (feeder augmentation and supply from existing substations) in terms of its ability to deliver capacity through the period until 2042–43. It has not assessed the deferral benefits of using one or more of the projects outlined in option 3 to enable a delay to the construction of the Molonglo substation.

ActewAGL's option 3 includes a Woden feeder to be constructed in 2018–19 that would add 5.5MVA of capacity at a cost of \$2.3 million (\$2013–14).<sup>83</sup> This would bring capacity in Molonglo to 14.1MVA, which would be sufficient to supply the expected demand until mid-2022, allowing the deferral of the Molonglo substation. From 2022 (the subsequent regulatory period), additional supply capacity would be required either from the construction of a substation at Molonglo or the addition of feeders from existing substations. The costs and timetable for this option are outlined in Table B-3.

**Table B-3 Modified option for supply to Molonglo District**

Modified option 2/3 (\$,000, 13/14)	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22
Hilder feeder extension	0.4							
Streeton Feeder Extension	0.4							
Black Mountain upgrade			0.9					
Molonglo ZST						4.1	10.4	6.2
Road Access						0.5		
11kv Feeder								1.4
Woden Feeder					2.3			
<b>Total</b>	<b>0.8</b>	<b>0.0</b>	<b>0.9</b>	<b>0.0</b>	<b>2.3</b>	<b>4.7</b>	<b>10.4</b>	<b>7.7</b>

Source: AER Analysis, costings from Proposed Molonglo District Supply Solution, Table 9, p 18,

Using the ActewAGL spreadsheet, we modelled the NPV impact of utilising the Woden feeder from option 3 and using it to defer the expenditure of \$22.7 million (\$2013–14) on the Molonglo substation until after the 2014–19 period. Under this option, construction of the substation would commence in the first year of the 2019–2024

<sup>83</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, Attachment D6 (Proposed Molonglo District Supply Solution), Table 9, p 18.



period and be completed to meet demand from 2022. This is presented as option five in the NPV analysis summary in Figure B-1.

**Figure B-1 Revised Molonglo option NPV analysis**

<b>SUMMARY FINANCIAL ANALYSIS RESULTS FOR</b>		<b>Molonglo Zone Sub</b>					<a href="#">Menu</a>
<b>SCENARIO:</b>	<b>Options Analysis</b>						
<b>Determine least net present cost of options analysed</b>							
<b>Project Purpose:</b>	To meet reliability and capacity requirements of customers in Molonglo						
		<b>Option</b>	<b>Desc</b>				
		One	Do Nothing				
		Two	Molonglo Zone Substation				
		Three	Feeder Augmentations				
		Four	Woden Zone Substation Extension				
		Five	Defer - nominal losses				
		Six	Defer - high losses				
<b>RESULTS:</b>		<b>One</b>	<b>Two</b>	<b>Three</b>	<b>Four</b>	<b>Five</b>	<b>Six</b>
Capital Outlay (Real 2014/15 \$)	\$0	\$33,346,682	\$59,916,145	\$44,771,568	\$35,646,682	\$36,634,699	
Nominal Capital & Cash Flows - 50 years	\$0	\$29,119,817	\$68,942,993	\$44,162,671	\$33,160,077	\$34,031,313	
NPV - 30 years	\$0	(\$21,816,516)	(\$27,692,581)	(\$24,925,942)	(\$20,730,176)	(\$21,316,997)	
<b>Financial Conclusion</b>							
Option 5 provides the lowest NPV outcome over a 30 year period. This analysis includes Energy at Risk (Value of Customer Reliability), 11kV Feeder Losses. Options 2, 5 and 6 include the access road and initial civil works (benching) for the zone substation site.							

Source: AER Analysis, copy of ActewAGL Financial Evaluation Model Molonglo ZS\_080115a.xlsm (modified)

The NPV of ActewAGL's preferred option to 2022 is \$21.8 million (\$2013–14). As shown in Figure B-1, the NPV of the alternative option that delays completion of the Molonglo substation until 2021/2022 is \$20.7 million (\$2013–14). In undertaking this analysis we have used the same three year project timetable for the completion of the Molonglo substation as used in ActewAGL's preferred option, beginning in 2019/20.

We acknowledge that the option of including a feeder solution (ie. supplying load from distant substations) has the potential to increase the value of network losses. ActewAGL included an increase in these losses in its modelling of option 3. To test the sensitivity of the NPV analysis to network losses, we also modelled a sixth option. This includes the higher network losses associated with the feeder solution until the Molonglo substation is assumed to be finalised. While this does increase the NPV to \$21.3 million (\$2013–14), it is still less than ActewAGL's preferred solution. This provides additional support for the deferral of the \$22.7 million (\$2013–14) Molonglo substation.

In simple terms, this analysis shows that the cost to consumers would be minimised if ActewAGL were to delay construction of the Molonglo substation until after July 2019 and instead met the extra capacity needed via the construction of a \$2.3 million (\$2013–14) feeder from the Woden substation. Based on ActewAGL's analysis, this variation would still enable the expected demand in the Molonglo district to be met without the need to construct the \$22.7 million (\$2013–14) Molonglo substation during the 2014–19 period.

While we have performed this analysis assuming that the most cost effective solution would be the construction of the Molonglo substation after 2019, this does not mean that it will remain the most appropriate solution into the future. One of the benefits of delaying major augmentations for as long as is possible while ensuring expected demand can be met, is that it allows time for a greater understanding of factors such as actual demand growth. For example, the load in Molonglo area may grow slower than forecast due to higher energy efficiency requirements put in place by the ACT

Government. By delaying the Molonglo project, ActewAGL will have the opportunity to observe the growth in the new district and continue to assess the need and timing of future augmentations. This minimises the potential for consumers to be funding underutilised or stranded assets.

### Independent review of findings

We retained EMCa to undertake a peer review of our analysis in relation to the Molonglo substation forecast. Specifically, we asked EMCa to consider the material provided by ActewAGL in its initial regulatory proposal, revised proposal and project justification report and in light of this material advise us whether:

- our judgement and reasoning is sound and is drawn accurately from options presented by ActewAGL
- the supporting NPV modelling is sound and correctly justifies the position that deferral of the Molonglo zone substation until after the next regulatory control period is prudent and efficient.

In summary, EMCa conclude that while the best long term option is the construction of the Molonglo substation, the expenditure can be prudently deferred until after the 2014–19 period in two ways.

- First, by adopting the short-term feeder extensions already proposed by ActewAGL, namely Streeton, Hilder and Black Mountain by 2016–17. This will add 8.6MVA of capacity.
- Second, by a further extension to the network in 2018–19 with the additional Woden feeder to add a further 5.5MVA to the network in 2019–20, allowing the forecast demand to be met during the 2014–19 period.<sup>84</sup>

EMCa have independently constructed an NPV analysis from the material submitted by ActewAGL. This confirms our modelling that the NPV of the deferment option is less than the NPV of ActewAGL's preferred option of \$21.8 million (\$2013–14).<sup>85</sup> EMCa also confirms that the deferral should not result in a material increase in risk, and therefore should be manageable by ActewAGL.<sup>86</sup>

On the options proposed by ActewAGL, EMCa's report notes that there has been insufficient analysis by ActewAGL of the available alternate options to meet the projected demand growth. Further, EMCa raises concerns that the options analysis provided by ActewAGL appears to include a bias to advance the Molonglo zone

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<sup>84</sup> *Peer review of AER analysis for new Molonglo zone substation*, April 2015, p. 20.

<sup>85</sup> EMCa undertook the modelling exercise independently of the AER. EMCa applied different assumptions on the timing of additional Molonglo feeders and on network losses. EMCa's assumptions lead to a lower NPV than that calculated by the AER. That is, if the EMCa assumptions were to be applied, the case for deferral of the Molonglo substation would be strengthened. Rather than adopting EMCa's assumptions, we have retained our own as a further sensitivity check on our conclusions. This shows a benefit of deferral under all scenarios.

<sup>86</sup> *Peer review of AER analysis for new Molonglo zone substation*, April 2015, p. ii.

substation project. This bias is due to the absence of consideration of the potential benefits of prudent deferral options.<sup>87</sup>

Ultimately, EMCa conclude that the cost is minimised if ActewAGL defers the construction of the Molonglo substation until after July 2019 and meets the extra capacity via a feeder from the Woden substation.<sup>88</sup>

As outlined above, a key benefit of deferral is the minimisation of the potential for consumers to be funding underutilised assets. This view was supported by EMCa's observation that an important benefit of deferral is the preservation of options that may become economically attractive through continued developments in technology such as PV and energy storage. EMCa further note that preserving these options for future adoption substantially reduces the potential risk of stranded investment.<sup>89</sup>

### **Belconnen zone substation**

ActewAGL initially proposed to install a third transformer at the Belconnen zone substation due to the potential that block load increases could result in capacity constraints towards the end of the 2014–19 period.<sup>90</sup> Our draft decision excluded the third transformer at the Belconnen zone substation as we considered it was justified by reference to out-dated demand forecasts.

ActewAGL removed this project from its forecast in its revised proposal in light of updated demand forecasts and its ability to load balance with other zone substations.<sup>91</sup>

### **Zone substation earth grid upgrade**

ActewAGL's initial proposal included \$2.6 million (\$2013–14) to upgrade earth grids at its zone substations.<sup>92</sup> ActewAGL stated the earth grid condition of its zone substations is largely unknown, so it is prudent to estimate a cost for refurbishment.

In our draft decision, we noted that ActewAGL did not provide evidence of earth grid failures or degradation of performance. We did not 'endorse' a do-nothing approach as stated by ActewAGL in its revised proposal, but rather indicated a lack of supporting evidence in the material provided by ActewAGL.<sup>93</sup>

ActewAGL's revised proposal has reduced its forecast for the earth grid upgrade to \$1.2m (\$2013–14). ActewAGL submitted further information in both its revised

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<sup>87</sup> EMCa, *Peer review of AER analysis for new Molonglo zone substation*, April 2015, p. i.

<sup>88</sup> EMCa, *Peer review of AER analysis for new Molonglo zone substation*, April 2015, p. 17.

<sup>89</sup> EMCa, *Peer review of AER analysis for new Molonglo zone substation*, April 2015, p. ii.

<sup>90</sup> ActewAGL, *Regulatory proposal: 2015–19 Subsequent regulatory control period Distribution services provided by the ActewAGL Distribution electricity network in the Australian Capital Territory*, 2 June 2014 (resubmitted 10 July 2014), p. 185.

<sup>91</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 301.

<sup>92</sup> ActewAGL, *Regulatory proposal: Attachment D3: Customer initiated capital works plan, Network augmentation capital works plan, Asset management plan*, 30 May 2014, pp. 18–19.

<sup>93</sup> ActewAGL *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 319.

proposal and a subsequent submission.<sup>94</sup> The submission attached condition reports for the Fyshwick and Wanniasa zone substations dated 6 February 2015. These reports were commissioned as part of ActewAGL's condition assessment based refurbishment approach to manage the earth grid. While the reports do not indicate that remediation of the earth grids at these substations is required, there are other safety related issues that need to be addressed. For example, the Fyshwick substation report suggests, amongst other things, that a 1.5 metre wide asphalt layer be placed around the substation in order to mitigate the potential for high touch voltages.<sup>95</sup>

After undertaking a technical assessment, we consider that the condition based refurbishment approach is generally sound. We have some concerns that ActewAGL consider there is a very high safety risk associated with earth grid failure,<sup>96</sup> and yet did not conduct periodic earth grid condition assessments until after our draft decision.

We are aware that the ActewAGL program of checking the condition of its earth grids is in its infancy. However, given the potential consequences of failure of an earth grid and the fact that some safety work around substations has been shown to be required, we have included ActewAGL's forecast of earth grid refurbishment in our alternative estimate.

### **Gold Creek 11 kV switchboard extension**

ActewAGL initially proposed \$0.77 million (\$2013–14) of expenditure on a new switchboard as the Gold Creek substation does not have spare switch bays for the connection of new feeders.<sup>97</sup> Our draft decision noted our understanding that it is a common industry solution to double up the cable termination box on the existing switchboard when facing a shortage of switch bays.<sup>98</sup>

Following our draft decision, ActewAGL subsequently drafted and provided a project justification report with the revised proposal.<sup>99</sup> ActewAGL stated in its revised proposal that it has included doubling feeder termination as part of its solution to mitigate the lack of switch bays for new feeders.<sup>100</sup> After considering this information, including the potential for new sensitive block loads, we accept ActewAGL's submissions and its supporting evidence and have included ActewAGL's forecast in our alternative estimate.

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<sup>94</sup> ActewAGL submission on its Revised Regulatory Proposal 2015–19, 13 February 2015.

<sup>95</sup> PSE Energy, Fyshwick Zone Substation Earth Grid Condition Assessment Report, p iii.

<sup>96</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, Attachment D9 (Earth Grid refurbishment), p. 20.

<sup>97</sup> ActewAGL, *Regulatory proposal: Attachment D3: Customer initiated capital works plan, Network augmentation capital works plan, Asset management plan*, 30 May 2014, pp. 18–19.

<sup>98</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 40.

<sup>99</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, Attachment D10 RJP (Gold Creek 11kV switchboard extension).

<sup>100</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 321.

## Mitchell zone substation

ActewAGL proposed \$0.6 million (\$2013–14) in its augex forecast for the purchase of land for the future development of a new Mitchell zone substation.<sup>101</sup> However, ActewAGL provided insufficient information on the purpose and scope of this expenditure and as such we did not include it in our alternative estimate.

Following our draft decision, ActewAGL has submitted a project justification report. This report demonstrated a long term need for a new zone substation in the area based on capacity of its existing assets and projected growth, primarily driven by land developments in the area. We now consider that the need of a site for the future zone substation is supported by the evidence and have included ActewAGL's forecast in our alternative estimate.

## B.3 AER findings and estimates for connections and contributions

Customer-initiated capital expenditure refers to work that ActewAGL must undertake either when a new customer connects to the distribution network or an existing customer seeks to amend their connection.

Capital contributions include the value of assets constructed by third parties which are operated by ActewAGL, and payments from customers who directly benefit from customer-initiated services. These contributions are used to reduce the amount of capex that is recovered from all other consumers.

### B.3.1 Position

We accept ActewAGL's revised proposal for connections capex of \$77.6 million (\$2013–14). Similarly, we accept ActewAGL's proposed forecast for capital contributions of \$25.2 million (\$2013–14).

### B.3.2 Revised proposal

In its revised proposal, ActewAGL included a forecast of connections expenditure of \$77.6 million (\$2013–14) and a forecast of capital contributions of \$25.2 million (\$2013–14).

This is lower than ActewAGL's initial proposal which included forecasts of \$91.42 million (\$2013–14) for connections and \$41.16 million (\$2013–14) for capital contributions. The change in proposed capex since ActewAGL's initial proposal reflects the re-classification of relocation and replacement connections activities from standard control into alternative control services, as explained below.

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<sup>101</sup> ActewAGL, *Regulatory proposal: Attachment D3: Customer initiated capital works plan, Network augmentation capital works plan, Asset management plan*, 30 May 2014, pp. 18.

### B.3.3 Reasons

Our draft decision accepted ActewAGL's proposed connections forecast. We accepted the forecast after considering trends relative to recent expenditure and our assessment that the forecast was consistent with expected construction activity in the ACT. Our draft decision set out our full reasons for accepting ActewAGL's forecasts.<sup>102</sup>

However, in the draft decision we noted that there was a discrepancy in the forecast of customer contributions included in ActewAGL's proposal and Post Tax Revenue Model (PTRM). Further, in our draft decision we noted our understanding that funding for relocation and replacement connection services should be recovered from the individual requesting customer, rather than the service cost recovered across the whole customer base as standard control services.<sup>103</sup> As a result, we adopted the higher forecast included in ActewAGL's PTRM as we considered this better reflected the likely contributions that ActewAGL would receive, including for relocation and replacement connection services.<sup>104</sup>

ActewAGL's revised proposal reflects this position that customers should directly pay for the relocation and replacement services that they request. Accordingly, we have included ActewAGL's forecast in our alternative estimate.

## B.4 AER findings and estimates for replacement expenditure

Repex is driven by a service provider's need to replace its assets. In the long run, a service provider's assets will no longer meet the requirements of the network and need to be replaced, refurbished or removed.<sup>105</sup> Replacement may occur when an asset fails, or a condition assessment may find it is likely to fail soon and replacement is the most economic option. It may also occur because jurisdictional safety regulations mean it can no longer be safely operated on the network, or because the risk of using the asset exceeds the benefit of continuing to operate it on the network.

In general, the majority of network assets will remain in efficient use for far longer than a single five year regulatory control period. As a consequence, a distributor will only need to replace a portion of its network assets in each regulatory control period. The majority of its assets will remain in commission beyond the end of the regulatory control period, and be replaced in subsequent regulatory control periods.

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<sup>102</sup> AER, Draft Decision, *ActewAGL distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014, p. 42.

<sup>103</sup> AER, Draft Decision, *ActewAGL distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014, p. 43.

<sup>104</sup> Draft Decision, *ActewAGL distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014, p. 43.

<sup>105</sup> Assets may also be replaced due to network augmentation. In these cases the primary reason for the asset expenditure is not the replacement of an asset that has reached the end of its economic life, but the need to deploy new assets to augment the network, predominantly in response to changing demand.



Our assessment of repex seeks to establish what portion of ActewAGL's assets are likely to require replacement over the 2014–19 period, and the associated expenditure.

### **B.4.1 Position**

We do not accept ActewAGL's revised proposed repex. We have instead included in our alternative estimate of overall total capex, an amount of \$104.6 million (\$2013-14) for repex, excluding overheads, a reduction of nine per cent on ActewAGL's revised proposal. We are satisfied that this amount reasonably reflects the capex criteria.

### **B.4.2 Revised proposal**

ActewAGL maintained \$112.3 million for repex,<sup>106</sup> excluding overheads in its revised proposal, as was in its initial proposal. The AER's draft decision included \$98.6 million for repex.

### **B.4.3 Explanation of AER approach**

In our draft decision, we applied several assessment techniques to assess ActewAGL's forecast of repex against the capex criteria. These techniques were:

- analysis of ActewAGL's long term total repex trends
- predictive modelling of repex based on ActewAGL's assets in commission
- review of ActewAGL's major repex programs
- consideration of various comparative performance metrics of repex between NSPs
- consideration of various asset health indicators.

In response to ActewAGL's comments about some of the above assessment techniques, we have clarified our application of those techniques and the extent to which we have relied on the outcomes of each in this final decision. In the course of doing so, we have addressed the further information ActewAGL has provided in its revised proposal.

We primarily use our predictive modelling to assess 70 per cent of ActewAGL's proposed repex in combination with the findings of our review of its major projects.

For the remaining categories of expenditure, we do not use our predictive modelling but rely instead on the analysis of historical expenditure for those categories as supported by the findings from our review of ActewAGL's major projects.

We note that the other assessment techniques were considered, but were not ultimately used to reject ActewAGL's forecast of repex or develop our alternative

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<sup>106</sup> In our draft decision we considered ActewAGL's initial proposal was \$114.5 million. Following clarification of balancing items ActewAGL's revised proposal number is \$112.5, see Table 6-6.

estimate, though our findings from those other assessment techniques are consistent with our overall conclusion.

We note that the outcomes of our other assessment techniques are consistent with our overall conclusions.

## Trend analysis

We recognise the limitations of expenditure trends, especially in circumstances where replacement needs may change over time (e.g. a distributor may have a lumpy asset age profile or legislative obligations may change over time). In recognising these limitations, we have used this analysis to draw general observations in relation to repex, but we have not used it to reject ActewAGL's forecast of repex or develop our alternative estimate.

## Predictive modelling

The repex model can predict the reasonable amount of repex ActewAGL would require if it maintains its current risk profile for condition-based replacement into the next regulatory control period. Using what we refer to as calibrated replacement lives in the repex model gives an estimate that reflects 'business as usual' asset replacement consistent with maintaining ActewAGL's asset replacement practices. We explain the calibrated replacement life scenario, along with other input scenarios, further at section B.4.4.

We use predictive modelling to estimate a quantum of business as usual repex for the modelled categories to assist in our assessment. However, predictive modelling is not the only assessment technique we have relied on in assessing ActewAGL's proposal. Our other techniques, which are mostly qualitative in nature, allow us to form a view as to whether there is evidence that business as usual expenditure will not be sufficient to reasonably reflect the capex criteria.

Any material difference from the calibrated (business as usual) estimate could be explained by evidence of a non-age related increase in asset risk in the network (such as a change in jurisdictional safety or environmental legislation) or evidence of significant asset degradation that could not be explained by asset age. We use our qualitative techniques, particularly our review of ActewAGL's major repex programs, to assess whether there is any such evidence. In this way, we consider that the repex model does serve as a 'first pass' test, as set out in our Expenditure Forecast Assessment Guideline.<sup>107</sup>

Our Guideline sets out our techniques but does not dictate how we arrive at an alternative estimate. When choosing our alternative estimate we have in part relied on the repex model to quantify our overall estimate of repex. This is once we have been

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<sup>107</sup> AER, Expenditure Forecast Assessment Guideline for Electricity Distribution, November 2013, p. 11.



satisfied that there is not sufficient evidence before us to support any asset replacement above business as usual requirements.

We recognise that our predictive modelling cannot perfectly predict ActewAGL's necessary replacement volumes and expenditure over the next regulatory control period, in the same way that no prediction of future needs will be absolutely precise. However, we consider the repex model is suitable for providing a reasonable statistical estimate of replacement volumes and expenditure for certain types of assets, where we are satisfied we have the necessary data. We explain our reasons for this in Appendix D of our draft decision.<sup>108</sup>

The model has the advantage of providing both a bottom up assessment, as it is based on detailed sub-categories of assets using data provided by the service providers, and once aggregated it provides a well-founded high level assessment of that data. The model can also be calibrated using data on ActewAGL's entire stock of network assets, along with ActewAGL's actual replacement practices, to estimate the repex required to maintain its current risk profile.

We recognise that there are reasons why some assets may be better assessed outside of the model. Where we considered this was justified, we have separately assessed those assets by using techniques other than predictive modelling.

## Review of major repex projects

Our task is to determine the prudent and efficient amount of total forecast capex. We assess repex as one of the drivers which contributes to total capex. In assessing repex we examined some of the major repex programs ActewAGL included in its proposal. We used our assessment of these major programs in combination with our other assessment techniques, to determine whether ActewAGL's forecast repex will contribute to a prudent and efficient amount of total forecast capex.

Our assessment does not involve accepting or rejecting specific programs of work and the associated expenditure. For each major repex program we examined whether ActewAGL had sufficiently justified both the need for the program, and the amount of associated expenditure.

Where we determined there was sufficient justification for a program, this does not mean we are approving or directing that ActewAGL spend the exact amount of expenditure it proposed on exactly that program. Nor are we approving or directing ActewAGL's specific asset management strategies. Conversely, where we determined there was insufficient justification for a program, this does not mean we are disallowing the program, or restricting the precise amount of expenditure ActewAGL can incur on the program, or directing what ActewAGL's asset management strategies should be. Our assessment shows that we do not agree that the program, in part or in total, is

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<sup>108</sup> AER, Draft decision, ActewAGL distribution determination 2015-16 to 2018-19, Attachment 6: Capital expenditure, appendix D, November 2014.

likely to contribute to an efficient overall capex program that reasonably reflects the capex criteria. As discussed in our capex attachment, once we approve total capex, ActewAGL will have to prioritise its capex program given the prevailing circumstances at the time (such as demand and economic conditions that impact during the regulatory control period). We consider that, acting prudently and efficiently, ActewAGL will consider the changing environment throughout the regulatory control period and make sound decisions taking into account its individual circumstances.

## **Asset health indicators and comparative performance metrics**

We have used a number of asset health indicators with a view to observing asset health. Historical trend in unplanned outages is one such indicator. We have relied on changes in unplanned outages to provide an indication as to whether ActewAGL's assets are likely to deteriorate more or less than would be expected given the age of its assets. We consider this is a useful check on the outcomes of our predictive modelling in that unlike the other indicators, and the predictive modelling itself, it is not age based.

The remaining indicator we have used is aged based. We acknowledge that this is less useful for providing a check on the outcomes of our predictive modelling because the model also assumes age is a reasonable proxy for asset condition. While providing some context for our decision, we have not relied on this age-based indicator to any extent to inform our alternative estimate. We do note that ActewAGL has also used age based indicators in its revised proposal.<sup>109</sup> ActewAGL's use is consistent with a general acceptance that the age of assets is a reasonable proxy for asset condition. This assumption accords with our use of our predictive modelling.

Another factor we have had regard to in assessing ActewAGL's proposed repex was its performance on relevant performance metrics. Similar to trend analysis as discussed in section B.4.4 our use of these high level benchmarks has been to draw general observations from past performance. This analysis indicates that ActewAGL compares unfavourably to other distributors. However, we have not used this analysis in determining our alternative estimate. We have used other techniques that take into account the issues raised by ActewAGL.

ActewAGL submitted in its revised proposal that these measures do not account for the nature of repex drivers, which are:<sup>110</sup>

- the volumes and types of assets on the system
- the overall age profile of the system assets as a whole
- the overall condition and serviceability of the assets on the system, and any specific deficiencies in individual asset classes

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<sup>109</sup> ActewAGL, Revised Regulatory Proposal 2015-19, p.167.

<sup>110</sup> ActewAGL Revised Regulatory Proposal, p.331.

- the estimated unit replacement cost of assets that have reached the end of their economic service life.

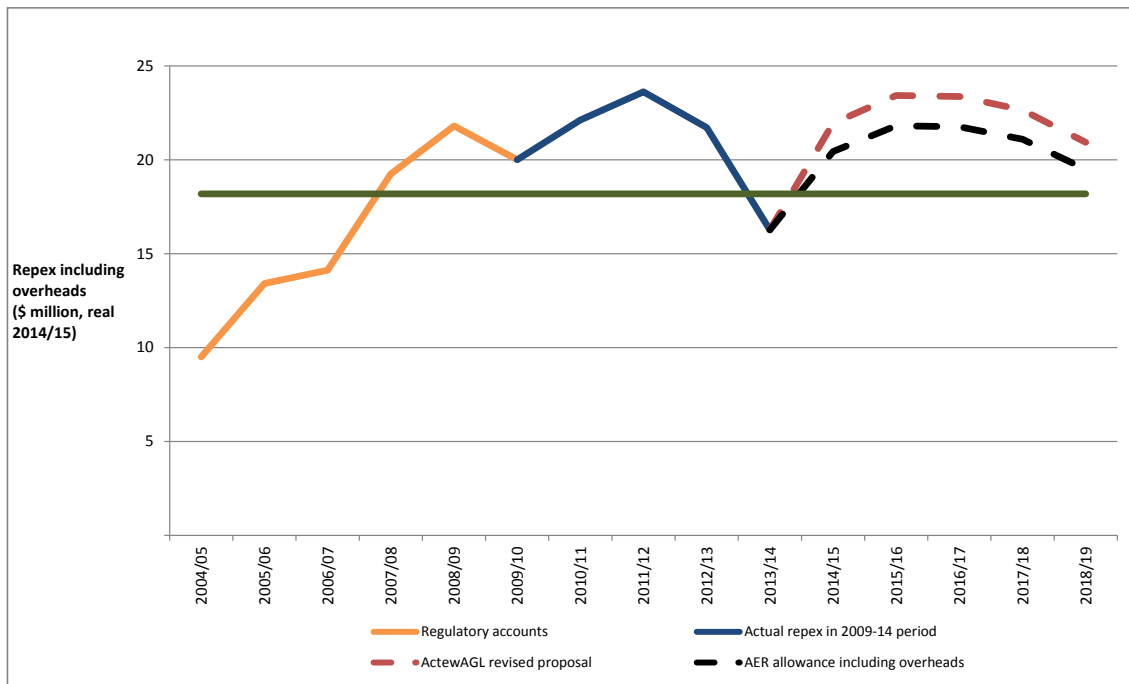
We acknowledge ActewAGL's submission and note that we have not used this analysis to reject ActewAGL's forecast of repex or develop our alternative estimate.

#### B.4.4 AER repex findings

##### Trends in historical and forecast repex

For the reasons set out below, we remain of the view that our trend analysis, as set out in our draft decision, provides an informed starting point for further enquiry. Figure B-2 below shows the trends in ActewAGL's actual and expected repex compared to the long run average level of repex.

**Figure B-2 Trends in ActewAGL's repex including overheads (real \$ million June 2014)**



Source: AER analysis

We acknowledge sourcing historical data prior to the 2009-14 period is difficult given the varied definitions of replacement capex ActewAGL has reported against.<sup>111</sup>

<sup>111</sup> We sourced the data for the initial years in Figure B-2 from the ActewAGL's regulatory accounts submitted to the ACT Independent Competition and Regulatory Commission. ActewAGL's actual repex for the 2009-14 period is sourced from ActewAGL's Reset RIN, Table 2.1.1 - Standard control services capex. With the revised proposal sourced from ActewAGL's response to information request 061. Note that we have included overheads on a proportional basis and at a rate consistent with final decision for the forecast to improve comparability with the

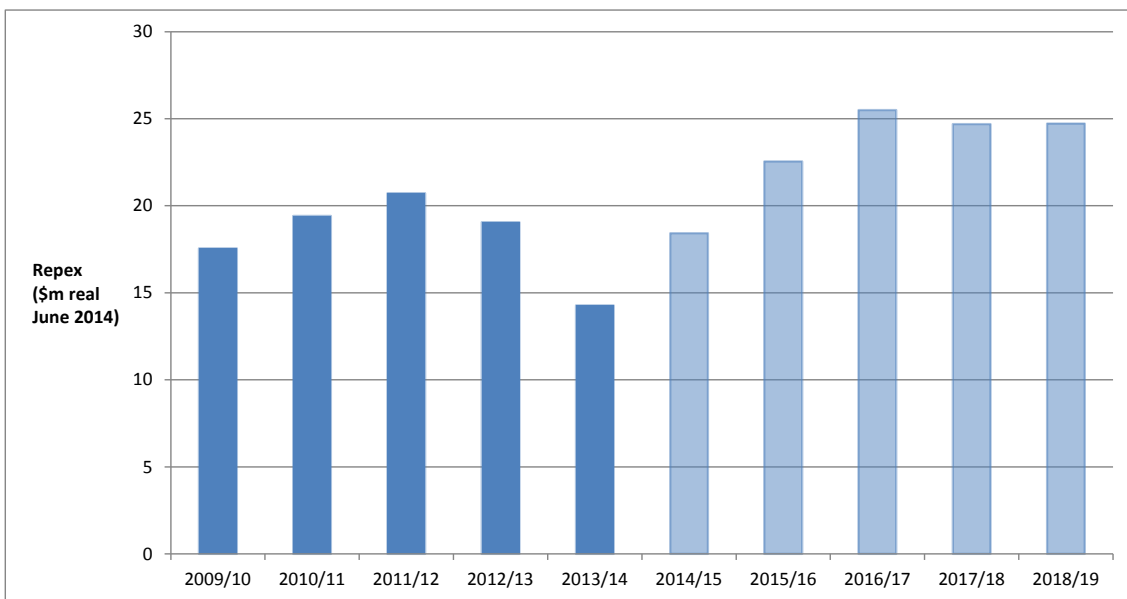
However we are satisfied that from the data available to us, shown in Figure B-2, that recent actual and expected repex is above that which ActewAGL incurred in the early years of the trend.

ActewAGL in its revised proposal submitted that it is not appropriate to base future repex requirements on historic expenditure.<sup>112</sup>

As we discuss above we have clarified the extent to which we have relied on trend analysis. We consider the analysis can be informative as a starting point for our analysis as it does provide insights regarding the scale of proposed repex against previous repex. In particular, this analysis indicates that ActewAGL's proposed expenditure is relatively higher than historical expenditure and the long term trend.

Consistent with our earlier discussion that expenditure trends are used as a starting point on whether ActewAGL's proposed repex for the 2014-19 period reasonably reflects the capex criteria, we have compared its proposal with that incurred in the 2009-14 regulatory control period. Figure B-3 below is a subset of Figure B-2 and compares the year on year profile for actual and expected repex across the 2009-14 and 2014-19 periods.

**Figure B-3 Actual and expected repex direct costs (\$ million real June 2014)**



Source: AER analysis

From the above we note ActewAGL's revised repex proposal for the 2014-19 period sharply inclines in the initial years of the forecast period before flattening out in the

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regulatory accounts data that is inclusive of overheads. We have applied CPI deflators to historical nominal expenditure from CPI figures published by the ABS (Series Cat no 6401.0).

<sup>112</sup> ActewAGL Revised Regulatory Proposal 2015-19, p.329, pp.333-34

later years. Figure B-3 shows the initial years of the 2014-19 period mirror the later years of 2009-14 period. This has the effect of producing a 'V' shape expenditure profile.

ActewAGL submitted in its revised proposal that repex for the 2014-19 period departs from its expenditure in the 2009-14 period, in part, because it has shifted its asset management strategy from one of 'run to failure' to 'condition based monitoring' or 'age and condition based replacement' for some asset classes. We have scrutinised ActewAGL's proposed expenditure for major repex programs related to underground cables, overhead conductors and pole top structures as part of our assessment.

## Predictive modelling

We use predictive modelling to estimate how much repex ActewAGL is expected to need in future, given how old its current assets are, and based on when it is likely to replace the assets. In this final decision, as in our draft decision, we have arrived at a modelling outcome based on calibrated replacement lives as the basis for our repex estimate. When combined with forecast unit costs based on ActewAGL's data, this results in an estimate that reflects ActewAGL's existing approach to managing risk. This modelling outcome gave an estimate of \$76.6 million for the five modelled asset categories. We have reached this conclusion only after evaluating this outcome against our other techniques.

This 'business as usual' repex estimate from our predictive modelling is based on:

- ActewAGL's current risk profile as evidenced by its own replacement practices. Our estimate trends forward ActewAGL's current approach to asset risk management, weighted by the actual age of its assets.
- ActewAGL's own forecast unit costs for the next regulatory control period. These reflect the unit costs ActewAGL expects to incur over the next five year control period based on information it provided under the RIN.

This estimate uses ActewAGL's own forecast unit costs, but it effectively 'calibrates' the proposed forecast replacement volumes to reflect a volume of replacement that is consistent with ActewAGL's recent observed replacement practices.

In the draft decision, we considered a reasonable range of model outcomes before deciding on an alternative repex forecast. Both ends of this range were based on the use of calibrated lives. However, we used ActewAGL's forecast unit costs and the average benchmarked unit cost from all service providers in the NEM to provide a range of outcomes.<sup>113</sup>

In our draft decision, we ultimately decided that the service provider's own data provided the best estimation of unit cost, and applied ActewAGL's forecast costs rather than the industry benchmark. We are of the same view in the final decision.

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<sup>113</sup> AER, Draft decision, ActewAGL distribution determination, November 2014, Attachment 6, p. 6-11.

ActewAGL raised specific concerns regarding the repex modelling outcomes for particular asset groups where the forecast outcome was lower than its regulatory proposal. The repex modelling outcomes differed from ActewAGL's proposed repex for each asset group, but some expenditure outcomes were higher and some were lower than the regulatory proposal. The outcomes of our predictive modelling assessment are not intended to dictate the particular amounts ActewAGL should spend on its particular asset groups, or how it should conduct its asset management strategies. As we highlighted in our capex attachment, the assessment techniques that focus on sub-categories of expenditure (e.g. repex) are not conducted for the purpose of determining what projects or programs of work ActewAGL should or should not undertake. This is consistent with the regulatory framework and the AEMC's statement that the AER does not approve projects.

Taken in aggregate our modelling predicts the business as usual amount of repex for the 2014–19 period is \$76.6 million, or around 4 per cent lower than ActewAGL's proposal. We separately reviewed ActewAGL's materials supporting its major projects. These did not indicate a change in underlying risk which could justify a change from a business as usual approach. This suggests that ActewAGL's proposed repex forecast was higher than the amount that would likely contribute to a prudent and efficient amount of total forecast capex.

### ***Model inputs***

The repex model uses the following inputs:

- The asset age profile input is the number of assets in commission and when each one was installed.
- The replacement life input is a mean replacement life and standard deviation (i.e. on average, how old assets are when they are replaced).
- The unit cost input is the unit cost of replacement (i.e. on average, how much each asset costs to replace).

In the draft decision, we described using the repex model to create three scenarios. In each of the three modelling scenarios (base case scenario, calibrated scenario and benchmark scenario) we combined different data for the final two inputs.

Under all scenarios, the first input is ActewAGL's asset age profile (how old ActewAGL's existing assets are). This is a fixed input in all three scenarios.

The second and third inputs can be varied by using different input assumptions about:

- how long we expect an asset to last before it needs replacing
- how much it costs to replace it.

The repex model takes the replacement life input for each asset category and applies it to the actual age of the assets in each asset category, on an asset category basis. In doing this it calculates when and how many assets in the asset category will need replacement in the near future.<sup>114</sup> The model then applies the unit cost input to calculate how much expenditure is needed for that amount of replacement in each asset category. This is aggregated to a total repex forecast for each of the next 20 years.

Table B-4 outlines the replacement lives and unit cost inputs we tested in the repex model. As part of our assessment, we compared the outcomes of using ActewAGL's estimated replacement lives and its unit costs, both forecast and historical, with the replacement lives and unit costs achieved by other NEM distributors. We also used the repex model to determine calibrated replacement lives that are based on ActewAGL's past five years of actual replacement data. These reflect ActewAGL's recent past approach to replacement.<sup>115</sup>

We calculated historic unit costs by dividing historic expenditure by historic volumes. We calculate forecast unit costs by dividing forecast expenditure by forecast volumes. Forecast unit costs were significantly lower than historical unit costs.

Detail on how we prepared the model inputs is at Appendix D in our draft decision.<sup>116</sup>

**Table B-4 Repex model inputs**

Input	AER comments in draft decision
<b>Mean replacement lives</b>	
ActewAGL estimated replacement lives	<p>When used in the repex model, ActewAGL's estimated replacement lives produced forecast repex estimates several times higher compared to when we used any other replacement lives, and several times higher than ActewAGL's own repex forecast.</p> <p>The model also forecast a sharp 'step-up/trend down' forecast expenditure profile. That is, it predicted there was a significant amount of repex required in the first year of the forecast period. This indicates the replacement lives used by ActewAGL are likely to be too short and do not represent its actual replacement behaviour as they predict a large unrealistic 'backlog' of replacement of assets that were far older than would be expected if the replacement lives were accurate.</p>
Calibrated replacement lives based on ActewAGL data	<p>As set out above, we considered ActewAGL's estimated replacement lives were not appropriate. By contrast, calibrated replacement lives reflect ActewAGL's actual approach to replacement in the most recent five years. We discuss these calibrated replacement lives in detail in section B.4.4.</p>
Benchmark estimated replacement lives	<p>We developed a series of benchmark replacement lives using the data collected from all NEM distributors in the category analysis RINs. For model inputs we used the average, third quartile (above average), and longest replacement lives of all NEM distributors for</p>

<sup>114</sup> The repex model predicts replacement volumes for the next 20 years.

<sup>115</sup> For discussion on how we prepared each of the inputs see, AER, Draft decision, ActewAGL distribution determination, Attachment 6, appendix D, November 2014, p. 6-98.

<sup>116</sup> AER, Draft decision, ActewAGL distribution determination, Attachment 6, appendix D, November 2014.



	<p>each category.</p> <p>As with ActewAGL's estimated replacement lives, we found using these benchmark replacement lives produced sharp 'step-up/trend down' forecast expenditure, indicating the replacement lives used are likely to be too short for modelling purposes as they predict a large unrealistic 'backlog' of replacement. When used in the model these also produced outcomes higher than ActewAGL's own forecasts.</p>
Benchmark calibrated replacement lives	<p>We developed benchmark calibrated lives by first using the repex model to calculate calibrated lives based on the replacement data from all NEM distributors. For model inputs we again used the average, third quartile (above average), and longest of the calibrated lives of all NEM distributors for each category.</p> <p>When applied to the model for ActewAGL, these lives produced outcomes lower than when we used the calibrated lives based on ActewAGL's data. The calibrated benchmark replacement lives will reflect to some extent the particular circumstances of a distributor and this may not be applicable to the business under review. At most, this input allowed us to check that ActewAGL's calibrated lives were reasonable against its peer service providers in the NEM.</p>
<b>Unit cost of replacement</b>	
ActewAGL unit costs (historic)	<p>When used in the repex model, ActewAGL's historic unit costs as submitted under its RIN gave forecast outcomes several times higher than when we used any other unit cost, and several times higher than ActewAGL's own repex forecast. This indicates historic unit costs are not likely to reflect a realistic expectation of input costs.</p>
Unit costs achieved in the most recent five years	
ActewAGL unit costs (forecast)	<p>As outlined above we considered it was not appropriate to use ActewAGL's historic unit costs. We compared industry benchmark unit costs to ActewAGL's forecast unit costs and observed that ActewAGL's forecast unit costs did not result in significantly higher forecasts. As a result we accepted the use of ActewAGL's own forecast unit costs rather than industry benchmarks.</p> <p>We developed industry benchmark unit costs using the data collected from all NEM distributors in the category analysis RINs. For model inputs we used the average, first quartile (below average), and lowest unit costs of all NEM distributors for each asset category.</p>
Unit costs ActewAGL forecasts for the next five years	
Industry Benchmark unit costs	<p>As set out above, applying the average benchmark unit costs in the repex model for ActewAGL gave an outcome that was slightly lower compared to when we used ActewAGL's forecast unit costs. The outcomes when using the first quartile and lowest unit cost benchmark numbers were significantly lower. We considered the benchmark average unit cost was a useful comparison with the cost of other distributors in the NEM.</p>

Source: AER analysis

### ***Calibrated replacement lives input***

The calibrated replacement lives use ActewAGL's recent asset replacement practices to estimate a replacement life for each asset type. These replacement lives are calculated by using ActewAGL's past five years of replacement volumes, and its current asset age profile (which reveals how many, and how old, ActewAGL's assets are), to find the age at which, on average, ActewAGL replaces its assets. The



calibrated replacement life represents this age. We explain the process of calculating calibrated lives in our repex model handbook.<sup>117</sup>

Our premise is that these calibrated replacement lives necessarily form the basis of a business as usual forecast for repex because they are derived from the service provider's actual replacement practice observed over the past five years.

The service provider decides to replace each asset at a certain time by taking into account the age and condition of its assets, its operating environment, and its regulatory obligations. If the service provider is currently meeting its network reliability, quality and safety requirements by replacing assets when they reach a certain age, then by adopting the same approach to replacement in future they are likely to continue to meet their obligations.

However, if underlying circumstances are different in the next regulatory control period, then the business as usual approach to replacement age may no longer allow a distributor to meet its obligations. We consider a change in underlying circumstances is constituted by a genuine change in the underlying risk of operating an asset, genuine evidence that there has been a change in the expected non-age related condition of assets from the last regulatory control period, or a change in regulatory obligations (e.g. obligations governing safety and reliability).

If we are satisfied that there is evidence of a change in a service provider's underlying circumstances, we will accept that future asset replacement should not be based on a business as usual approach. This means that where there is evidence that a service provider's risk profile has changed then it may be necessary to provide a forecast of repex that exceeds the business as usual estimate. This higher forecast would be required in order to satisfy us that the amount reasonably reflects the capex criteria.

ActewAGL considered one of the key weaknesses of the model is its assumption under the calibrated lives scenario that past replacement volumes and expenditures are the best indicator of future efficient needs, and "back-engineers" an asset life that fits that construct.<sup>118</sup> It submitted a report by Jacobs to support its position. Jacobs considered the repex modelling and calibration process were fundamentally flawed in logic.<sup>119</sup>

We reviewed the submissions of ActewAGL and Jacobs and maintain our reasoning from the draft decision. Our predictive modelling approach is well established having been used by us in previous distribution determinations and by other regulators.<sup>120</sup> It

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<sup>117</sup> AER, Replacement expenditure model handbook, November 2013, p. 20.

<sup>118</sup> ActewAGL Revised Regulatory Proposal 2015-19, p. 325.

<sup>119</sup> Ausnet Services and Energy Networks Association expressed similar concerns to ActewAGL; Ausnet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015, p. 4; Energy Networks Association, *AER Draft decision for NSW and ACT electricity distributors, ENA response*, 13 February 2015, p. 12

<sup>120</sup> OFGEM, *Strategy decisions for the RIIO-ED1 electricity distribution price control - Tools for cost assessment*, March 2013, p. 44; AER, *Final decision: Victorian electricity distribution network service providers: Distribution determination 2011–2015*, October 2010; AER, *Final decision: Aurora Energy distribution determination*, April 2012.

has been refined following extensive consultation as part of the Better Regulation program. It was clear from our engagement with stakeholders in that process that calibration is understood to be an integral part of good practice in repex modelling for the very reason that it utilises updated data provided by the business being regulated. It is not an arbitrary process or one which involves manipulation to arrive at a pre-determined outcome. It is a systematic process with a transparent purpose.

Jacobs also submitted that future replacement needs cannot be predicted by looking at recent past investment and expenditure.<sup>121</sup> However, we consider that Jacob's understanding in this respect fundamentally misconstrues the workings of the model. We reiterate that using calibrated replacement lives in the repex model is not trending forward past expenditure or volumes. It is trending forward ActewAGL's approach to replacement given its current stock of assets in commission and asset age profile. It is akin to maintaining a business as usual approach. We further assess whether there is evidence that the service provider requires a different forecast to meet the capex criteria through our application of other assessment techniques.

Jacobs submitted that we failed to recognise other factors such as the investment cycle of each asset class, one-off major projects or changing asset characteristics. We disagree for two key reasons. The use of calibrated replacement lives captures ActewAGL's recent replacement practices and the age of all its assets in commission. This is expected to reflect relevant factors ActewAGL considers when replacing its assets. Further, and as discussed in our draft decision, we do recognise that some assets should not be modelled for a variety of reasons.<sup>122</sup> We discuss our approach to un-modelled assets below.

Jacobs is of the view that we did not substantiate why ActewAGL's base case replacement lives (that is, the replacement lives proposed by ActewAGL) were inappropriate, or why the calibrated lives were most suitable. As discussed in our draft decision, we considered the asset lives ActewAGL submitted were inappropriate as they produced an outcome under the base case scenario modelling that was significantly higher than when we used other input lives (calibrated and benchmark), and even higher than ActewAGL's own forecasts. They also produced a replacement profile heavily weighted towards the first year of the regulatory control period. Such an outcome is not consistent with ActewAGL's recent approach to asset replacement. If the base case replacement lives were accurate then based on the modelling outcome we would have to accept that ActewAGL has maintained many assets on its network far longer than their average replacement life would suggest as reasonable. We do not consider that this can be accepted given the evidence of ActewAGL's recent replacement practices. The base case data is problematic because it leads to such an anomalous outcome. By contrast, the calibrated lives are the only replacement lives based on ActewAGL's recent observed practices.

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<sup>121</sup> Jacobs, Regulatory Submission, ACTEWAGL DISTRIBUTION, Focussed Critique of AER's REPEX - 'Calibrated Model', pp. 1-2.

<sup>122</sup> AER, Draft decision, ActewAGL distribution determination, Attachment 6, appendix D, November 2014, p. 6-99.

## ***Un-modelled repex***

We have maintained our approach from the draft decision for unmodelled repex categories. Repex categorised as: overhead conductor; supervisory control and data acquisition (SCADA), network control and protection (collectively referred to hereafter as SCADA); pole top structures and "other" in ActewAGL's RIN response were not included in the repex model. As noted in Appendix D of our draft decision, we did not consider these asset groups were suitable for inclusion in the model, either because of lack of commonality, or because we did not possess sufficient data to include them in the model. Together, these categories of repex account for \$34 million (or 30 per cent) of ActewAGL's proposed repex.

As we are not in a position to directly use predictive modelling for these asset categories, we have placed more weight on our review of ActewAGL's major projects and on ActewAGL's recent historical repex.

We have maintained our decision on un-modelled repex to accept the SCADA and "other" categories as outlined in our draft decision. We are satisfied that the amounts of \$6.9 million for the SCADA category and \$9.6 million for the "other" category will contribute towards a total capex forecast capex amount that is sufficient to meet the capex criteria in the 2014–19 period.

However, in light of supporting information from ActewAGL we have amended our findings on overhead conductor and pole top structures repex. ActewAGL forecast \$17.9 million of repex for overhead conductor and pole top structures replacement. In the 2009–14 period, ActewAGL's repex for overhead conductors and pole top structures was \$6 million. We maintain that we are not satisfied that ActewAGL has justified the need for a change in repex on overhead conductor and pole top replacement. We outline our reasons in our draft decision and below. However, we have taken into account supporting information from ActewAGL indicating some of the increase in repex is offset by a decrease in opex. ActewAGL submitted that it reallocated \$5.5 million of forecast repex for pole top structures from opex to repex. Further, that this expenditure effectively maintains historic volumes and unit costs.<sup>123</sup> Consequently, we are satisfied that repex of \$11.5 million for overhead conductor and pole top structures will contribute towards a total capex forecast capex amount that is sufficient to meet the capex criteria in the 2014–19 period.

## **Major repex programs**

We maintain from our draft decision that we are satisfied ActewAGL has sufficiently justified its pole replacement program. However, we also maintain that we are not satisfied ActewAGL has sufficiently justified the proposed expenditure related to its underground cables, overhead conductors or pole top structures programs. We

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<sup>123</sup> ActewAGL, Email response to information request AER ACTEW 063, reallocation of opex to repex , 17 March 2015.

acknowledge ActewAGL's justification for the need for these programs, but remain of the view it has not provided sufficient evidence to support its proposed level of expenditure such that it reasonably reflects the capex criteria.

As explained above, the findings of our review of ActewAGL's major repex programs do not mean we are accepting or rejecting specific projects or programs of work. Rather, our findings supported by historical repex and predictive modelling outcomes suggest a lower amount of repex is likely to contribute to a prudent and efficient amount of total forecast capex.

### ***Underground cables***

We maintain our draft decision and reasons that we are not satisfied ActewAGL has sufficiently justified the level of forecast expenditure associated with its underground cables repex.

ActewAGL provided forecast cable failure rates based on regression analysis using historic data. We are of the view that ActewAGL did not sufficiently justify why its regression analysis approach was appropriate to apply to cable fault forecasting. We consider this methodology and its outcomes are not reliable because:

- This forecasting method is based on trending forward failure rates. This analysis does not take into account the actual age or condition of the assets in question. We do not consider it is appropriate to take a failure rate based on a certain population of assets, and simply trend it forward to apply to a different population of assets.
- ActewAGL forecasts its cable fault rate will increase by 50 per cent over the next five years.<sup>124</sup> However, its high voltage cable fault rate has remained steady between 15 and 20 faults per year over the past 12 years with only two exceptions. ActewAGL has not justified why there would be such a significant change in likely asset condition over the next five years.
- ActewAGL forecasts its associated reactive maintenance cost will increase by 160 per cent over the next regulatory control period.<sup>125</sup> It is unclear how this increase is consistent with the forecast cable fault rate increase of 50 per cent over the same period.
- ActewAGL has not justified why its cable reactive maintenance cost increased by 150 per cent over the past five years to 2012–13 while its cable fault rate did not have a similar rate of increase.<sup>126</sup> That is, this is an apparently significant increase in the unit cost to repair cable faults over this period which ActewAGL has not justified.

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<sup>124</sup> ActewAGL, D14 HV underground cable condition assessment project justification report, 7 January 2015, Figures 2 and 3.

<sup>125</sup> ActewAGL, D14 HV underground cable condition assessment project justification report, 7 January 2015, Table 4.

<sup>126</sup> ActewAGL, D14 HV underground cable condition assessment project justification report, 7 January, Figure 1.

ActewAGL stated its preferred option is to change its cable management approach from run to failure to a condition monitoring approach with prioritised replacement. This is a fundamental change of approach to managing a significant proportion of its assets. We recognise the need for underground cable asset renewal, but only to the extent it is reasonably demonstrated to be a prudent and efficient requirement to maintain the safety, reliability and quality of supply, and ActewAGL's obligations. In particular, we consider the proposed expenditure should be justified by quantified risks, consumer benefits and regulatory service obligations.

ActewAGL stated that its program represented the lowest cost option of those it considered for addressing anticipated cable failures.<sup>127</sup> However, we do not consider ActewAGL provided sufficient evidence or analysis to support its position. ActewAGL provided limited description of how it established the appropriate level of capex under its new approach to underground cable management.<sup>128</sup> It is unclear whether the proposed monitoring and replacement programs of work were optimised or prioritised. ActewAGL submitted its economic justification was based on life cycle cost analysis. That is, when the cost rate of the run to failure approach exceeds the cost of condition based replacement then the cable should be replaced.<sup>129</sup> However, ActewAGL has not estimated the benefits either in terms of cost savings over the assets life, or the consumer benefits as a result of the program.

### ***Overhead conductors and pole top structures***

We maintain our draft decision and reasons that we are not satisfied ActewAGL has sufficiently justified the level of forecast expenditure associated with its overhead conductors and pole top structures repx. The major replacement programs ActewAGL include are:

- rural pole top upgrade
- pole top hardware renewal/cross-arm replacement
- cast iron LV pothead replacement.

ActewAGL's supporting information and Jacob's review offer a sound description of the engineering issues around the general causes of pole top condition deterioration.<sup>130</sup> However, there is no quantified assessment of systemic failures, cost of risks, cost of remedies, or anticipated benefits of addressing issues. While the need to replace aging and failing overhead conductors and pole top structures exists, ActewAGL has not demonstrated that the cost of the program is proportionate to the risk reduction it intends to achieve.

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<sup>127</sup> ActewAGL, *Revised regulatory proposal*, p. 342.

<sup>128</sup> ActewAGL, Asset Specific Plan, UG Cables, 29 March 2014; ActewAGL, H.V Underground Cable Condition Assessment Project Justification Report, 7 January 2015.

<sup>129</sup> ActewAGL, *Revised regulatory proposal*, p. 348.

<sup>130</sup> ActewAGL, Asset Specific Plan – OH lines and pole top hardware, 29 May 2014; D17 – Jacobs, Regulatory submission, review of AER draft decision - REPEX, January 2015.

ActewAGL state that findings from the 2009 Royal Commission into the Victorian bushfires drive its rural pole top upgrade program. ActewAGL maintained its replacement programs in this category within its forecast repex during the 2009–14 period, reporting underspending on repex in each year. We would have expected ActewAGL to have already incorporated the Royal Commission's findings into its current asset management approach for the 2009–14 regulatory control period. That is, to the extent ActewAGL considered further repex was necessary based on its reassessment of risk in light of the Royal Commission recommendations. This is consistent with our view that where a distributor's underlying risk profile is expected to be similar going forward, its approach to asset replacement should be similar. In this context we are not satisfied there has been a change in ActewAGL's underlying risk profile regarding overhead conductors and pole top structures that would support the expenditure proposed.

ActewAGL provided further information in its revised proposal indicating that it has reallocated \$5.5 million of proposed expenditure for pole top hardware renewal/cross-arm replacement from opex to repex. On reviewing ActewAGL's supporting material we have taken this reallocation into account when assessing the change in expenditure between the 2009–14 period and the 2014–19 period.

We consider that ActewAGL has not provided a quantified assessment of the risks, costs and benefits of its proposed cast iron LV pothead replacement program. We do not consider there is adequate justification to support the level of proposed expenditure. ActewAGL proposed to replace the 500 potheads in its system over the next ten year period.<sup>131</sup> It proposes replacing 25 potheads each year based on their risk to public safety and replacing a further 25 potheads on an opportunity basis.<sup>132</sup> ActewAGL has not explained the basis of its forecast for replacement on an opportunity basis. This decision on the volume of replacements per year does not appear to be risk based. ActewAGL has submitted only that there have been a small number of cases of dangerous pothead explosions.

We do not dispute the general technical explanation for pothead explosion, and recognise there is a safety risk associated with their failure. However, ActewAGL has not presented a well quantified cost benefit analysis, or any risk assessment outcome. In particular, ActewAGL and Jacobs did not present an assessment of the likelihood and severity of the consequence of pothead failure.

For these reasons, we do not consider there has been a change in ActewAGL's existing risk profile or regulatory obligations to support increased risks going forward. Our findings here do not mean we are accepting or rejecting the program or setting out how ActewAGL should allocate its expenditure or approach its asset management. We consider our total capex forecast for the 2014–19 period will allow ActewAGL to meet

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<sup>131</sup> Professionals Australia also commented on ActewAGL's pothead replacements; Professionals Australia, *Response to the Australian Energy Regulator's draft regulatory determinations to NSW and ACT transmission and distribution businesses 2014 – 2019*, 12 February 2015, p. 13.

<sup>132</sup> ActewAGL Revised Regulatory Proposal 2015-19, p. 352.



its obligations, and ActewAGL can also prioritise its capex program or reallocate expenditure depending on its circumstances.

## Network health indicators

### *Network health indicators*

In preparing a proposal, distributors should factor in the condition or health of its network assets when determining the level of repex it requires to achieve the capex objectives.<sup>133</sup> Consistent with our draft decision we consider an important determinant of ActewAGL's repex requirements is the condition of its assets currently in commission.<sup>134</sup> In assessing this, we have considered:

- the estimated residual service life of ActewAGL's network by asset class
- unplanned outages.

### *Asset age*

Consistent with our draft decision we are satisfied that asset age can serve as a high-level proxy for asset condition. We consider that it is industry practice for service providers to include an assessment of asset age when determining its forecast repex requirements where asset condition data is not available. Further, we note ActewAGL uses asset age as an input to how it determines its asset management strategies.<sup>135</sup>

Figure B-4 reproduced from our draft decision indicates that ActewAGL has maintained its aggregate residual asset life across its major asset classes over time.

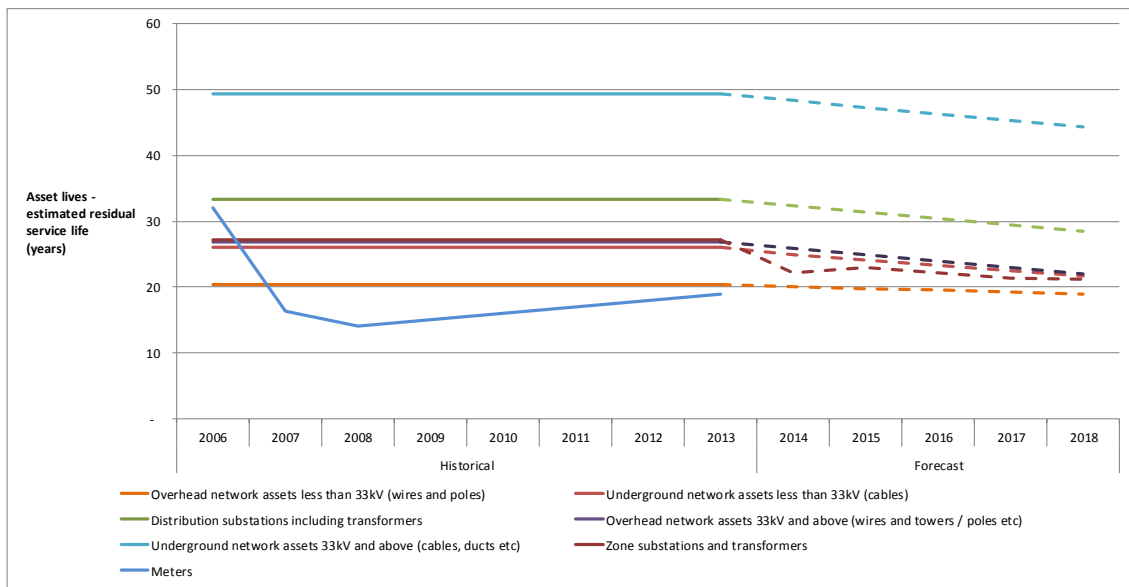
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<sup>133</sup> NER 6.5.7(3).

<sup>134</sup> AER, Draft decision, ActewAGL distribution determination, Attachment 6, November 2014, p. 6-51.

<sup>135</sup> ActewAGL Revised Regulatory Proposal 2015-19, p. 167.

**Figure B-4 ActewAGL Asset Lives – estimated residual service life**



Source: ActewAGL - EBT RIN - 4. Assets (RAB) - Table 4.4.2 Asset Lives – estimated residual service life (Standard control services).

We consider the above suggests that ActewAGL's network assets are not likely to deteriorate substantially in the future.

ActewAGL in its revised proposal contended the usefulness of measures related to network age in gauging network health. ActewAGL noted that forecast repex is dependent on the potential for asset failure, not the previous history of unplanned outages (SAIFI). This is because unplanned outages are influenced to some extent by asset condition, but are more highly correlated with weather and other environmental factors.<sup>136</sup>

We agree that environmental factors influence in-service asset failure rates. We note however that measures of SAIFI remove the impact of extreme weather events. As such, we are satisfied that historical trends in unplanned SAIFI provide a useful indicator of asset condition.

As explained above we have not used this technique to reject ActewAGL's revised proposal. Instead, the results point to the need for a more detailed assessment.

<sup>136</sup> ActewAGL Revised Regulatory Proposal 2015-19, p. 336.



## B.5 AER findings and estimates for capitalised overheads

Capitalised overheads are costs associated with capital works that have been capitalised in accordance with ActewAGL's capitalisation policy. They are generally costs shared across different assets and cost centres.

### B.5.1 Position

Whilst we have concerns with ActewAGL's forecast, in the absence of sufficiently robust evidence to the contrary, we accept ActewAGL's revised proposal of \$52.3 million (\$2013-14) of forecast capitalised overheads reasonably reflects the capex criteria and have included it in our alternative estimate.

### Revised proposal

ActewAGL's revised proposal included \$52.3 million (\$2013-14) of forecast capitalised overheads, which is unchanged from its initial proposal. ActewAGL did not accept our approach in our draft decision.<sup>137</sup> ActewAGL considers changes made to ActewAGL corporate overheads allocation methodology with effect from 1 July 2014 render the AER's trend analysis of limited probative value in assessing ActewAGL Distribution's forecast capex for capitalised overheads.

### B.5.2 AER approach

We accept that the changes in ActewAGL's CAM mean that the trend analysis conducted in our draft decision did not reflect anticipated increases in capitalised overheads in the 2014-19 period. Further, in our draft decision we applied an adjustment based on an observed historical ratio of overheads to capital expenditure. However, as a result of submissions on this approach from several distributors, we accept that this approach implicitly assumed that all overheads were variable. Accordingly, we do not consider it appropriate to apply our draft position in the final decision.

As a logical proposition we consider that reductions in ActewAGL's forecast expenditure should see some reduction in the size of ActewAGL's total overheads. Our assessment of ActewAGL's proposed direct capex, demonstrates that a prudent and efficient distributor would not undertake the full range of direct expenditure contained in ActewAGL's revised proposal and it follows that we would expect some reduction in the size of ActewAGL's capitalised overheads. We do accept that some of these overheads are relatively fixed in the short term and so are not correlated to the size of the expenditure program. However, we maintain that a portion of the overheads should vary in relation to the size of the expenditure.

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<sup>137</sup> ActewAGL, *Revised Regulatory Proposal*, p.354.

We have engaged in considerable consultation with ActewAGL regarding its overheads.<sup>138</sup> We sought to understand how overheads vary with the size of ActewAGL's expenditure program and in particular to quantify the proportion of overheads that are fixed and varied. ActewAGL submitted that:<sup>139</sup>

corporate overheads are fixed, and generally unaffected by changes in AAD's capital program.<sup>140</sup> Therefore, for a 1% increase/decrease in capex, ActewAGL expects that there would be a 0% change in corporate overheads.

In our view, it is unlikely that these costs are wholly fixed and we note that ActewAGL's submissions on this point have not been entirely consistent. We provided some regression analysis to ActewAGL and the other NSW/ACT distributors, which attempted to quantify the relationship between expenditure and capitalised overheads.<sup>141</sup> Our analysis indicates that some portion of these overheads are variable. However, in response the distributors identified a number of data issues underlying this regression analysis. ActewAGL and the other distributors also pointed to non-recurrent overheads and one-off adjustments are present in the historical data, which undermines the trend analysis:<sup>142</sup> Service providers submitted that factors which undermine this trend analysis include:

- Accounting adjustments to overhead costs such as year-end adjustments for provisions that account for employee related entitlements should be removed to reveal an underlying overhead cost trend. After removing these adjustments they contend the explanatory power of the regression is poor.
- The relationship does not demonstrate causality and the distributors propose a number of other reasons for the observed relationship.
- A limited number of data points for the regression.

We do not discount our regression analysis entirely, but at this stage accept that it is not sufficiently robust to form the basis of a mechanistic adjustment to ActewAGL's capitalised overheads. Without evidence to the contrary, we accept ActewAGL's proposed capitalised overheads reasonably reflect the capex criteria.

## **B.6 AER findings and estimates for non-network capex**

Non-network capex includes capex on information technology (IT), motor vehicles, buildings and property, and tools and equipment.

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<sup>138</sup> AER, information request, AER ACTEW 061.

<sup>139</sup> ActewAGL response to info request AER ACTEW 061. p.3.

<sup>140</sup> ActewAGL response to info request AER ACTEW 061. p.3.

<sup>141</sup> AER, information request, AER ACTEW 061.

<sup>142</sup> AER, Info request Ausgrid 055 plus follow-up requests; AER, Info request Endeavour 047 plus follow-ups requests; AER, Info request Essential 047 plus follow-ups requests; AER, Info request Actew 061 plus follow-ups requests.

In our draft decision, we accepted ActewAGL's forecast of non-network capex (including network IT) on the basis that:<sup>143</sup>

- ActewAGL has forecast capex for this category returning to levels consistent with expenditure in the period prior to the 2009–14 regulatory control period
- the significant reductions forecast for the ICT, buildings and property, and plant and equipment categories reflect the high level drivers of these categories
- the forecast increase in motor vehicles capex is a result of ActewAGL's switch from operating to finance lease arrangements, rather than inefficiencies or unit cost increases in the fleet program.

ActewAGL's revised proposal for non-network capex of \$57.3 million (\$2013-14), excluding overheads, corrects for minor errors in the data previously submitted to us but is otherwise consistent with ActewAGL's initial proposal.<sup>144</sup> Consistent with our draft decision, we accept that ActewAGL's forecast of non-network capex is a reasonable estimate of the efficient costs required for this capex category. We have included it in our alternative estimate of total capex for the 2014–19 period.

## B.7 Demand management

Demand management refers to non-network strategies to address growth in demand and/or peak demand. Demand management can have positive economic impacts by reducing peak demand and encouraging the more efficient use of existing network assets, resulting in lower prices for network users, reduced risk of stranded network assets and benefits for the environment.

Demand management is an integral part of good asset management for network businesses. Network owners can seek to undertake demand management through a range of mechanisms, such as incentives for customers to change their demand patterns, operational efficiency programs, load control technologies, or alternative sources of supply (such as distributed or embedded generation and energy storage).<sup>145</sup>

The current incentive frameworks and obligations in the NER are designed to encourage distributors to make efficient investment and expenditure decisions. However, the NER recognises that the planning and investment framework and the incentive regulation structure may not be sufficient by themselves to remove any bias towards network capital investment over non-network responses.

As such, the NER set out that distributors should examine non-network alternatives when developing network investments through the regulatory investment test for distribution (RIT-D) process. The RIT-D requires distribution network businesses to consult with stakeholders on the need for new capex projects and consider all credible network and non-network options as part of their planning processes. Its aim is to

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<sup>143</sup> AER, *ActewAGL Draft Decision - Attachment 6: Capital expenditure*, November 2014, pp. 6-68 to 6-72.

<sup>144</sup> ActewAGL, *Revised regulatory proposal*, 20 January 2015, p. xii.

<sup>145</sup> AER, *Draft Decision, ActewAGL, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 64.

create a level playing field for the assessment of non-network options, such as demand-side management, against network options.

The NER also require us to consider the extent to which a business has considered efficient and prudent non-network alternatives in our assessment of capex proposals.<sup>146</sup> In addition, the NER require us to develop and implement mechanisms to incentivise distributors to consider economically efficient alternatives to network solutions. As set out in our demand management incentive scheme attachment (attachment 12), we are continuing ActewAGL's demand management innovation allowance.

### **B.7.1 Position**

We have maintained our view from the draft decision that it is most appropriate to rely on the incentive framework, together with the requirements in the RIT-D and the distribution Annual Planning Report, to drive the efficient use of demand management. The benefits of capex deferral would be shared with consumers through the Capital Expenditure Sharing Scheme (CESS).

Accordingly, our alternative estimate of required capex does not include a generic reduction to overall system capex for potential for deferred capital needs through the use of demand management initiatives.

Our decision not to include a generic capex offset for possible future demand management activities does not impact on our consideration of the business cases for specific demand management proposals, or the consideration of non-network alternatives within the RIT-D process. Where a specific capex/opex trade-off can be shown to meet the capex and opex criteria we will include the amounts in the forecasts. This approach is consistent with the capital expenditure factor that requires us to have regard to the extent to which the distributor has considered, and made provision for, efficient and prudent non-network alternatives.<sup>147</sup>

### **B.7.2 Revised proposal on demand management**

In its revised proposal, ActewAGL did not provide further information regarding the potential for capex deferrals from demand management. ActewAGL noted that capex/opex trade-off analysis "is usually undertaken with respect to refurbishment and replacement of aging and potentially unreliable equipment, where the ongoing maintenance, repair, and fault costs (including loss of supply) can be compared with the capital cost of refurbishment and replacement."<sup>148</sup>

### **B.7.3 Draft decision position**

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<sup>146</sup> NER, clause 6.5.7(3)(10).

<sup>147</sup> NER Clause 6.5.7(e)(10).

<sup>148</sup> ActewAGL, *Revised Regulatory Proposal 2015-19 Regulatory Control Period*, January 2015, p. 287.

Distributors are required to transparently consider non-network alternatives through the RIT-D process. Through the RIT-D process and other initiatives developed as part of the demand management innovation allowance, it is expected that some amount of system capex currently in the forecast will be efficiently deferred. In our draft decision, we considered whether it was appropriate to estimate the amount of capex that may be efficiently deferred through the use of demand management initiatives and explicitly reduce the capex forecast by this amount.

In our draft decision, we did not include an explicit capex forecast reduction in anticipation of the deferrals that may be achieved through demand management. Based on the available information, and subject to further input from stakeholders, we formed the view that it was most appropriate to rely on the incentive framework and the RIT-D process to drive the efficient use of demand management. Any capex deferral would be shared with consumers through the CESS.

However, we also provided an analysis of the past performance of one of ActewAGL's peers, Ausgrid, which deferred 9.2 per cent of capex during the 2009–14 period through demand management initiatives. We invited stakeholder commentary on whether this estimate should be used to explicitly adjust the capex forecast for the 2014–19 period. We also noted that in order to apply a capex/opex trade-off we would need to assess the efficient opex required to fund the demand management initiatives.<sup>149</sup>

#### **B.7.4 Reasons for final decision**

We have not received any specific stakeholder commentary on the appropriate capex offset that should be included in the forecast. However, EnerNOC questions the appropriateness of simply removing 9.2 per cent from the capex allowance on the assumption that it ought to be deferrable.<sup>150</sup>

EnerNOC also raises concerns with the approach we sought views on as it suggests that we have reduced capex associated with demand management without allowing the associated opex for demand management initiatives.<sup>151</sup> As set out above and consistent with our consideration of opex step-changes in attachment 7, our position is to only apply a specific capex/opex trade-off where it can be shown to meet the capex and opex criteria. However, we have not applied an additional generic capex offset associated with likely demand management activities.

No other stakeholders provided views on the appropriateness of estimating a generic capex deferral associated with future demand management activities. Therefore, consistent with our position in the draft decision, we are of the view that the efficient

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<sup>149</sup> Draft Decision, *ActewAGL distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014.

<sup>150</sup> EnerNOC submission on 2015-19 draft decisions and revised proposals for NSW distributors p6.

<sup>151</sup> EnerNOC submission on 2015-19 draft decisions and revised proposals for NSW distributors p5.

capex/opex trade-off is most efficiently discovered through reliance on the incentive framework, together with the RIT-D process.

## C Demand

The expected level of demand is fundamental to a distributor's forecast capex and opex and to the AER's assessment of that forecast expenditure.<sup>152</sup> This appendix sets out our position on ActewAGL's forecast total system demand for the 2014–19 period.<sup>153</sup>

System demand trends give a high level indication of the need for expenditure on the network to meet changes in demand. Forecasts of increasing system demand generally signal an increased requirement for growth capex, and the converse for forecasts of stagnant or falling system demand.<sup>154</sup> Accurate, or at least unbiased, demand forecasts are important inputs to ensuring efficient levels of investment in the network. For example, overly high demand forecasts may lead to inefficient expenditure as distributors install unnecessary capacity in the network.

In the draft decision we accepted ActewAGL's demand forecast while noting our expectation that updated forecasts would be provided in the revised proposal.<sup>155</sup> ActewAGL has updated its peak demand forecasts in its revised proposal to reflect the most current expectations for the 2014–19 period. In this final decision we find that ActewAGL's system demand forecast reasonably reflects a realistic expectation of demand. We formed this view after considering the updated forecasts contained in ActewAGL's revised proposal and comparing these to the most recent independent demand forecasts prepared by AEMO.

This appendix does not consider localised demand growth (spatial demand) that may drive the need for specific growth projects or programs.

### C.1 AER position

We are satisfied that the demand forecasts for the 2014–19 period proposed by ActewAGL in its revised proposal (January 2015) reasonably reflect a realistic expectation of demand.<sup>156</sup>

### C.2 AER approach

Our consideration of demand trends in ActewAGL's network relied primarily on comparing demand information from the following sources:

- ActewAGL's revised proposal

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<sup>152</sup> NER, cl. 6.5.6(c)(3) and 6.5.7(c)(3).

<sup>153</sup> In this attachment, 'demand' refers to summer maximum, or peak, demand (megawatts, MW) unless otherwise indicated.

<sup>154</sup> Other factors, such as network utilisation, are also important high level indicators of growth capex requirements.

<sup>155</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p 6-118.

<sup>156</sup> NER, cl. 6.5.6(c)(3) and 6.5.7(c)(3).

- forecasts from AEMO<sup>157</sup>
- stakeholder submissions in response to ActewAGL's revised proposal (as well as submissions made in relation to the NSW/ACT distribution determinations more generally).<sup>158</sup>

### C.3 ActewAGL's revised proposal

ActewAGL has updated its demand forecasts (dated 5 January 2015) to reflect the most current expectations in respect of the forecast period. Following lower-than-forecast outcomes in 2013–14, ActewAGL's forecast growth has been revised downwards in its revised regulatory proposal. ActewAGL has made no change to the underlying methodology used in the demand forecast submitted in its initial regulatory proposal.

The 2014–19 period forecast has been calculated based on the forecast energy growth rates contained in ActewAGL's revised regulatory proposal. These revised forecasts are considerably lower than the forecasts provided in its initial regulatory proposal.<sup>159</sup>

The AEMO forecasted similar trends of low system demand growth for ActewAGL's network and for the NSW region more generally. We note that AEMO downgraded its demand forecast for the NSW region in its most recent report.<sup>160</sup>

ActewAGL's regulatory proposal described its demand forecasting methods, including approaches to:

- weather correction
- accounting for spot loads
- accounting for transfers
- accounting for embedded generation.<sup>161</sup>

As part of our final decision on system demand forecasts, we compared ActewAGL's revised system demand forecast to the sum of AEMO's connection point (CP) forecasts for ActewAGL's network.<sup>162</sup>

Figure C-1 and Table C-1 provide an overall system level view of ActewAGL's revised demand forecasts, the changes made since its regulatory proposal, and a comparison with the AEMO forecasts. ActewAGL's revised demand forecasts indicate a marginal increase in system demand over the 2014–19 period. However, ActewAGL's revised demand forecasts are marginally lower than those provided in its initial proposal.

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<sup>157</sup> AEMO, *National electricity forecasting report for the National Electricity Market*, June 2014, p. 4-4.

<sup>158</sup> AER, <http://www.aer.gov.au/node/1148>.

<sup>159</sup> ActewAGL, *Regulatory Proposal: 2015-19*, 10 July 2014, p. 106.

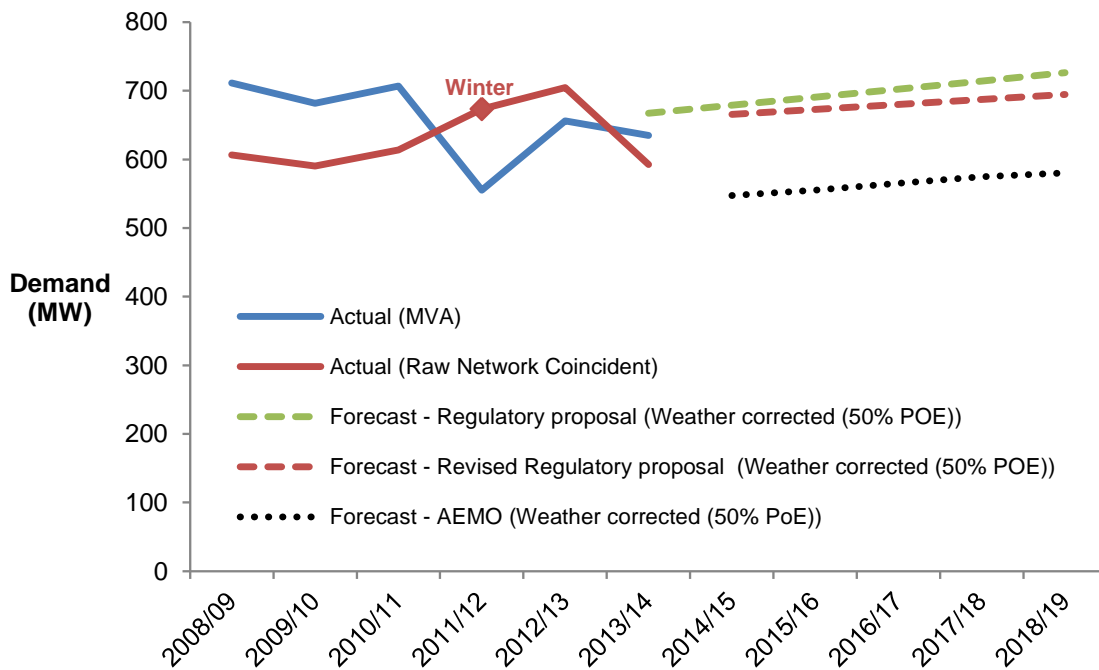
<sup>160</sup> AEMO, *National electricity forecasting report for the National Electricity Market*, June 2014, p. 4-4.

<sup>161</sup> ActewAGL, *Regulatory proposal: Attachment C1: Peak demand forecast*, 2 June 2014.

<sup>162</sup> AEMO, *Final Transmission Connection Point Forecasts*, October 2014.



**Figure C-1 Maximum system demand (summer coincident)**



**Table C-1 Maximum system demand (summer) - Weather corrected (50% PoE) (MW)**

	2014-15	2015-16	2016-17	2017-18	2018-19	Average annual growth (2014-19)
Regulatory proposal (May 2014)	679	691	703	714	726	0.55%
Revised proposal (January 2015)	666	673	680	687	695	0.36%

## C.4 AEMO forecasts

In July 2014, AEMO published the first edition of transmission CP forecasts for New South Wales and Tasmania.<sup>163</sup> These forecasts are AEMO’s independent electricity maximum demand forecasts at transmission connection point level, over a 10-year outlook period.<sup>164</sup> The Standing Council on Energy Resources (SCER) intended these demand forecasts to inform our regulatory determinations.<sup>165</sup> In addition, AEMO has

<sup>163</sup> AEMO, *Transmission connection point forecasting report for New South Wales and Tasmania*, July 2014, p. 6.

<sup>164</sup> AEMO, Website: <http://www.aemo.com.au/Electricity/Planning/Forecasting/Connection-Point-Forecasting/Transmission-Connection-Point-Forecasts>, accessed 3 September 2014.

<sup>165</sup> AER, *Better regulation: Explanatory statement: Expenditure forecast assessment guideline*, November 2013, p. 182.

published the National Electricity Forecasting Report (NEFR) since 2012, and published the latest edition in June 2014 (2014 NEFR).<sup>166</sup> The NEFR includes AEMO's summer and winter demand forecasts for all regions (states) in the National Electricity Market. More information about the AEMO process is included in our draft decision.<sup>167</sup>

Figure C-1 shows ActewAGL's growth trend is consistent with AEMO's CP forecasts over the 2014–19 period.<sup>168</sup> This is despite AEMO using different datasets and forecasting approaches. This consistency across both ActewAGL's and AEMO's growth trends has been considered in our final position on ActewAGL's demand forecasts.

As set out in our draft decision several stakeholders raised concerns that ActewAGL, as well as the other NSW/ACT distributors, were using overly conservative demand forecasts as inputs to their regulatory proposals. That is, many stakeholders considered that the forecasts included in the initial proposal were too high.<sup>169</sup> Similarly, commenting on the revised proposal, Mr John Herbst submits that the forecasting approach used by ActewAGL has the potential to result in unreliable and biased forecasts.<sup>170</sup>

While we do not consider that the approach used by ActewAGL has resulted in unreliable or materially biased forecasts, we acknowledge the concerns raised on the use of time series, the weighting given to early data points and the model selection process. As set out above, we have undertaken a comparison of the ActewAGL forecasts to those independently forecast by AEMO. We have found that the results from the two approaches forecast consistent levels of demand growth over the 2014–19 period. We have therefore concluded that the demand forecasts proposed by ActewAGL in its revised proposal (January 2015) reasonably reflect a realistic expectation of demand.

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<sup>166</sup> AEMO, *National electricity forecasting report for the National Electricity Market*, June 2014.

<sup>167</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 18.

<sup>168</sup> We summed AEMO's coincident demand figures for each CP in ActewAGL's network for each year.

<sup>169</sup> AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, pp. 90-91.

<sup>170</sup> Mr John Herbst, submission on ActewAGL revised Regulatory Proposal: 2015-19, 11 February 2015, p. 6.

## D Consumption

In this section, we set out our position on ActewAGL's consumption forecasts for the 2014–19 period.

Clause 6.12.1(10) of the NER requires the AER to make a decision on appropriate amounts, values or inputs as part of its final distribution determination for ActewAGL. The AER uses consumption forecasts to determine the amount of electricity delivered over a period of time. It is a key input into determining X factors under an average revenue cap, which applies to ActewAGL.<sup>171</sup>

### D.1 AER position

The AER is satisfied that the consumption forecasts for the 2014–19 period proposed by ActewAGL in its revised proposal (see Table D-1) reasonably reflect a realistic expectation of consumption.<sup>172</sup>

### D.2 Draft decision

In the draft decision we indicated that we were not satisfied that the consumption forecasts in ActewAGL's regulatory proposal for the 2014–19 period represent appropriate amounts, values, or inputs for the ActewAGL distribution determination.<sup>173</sup>

We stated our concerns regarding ActewAGL's consumption forecasting method and considered the resulting forecasts were not appropriate inputs into the PTRM.

We provided alternative consumption forecasts that we considered represented appropriate amounts, values, or inputs for the purposes of making ActewAGL Distribution's distribution determination.

### D.3 ActewAGL's revised proposal

ActewAGL has used the actual 2013–14 weather-corrected consumption to compare the accuracy of the forecasts for 2013–14 contained in its regulatory proposal. Table D-1 shows that ActewAGL's revised consumption forecasts are considerably closer to its initial forecast than to the AER's alternative forecast.

**Table D-1 AER position on ActewAGL consumption forecast (GWh)**

	2014-15	2015-16	2016-17	2017-18	2018-19
Regulatory proposal (May)	2 737	2 730	2 761	2 791	2 804

<sup>171</sup> AER, *Stage 1: Framework and approach paper: ActewAGL: Transitional regulatory control period 1 July 2014 to 30 June 2015, Subsequent regulatory control period 1 July 2015 to 30 June 2019*, March 2013, p. 28.

<sup>172</sup> NER, clause 6.12.1(10).

<sup>173</sup> NER, clause 6.12.1(10).

2014)

AER alternative forecast (November 2014)	2 849	2 849	2 874	2 916	2 955
Revised proposal (January 2015)	2 781	2 756	2 788	2 814	2 824
Difference (Revised / initial)	+1.6%	+1.0%	+1.0%	+0.8%	+0.7%

Source: AER, Draft Decision, *ActewAGL distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p 6-87

## Revised consumption forecasts

In the draft decision, we stated that we had concerns regarding certain aspects of ActewAGL's consumption forecasting method. In particular, we were concerned that:

- ActewAGL's approach to model selection suffers from the biasing effects of autocorrelation
- ActewAGL's preferred models do not include price as an explanatory variable, which we consider is important in determining consumption levels
- ActewAGL specified non-industry standard dependent variables in its preferred models
- ActewAGL did not consider the drivers of customer forecasts in sufficient detail, including how the profile of customers may change over the forecast period.

We also indicated that ActewAGL should conduct tests to ensure it has not double-counted energy efficiency schemes, particularly for the Residential GP category where energy efficiency has a strong effect.

ActewAGL engaged Jacobs to review the comments made by us in our draft decision.<sup>174</sup>

## ActewAGL's choice of models and price as an explanatory variable

Jacobs contend that their objective approach to model selection – selecting the model with the best statistical properties – results in a model that is preferred on the basis of parsimony and statistical robustness. Relying entirely on the statistical properties of the available models has resulted in Jacobs selecting a model that does not account for the impact of price on demand for electricity in the ACT.

We believe that this approach would be reasonable if it was conclusively found that price was not a statistically significant driver of demand. However, Jacobs' conclusion that price should not be included in the forecast equation was due to the lack of a price

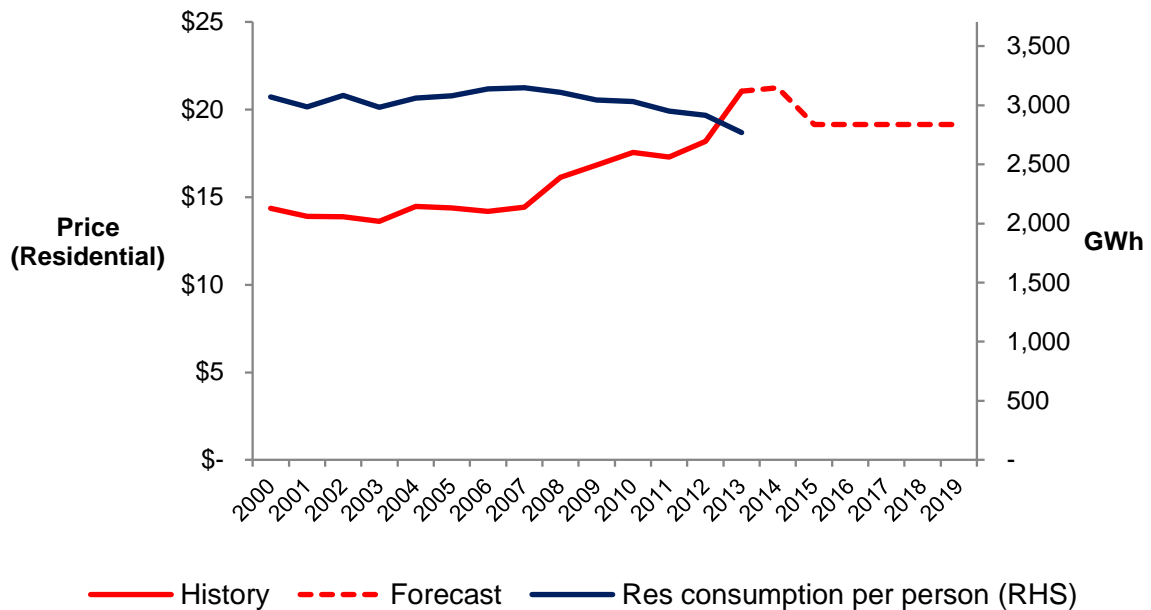
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<sup>174</sup> ActewAGL, *Revised Regulatory proposal: Attachment E3 - Jacobs review of consumption forecast - 20 January 2015*.

variable in their preferred model, not an assessment of the statistical significance of price. As such, Jacobs has not demonstrated that price should be excluded from the forecasts.

Furthermore, as illustrated in Figure D-1, since 2007 the annual increases in electricity prices have been highly correlated<sup>175</sup> with the annual reductions in electricity demand (measured here as residential consumption per person, in line with Jacobs' preferred model), particularly following the introduction of the Carbon Pollution Reduction Scheme CPRS.<sup>176</sup>

**Figure D-1 Residential electricity demand: residential electricity price**



Source: data extracted from Jacobs' Excel workbook '20141007-mdl-energy forecast calculations'

We acknowledge that correlation does not equal causation; however, it stands to reason that the two variables would be related. Economic theory demonstrates that demand is a function of price, and while electricity demand is relatively elastic it is not sufficient to state that ActewAGL's preferred model does not contain price and therefore price is not to be included in the forecast equation.

<sup>175</sup> The bivariate correlation of (gross) consumption per person and residential prices (both in natural logarithms) between 2000 and 2013 was calculated as -0.73. This was based on the series contained in Jacobs' Excel workbook '20141007-mdl-energy forecast calculation'.

<sup>176</sup> Jacobs contend that due to the compensation of affected parties, the carbon tax was "not material enough to be measured by an econometric model in the presence of other market price increases, and this assertion appears to be supported by the model selection process" (page 8). However, the chart in the text clearly shows that the sharp increase in prices in FY2013 corresponds with a sharp decrease in demand.

As the sample size includes only 14 annual data points there are not enough degrees of freedom to obtain robust estimates of each variable's coefficient and standard error.

However, on this occasion ActewAGL expects that there will be no change in price over the forecast period. This means the impact of a price variable component in the forecast equation would have been zero (i.e. when there is no variation in price, the price impact is reduced to zero). Therefore, despite our concerns with the process that ActewAGL has undertaken to derive the consumption forecast, the lack of price variable is not sufficient to find the ActewAGL forecast unreasonable. However, this decision would not hold in the absence of a zero growth price path expectation.

### **Dependent variable not in 'per customer' terms**

Jacobs contends that the statistically preferred model was based on consumption per person and therefore this is the basis of their forecasts.

However, we consider that Jacobs' preferred model (using consumption per person rather than per customer) is affected by factors external to electricity consumption (such as changes in household size). Consumption per customer, in contrast, is an actual measure of the consumption profile of existing customers.

Given the relatively short time frame of the forecasts (five years), we do not consider the selection of consumption per person over consumption per customer to have a material impact on the forecasts. Further, the consumption per person and consumption per customer series used by Jacobs as the basis of the regression analysis are highly correlated (91 per cent).

As such, we consider the forecasts supplied by Jacobs' preferred consumption per person model to be capable of delivering a realistic expectation of future consumption.

### **Double-counting energy efficiency schemes**

We requested Jacobs provide additional information on the specific energy efficiency programs included and justification for why double counting is not an issue.

The additional detail provided is sufficient to determine there is minimal risk of double counting. Specifically, Jacobs explained that the intention of the Energy Efficiency Incentive Scheme (EEIS) is to include energy savings above the mandatory standards included in the Mandatory Energy Performance Standards (MEPS) scheme and therefore there should be no overlap between the two programs.

Finally, we note that ActewAGL submitted that it was denied a reasonable opportunity to make submissions on our draft determination because certain particulars concerning our consultant from DAE were not made available to it.<sup>177</sup>

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<sup>177</sup> ActewAGL, *Revised Regulatory proposal: 2015-19*, January 2015, p. 79.

We reviewed our engagement with ActewAGL prior to our making of our draft decision, and we are satisfied that ActewAGL and its advisor Jacobs were given a reasonable opportunity to review and comment on all relevant material that we relied upon in the making of our draft decision on forecast demand and consumption.

## E Real material cost escalation

Real material cost escalation is a method for accounting for expected changes in the costs of key material inputs to forecast capex. ActewAGL in its revised regulatory proposal includes forecasts for changes in the prices of commodities such as copper, aluminium, steel and crude oil, rather than the prices of physical inputs themselves (e.g., poles, cables, transformers) used to provide network services. ActewAGL has also escalated construction costs in its forecast.

### E.1 Position

We are not satisfied that ActewAGL's revised proposed real material cost escalators (leading to cost increases above CPI) which form part of its total forecast capex reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period.<sup>178</sup> We maintain our view, as set out in our draft decision, that zero per cent real cost escalation is reasonably likely to reflect the capex criteria including that it is likely to reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period.

Consistent with our position in the draft decision, our approach to real materials cost escalation does not affect the proposed application of labour and construction cost escalators which apply to ActewAGL's forecast capex for standard control services.

### E.2 ActewAGL's revised proposal

In its revised proposal, ActewAGL has applied the same material and labour cost escalators to various asset classes proposed in its initial regulatory proposal submitted in June 2014.<sup>179</sup> It has submitted information additional to that included in its initial proposal including revised material cost escalators calculated by Competition Economics Group (CEG) and a report provided by its consultant Jacobs.

Table E-1 shows the revised material cost escalators calculated for ActewAGL by CEG<sup>180</sup>.

**Table E-1 ActewAGL's revised real materials cost escalation forecast—inputs (per cent)**

	2014–15	2015–16	2016–17	2017–18	2018–19
Aluminium	12.9	1.5	1.0	2.7	2.8
Copper	-2.6	-1.6	-1.4	0.8	1.1

<sup>178</sup> NER, clause 6.5.7(a).

<sup>179</sup> ActewAGL, *Revised regulatory proposal*, pp. 362-363.

<sup>180</sup> CEG, *Updated cost escalation factors*, December 2014.



Steel	-6.0	-0.4	2.0	0.7	1.0
Crude oil	- 12.1	-1.6	1.1	1.0	0.9
Construction costs - engineering and non-residential	0.7	1.1	-0.2	0.1	0.8

Source: ActewAGL, Revised regulatory proposal, Attachment C47, CEG Updated cost escalation factors, December 2014, pp. 6, 7, 9, 10 and 12.

On the basis of these individual material input price escalators, ActewAGL through its consultant Jacobs, calculated escalation factors specific to various asset classes. This was achieved by applying a percentage contribution, or weighting, by which each of the underlying cost drivers were considered to influence the total price of each asset taking into account foreign exchange movements to convert the price of international commodities that are typically quoted in United States dollars.<sup>181</sup> Jacobs calculated annual real cost escalation indices for 15 of ActewAGL Distribution's standard asset classes.<sup>182</sup>

In its revised proposal, ActewAGL rejected the AER's findings on material cost escalation because<sup>183</sup>:

- the AER's proposed approach, which is to apply zero percent escalation on the basis that it is too difficult to forecast real material cost changes with any accuracy, amounts to applying a forecast (of zero percent) without any evidentiary justification;
- by contrast, ActewAGL Distribution's materials cost escalation forecasts were prepared by SKM (now Jacobs) using an approach that has been accepted by the AER in past revenue determinations and is applied and accepted by regulators, governments, financial institutions in Australia and in other jurisdictions; and
- ActewAGL Distribution's material cost escalation model is unbiased, contrary to the AER's contention.

ActewAGL provided more specific details in rejecting the AER's findings on material cost escalation as detailed below.<sup>184</sup>

#### *Past practice*

ActewAGL's revised regulatory proposal provides examples where Jacobs has applied material cost escalation. These include: on behalf of Energex in 2010 to provide a set of suitable cost escalation rates for Energex's capex and opex programs of work; by

<sup>181</sup> ActewAGL, *Revised regulatory proposal*, p. 363.

<sup>182</sup> ActewAGL, *Revised regulatory proposal*, p. 363.

<sup>183</sup> ActewAGL, *Revised regulatory proposal*, p. 362.

<sup>184</sup> ActewAGL, *Revised revenue proposal*, pp. 368-372.

the AER in 2007 to review the regulatory revenue proposal submitted by ElectraNet for the regulatory reset period 2008 to 2013; and by SP AusNet to analyse the likely drivers of cost escalation on capital expenditure forecasts for 2006-07 and 2007-08 and for the regulatory reset period 2008-09 to 2012-13.

ActewAGL stated that the AER's proposal to apply zero real cost escalation to materials because it is 'too difficult' is inconsistent with its own previous decisions on material cost escalation.

ActewAGL stated that during the recent commodity boom, Jacobs was able to successfully demonstrate that electricity service provider's capital costs are strongly linked to commodity prices of steel, copper and aluminium.

*Basis for our departure from material escalation*

ActewAGL submitted that potential inaccuracies could be addressed and that this is not a sufficient reason for us not to accept material cost escalation. It referred to the Jacobs report which states that using a composite basket of weighted indices, appropriate and specific to the cost item in question, in order to forecast price movements of that cost item is both robust and more reliable than use of a single index based on projections of price movements in a non-representative basket of consumer goods.<sup>185</sup>

ActewAGL stated that the 'potential for inaccuracy' is true of any forecasting technique including the forecasting of CPI. ActewAGL stated that it is therefore not appropriate for the AER to throw aside a previously established and accepted method for escalating material costs in favour of a CPI (zero real) based forecasting approach, unless it can be demonstrated that this is more accurate. ActewAGL refer to the Jacobs report which states that it considers it more appropriate to decide whether or not to apply commodity escalation on the basis of whether the relevant projections are more often right (in terms of being in the vicinity of percentage changes in ActewAGL price movements over time) than wrong. The Jacobs report also notes that future CPI assumptions are also forecasts, but based on a basket of goods that is not representative of electricity service provider's cost bases. The Jacobs report considers that one way to address or ameliorate inaccuracies in any particular forecast index is through using composite indices (which are typically a mix of different commodity, labour and other costs). The Jacobs report further states that composite indices can compensate for individual commodity spot fluctuations by means of a portfolio averaging effect.<sup>186</sup>

*ActewAGL Distribution's material cost input model*

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<sup>185</sup> Jacobs, *ActewAGL - Cost Escalation Factors Commodity Price Forecasting*, January 2015.

<sup>186</sup> Jacobs, *ActewAGL - Cost Escalation Factors Commodity Price Forecasting*, January 2015, pp. 9-10 .

ActewAGL does not accept our view that ActewAGL's material cost input model may be biased and refer to the following comments in the Jacobs report to support its position<sup>187</sup>:

- the primary factors were selected following a multi-utility strategic procurement study which researched contract information for main items of plant equipment and materials (such as power transformers, switchgear, cables and conductors) together with contract cost information for turn-key substation and overhead line projects (including plant equipment, materials, construction, testing and commissioning)
- developing the specific weighting by which each of the input cost drivers are considered to influence the total cost of the various asset categories is achieved through an application of information that exists within the Jacobs model as well as from client input and input from major supplies – such as transformer manufacturers. The weightings applied are periodically adjusted to take account of any divergence in the cost escalation of constituent components of utility assets over time, and
- over the last ten years Jacobs has undertaken a substantial number of assignments across a number of electricity service providers and other utilities (water, rail etc.) developing these composite indices.

### E.3 Reasons

We are not satisfied for the reasons set out below that ActewAGL's proposed forecast is based on a sound and robust methodology and accordingly, consider that it does not reasonably reflect the capex criteria.<sup>188</sup> This criteria includes that the total forecast capex reasonably reflects a realistic expectation of cost inputs required to achieve the capex objectives.<sup>189</sup> Accordingly, we have not included it in our alternative estimate of total forecast capex. We are satisfied that zero per cent real cost escalation is reasonably likely to reflect the capex criteria and this is reflected in our alternative estimate.

This conclusion is based on the following:

- the degree of potential inaccuracy of commodities forecasts;
- there is little evidence to support how accurately ActewAGL's materials escalation model forecasts reasonably reflect changes in prices paid by ActewAGL for physical assets in the past and by which we can assess the reliability and accuracy of its materials model forecasts; and

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<sup>187</sup> Jacobs, *ActewAGL - Cost Escalation Factors Commodity Price Forecasting*, January 2015, pp. 18-19.

<sup>188</sup> NER, clause 6.5.7(c).

<sup>189</sup> NER, clause 6.5.7(c)(3).

- there is insufficient supporting evidence to show that ActewAGL has considered whether there may be some material exogenous factors that impact on the cost of physical inputs.

The weight of the information clearly evidences that there is a real potential for inaccuracy in commodity forecasts. This possibility in conjunction with the lack of evidence in support of ActewAGL's forecasts is such that we cannot conclude with a sufficient degree of certainty that commodity forecasts are either accurate or likely to be accurate. We associate this possibility with a real risk that consumers would pay more than ActewAGL's costs for its physical assets if we were to accept its material cost escalation.

Our decision not to accept ActewAGL's material cost escalation means that ActewAGL's real costs will be escalated annually by no more than CPI under its tariff variation mechanism. As part of its tariff variation mechanism, by default CPI ensures that ActewAGL's increased costs generally will be taken into account. This is not to suggest that CPI measures are a proxy for the movement in the prices of ActewAGL's physical assets. We acknowledge that CPI is directed at measuring changes in the price of a basket of goods and services which account for a high proportion of expenditure by the CPI population group (i.e. metropolitan households); it does not measure the movement in the prices paid for the physical assets purchased by network service providers. However, the CPI provides for a necessary degree of certainty for ActewAGL and consumers that a measured and well understood basis for increasing ActewAGL's costs is reflected in its revenue and prices. By contrast, the degree of possible inaccuracy of commodities' forecasts is such that it is not reasonable to use commodities' forecasts, in addition to CPI, to reflect changes in the prices paid by ActewAGL for assets. Commodities' forecasts do not display the same level of rigour as CPI to satisfy us that consumers should incur additional costs above CPI. In reaching this conclusion, we have had regard to the revenue and pricing principle that ActewAGL should be provided with a reasonable opportunity to recover at least the efficient costs it incurs in providing direct control services. We consider that if we were to apply ActewAGL's material costs escalation, there is possibility that it will recover in excess of its efficient costs. This, combined with an absence of evidence to support a conclusion that it would be in the long term interests of consumers to incur prices that reflected more than the CPI, were fundamental to our conclusion

In the following discussion, we have addressed each of the specific points raised by ActewAGL in its revised proposal.<sup>190</sup> We have also addressed related points made by AusNet in its submission.<sup>191</sup>

### *Past Practice*

In addition to ActewAGL's submissions on this point, AusNet Services stated that evidence of historic materials cost increases would be useful for our assessment of

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<sup>190</sup> ActewAGL, *Revised revenue proposal*, pp. 368-372.

<sup>191</sup> AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

future materials costs and that a lack of this has not precluded us from making regulatory decisions on this matter in the past, and should not prevent us from continuing to properly analyse expert evidence and assess forecast materials costs.<sup>192</sup>

We recognise that our approach differs in some respects to our past practice. This is as a result of the development of our Expenditure Forecast Assessment Guideline (Expenditure Guideline). As stated in our draft decision, we assessed ActewAGL's proposed real material cost escalation based on our approach as set out in our Expenditure Guideline to assessing the input price modelling approach to forecast materials cost.<sup>193</sup> The Guideline was a result of changes made by the AEMC in 2012 as to how we are to determine the total amount of revenue each electricity and gas network business can earn. After extensive consultation with stakeholders in the development of the Expenditure Guideline, we consider that it marks a significant improvement in our approach to expenditure assessment. It reflects both a review of assessment techniques employed throughout our first round of network determinations and how these can be improved (e.g. materials cost escalation). Most importantly, it also sets out a number of new assessment techniques.

ActewAGL further stated that our proposal to apply zero real cost escalation to materials because it is 'too difficult' to forecast changes with any accuracy is inconsistent with our own previous decisions on material cost escalation.

To clarify, we acknowledge the difficulty in accurately forecasting prices of commodities but this is not the basis for us not accepting ActewAGL's real materials cost escalation. We have not accepted ActewAGL's proposed real materials cost escalation because we consider there is likely to be significant uncertainty in forecasting commodity input price movements.

As we explained in our draft decision, we considered that we had seen limited evidence to demonstrate that the commodity input weightings used by service providers to generate a forecast of the cost of material inputs have produced unbiased forecasts of the costs the service providers paid for manufactured materials.<sup>194</sup> We consider it important that such evidence be provided because the changes in the prices of manufactured materials are not solely influenced by the changes in the raw materials that are used.

As with ActewAGL's initial regulatory proposal, ActewAGL's revised regulatory proposal does not include supporting data or information which demonstrates movements or interlinkages between changes in the input prices of commodities and the prices ActewAGL paid for physical inputs. ActewAGL's material cost input model assumes a weighting of commodity inputs for each asset class but does not provide information which explains the basis for the weightings nor whether the weightings applied have produced unbiased forecasts of the costs of ActewAGL's assets. For

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<sup>192</sup> AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

<sup>193</sup> AER, *Draft Decision ActewAGL distribution determination 2015-16 to 2018-19*, November 2014, p. 6-106.

<sup>194</sup> AER, *Draft Decision ActewAGL distribution determination 2015-16 to 2018-19*, November 2014, p. 6-106.

these reasons, there is no basis on which we can conclude that the forecasts are reliable.

*Basis for our departure from material escalation*

ActewAGL, referring to the Jacobs report, stated that one way to address or ameliorate inaccuracies in any particular forecast index is through using composite indices, which is typically a mix of different commodity, labour and other costs. The Jacobs report also stated that composite indices can compensate for individual commodity spot fluctuations by means of a portfolio averaging effect.<sup>195</sup>

We consider that the portfolio averaging effect is likely to be mitigated for commodity prices because commodity prices are likely to be moving in the same direction at any point in time, as evidenced during the 2009 commodities boom and more recently in an environment of depressed commodity prices.<sup>196</sup> Under these circumstances a decline in the forecast price of one commodity is not offset by an increase in the forecast price of another commodity used in the production of a particular asset. In respect of real materials cost escalation, it may be more likely that a composite index (mix of commodities) will increase the forecast error of the costs of key physical assets for network service providers.

ActewAGL stated that the 'potential for inaccuracy' applies for any forecasting technique including the forecasting of CPI and that it is therefore not appropriate for the AER to reject this in favour of a CPI (zero real) based forecasting approach, unless it can be demonstrated that this is more accurate. AusNet Services likewise submitted that potential inaccuracy generally is an insufficient reason to reject a forecast and that all forecasts inherently involve some level of uncertainty. AusNet Services stated that the inherent uncertainty of a forecast does not mean that a substitute of zero represents a "more reliable" estimation.<sup>197</sup>

To clarify, the 'potential for inaccuracy' in the way referred to by ActewAGL and AusNet Services, does not fully convey the basis for our draft decision. We have not accepted ActewAGL's proposed real materials cost escalation because we consider there is likely to be significant uncertainty in forecasting commodity input price movements.

We formed this view in part on the basis of:

- recent commodity studies and evidence in economic literature on the usefulness of commodities futures prices
- the difficulty in forecasting nominal exchange rates; and

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<sup>195</sup> Jacobs, *ActewAGL - Cost Escalation Factors Commodity Price Forecasting*, January 2015, p. 2.

<sup>196</sup> See for example *RBA: Index of Commodity Prices January 2015 (released 2 February 2015)*, where the Reserve Bank of Australia's Index of Commodity Prices has fallen by 20.4 per cent over the previous year in SDR (Special Drawing Rights) terms.

<sup>197</sup> AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

- our review of independent expert's reports, including ActewAGL's consultant Competition Economists Group (CEG) as discussed in our draft decision.<sup>198</sup>

We concluded that where we are not satisfied that a forecast of real cost escalation for materials is robust, and we cannot determine a robust alternative forecast, then real cost escalation should not be applied in determining a service provider's required capital expenditure. We accepted that there is uncertainty in estimating real cost changes but we considered the *degree* of the potential inaccuracy of commodities forecasts is such that there should be no escalation for the price of input materials used by ActewAGL to provide network services. We also consider that the variation in in the direction ((+) or (-)) between experts of forecasts for the same commodity is a reflection of the unreliability of commodity forecasts.

ActewAGL has not provided evidence that has altered our view of the potential inaccuracy of commodities forecasts. However, in order to further test our position on commodities forecasts we compared the forecasts provided by CEG in its December 2013 report to ActewAGL as part of ActewAGL's June 2014 regulatory proposal with the updated December 2014 report which forms part of ActewAGL's revised regulatory proposal.<sup>199</sup> Table E-2 compares CEG's real material cost escalation forecasts for December 2013 and December 2014.

**Table E-2 ActewAGL's real materials cost escalation forecasts December 2013 and 2014—inputs (per cent)**

	2014–15	2015–16	2016–17	2017–18	2018–19
<b>Aluminium</b>					
December 2013	4.2	5.8	5.0	4.2	3.6
December 2014	12.9	1.5	1.0	2.7	2.8
Difference (actual)	8.7	-4.3	-4.0	-1.5	-0.8
Difference (%)	207.1%	-74.1%	-80.0%	-35.7%	-22.2%
<b>Copper</b>					
December 2013	-0.9	1.1	0.3	-0.3	-0.7
December 2014	-2.6	-1.6	-1.4	0.8	1.1
Difference (actual)	-1.7	-2.7	-1.7	1.1	1.8
Difference (%)	188.9%	-245.5%	-566.7%	-366.7%	-257.1%
<b>Steel</b>					
December 2013	0.6	3.2	0.6	0.3	-0.1
December 2014	-6.0	-0.4	2.0	0.7	1.0
Difference (actual)	-6.6	-3.6	1.4	0.4	1.1

<sup>198</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-109-114.

<sup>199</sup> CEG, *Escalation factors affecting expenditure forecasts*, December 2013 and CEG, *Updated cost escalation factors*, December 2014.



Difference (%)	-1,100.0%	-112.5	233.3%	133.3%	-1,100.0%
Crude oil					
December 2013	-0.5	2.8	2.6	2.1	1.8
December 2014	-12.1	-1.6	1.1	1.0	0.9
Difference (actual)	-11.6	-4.4	-1.5	-1.1	-0.9
Difference (%)	2,320%	-157.1%	-57.7%	-52.4%	-50.0%
Construction					
December 2013	0.5	0.7	0.5	0.4	0.1
December 2014	0.7	1.1	-0.2	0.1	0.8
Difference (actual)	0.2	0.4	-0.7	-0.3	0.7
Difference (%)	40.0%	57.1%	-140.0%	-75.0%	700.0%

Source: CEG, Escalation factors affecting expenditure forecasts, December 2013, pp. 21, 24, 27 and 31 and CEG, Updated cost escalation factors, December 2014, pp. 6, 7, 9, 10 and 12.

As table E-2 shows, there is considerable variation between CEG's commodity cost escalation forecasts between the December 2013 and December 2014 reports. Aluminium, copper, steel and crude oil all showed significant forecast variation between the two periods. The largest forecast variation was for crude oil which showed an absolute variation of 11.6 percentage points in 2014-15. Aluminium also showed considerable variations, the largest being 8.7 percentage points in 2014-15. Consistent with the current environment of depressed commodity prices, the majority of the commodity forecast variations exhibited a reduction in forecast prices between 2014-15 and 2018-19 (as revealed between the December 2013 and December 2014 CEG reports).

Table E-2 also shows that the variation in forecast construction factors between December 2013 and December 2014 was lower than the variation in the forecast commodities factors between the two periods. This is consistent with our view that construction cost escalators can be more reliably and robustly forecast than material input cost escalators because these are not intermediate inputs and with respect to labour escalators, productivity improvements have been factored into the analysis.

The variation in CEG's commodity cost escalation forecasts between December 2013 and December 2014 demonstrates the uncertainty in the modelling of material input cost escalators to reliably and accurately estimate the prices of intermediate outputs used by service providers to provide network services. This supports our view that ActewAGL's forecast real material cost escalators do not reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the next regulatory control period.<sup>200</sup> Also, the commodity cost escalation forecasts would apply for the duration of the regulatory control period, further amplifying the risk of commodity

<sup>200</sup> NER, clause 6.5.7(a).



forecast error and subsequent impact on the accuracy of estimating the prices of network assets.

ActewAGL's statement that it considers it more appropriate to decide whether to apply commodity escalation on the basis of whether the relevant projections are more often right (in terms of being in the vicinity of percentage changes in the CPI) than wrong was not supported with any evidence showing how accurately ActewAGL's materials escalation model forecasts reasonably reflect changes in the prices paid by ActewAGL for its physical assets.

#### *ActewAGL's material cost input model*

In our draft decision, we stated that ActewAGL's material input escalation model may not be representative of the full set of inputs or input choices impacting on changes in the prices of assets purchased by ActewAGL and may also be biased to the extent that it may include a selective subset of commodities that are forecast to increase in price during the 2014-2019 period.<sup>201</sup>

We have reviewed ActewAGL's response to our concerns and consider that the Jacobs input escalation model may be based on relevant inputs impacting on changes in physical electricity asset prices but that there is still insufficient evidence to support how accurately ActewAGL's materials escalation model forecasts reasonably reflect changes in prices paid by ActewAGL for physical assets. Also, as we explained in our draft decision, the escalation of commodities such as aluminium are not necessarily the prices paid for aluminium equipment by manufacturers where the fabricated aluminium has gone through further stages of production than the refined aluminium that is traded on the LME.<sup>202</sup> The value of the input escalation model is diminished by the extent that these value adding processes for each commodity are not captured by the model. We also consider that there may be some inputs which impact on the price of assets purchased by ActewAGL for its network business that are not included in the Jacobs' model. One example of such an input may be the impact of design changes or components that are superseded and perform better or cost less through technological advances.

We consider that ActewAGL has not fully addressed our concerns about the Jacobs model. Questions remain about the completeness of it.

#### *Variation in cumulative revised real materials cost escalation*

In its submission, AusNet Services stated that based on the recent forecasts of real price growth for aluminium and steel by CEG, SKM and BIS Shrapnel showing the progressive escalation index for each of the consultants, AusNet Services consider that although experts in materials costs may have differing views of the volatility of

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<sup>201</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, p. 109.

<sup>202</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, p. 111.

commodities prices, their views of average real price growth in relevant materials costs is generally consistent.<sup>203</sup>

We have undertaken our own analysis of the cumulative variation of the material input cost escalation forecasts of the three consultants as shown in table E-3.

**Table E-3 Variation in cumulative revised real materials cost escalation forecasts 2014-15 to 2018-19—inputs (per cent)**

	Aluminium	Copper	Steel	Oil
CEG and SKM	13.7	452.0	8.5	131.8
SKM and BIS Shrapnel	30.2	45.7	18.8	114.3
CEG and BIS Shrapnel	48.1	200.0	8.7	95.5

Source: AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, p. 6-113.

As table E-3 shows, although the dispersion between commodities varies, there is still considerable variation in the cumulative forecast prices of commodities between the three consultants. Cumulative variation between the consultants was lowest for steel and greatest for copper. Notwithstanding the magnitude of forecast variation between consultants, the issue of commodity forecast uncertainty remains. That is, even assuming all three consultant's commodity price forecasts for the 2014-19 period were identical, the degree of the potential inaccuracy of commodities forecasts is significant.

### Jacobs' report

We have addressed each of the specific issues raised by Jacobs in respect of the AER's draft decision.<sup>204</sup>

#### Commodity price movements and exchange rate forecasts

We maintain our view that commodity price movements show mixed results for commodity price forecasts based on futures prices. We acknowledge that the London Metals Exchange (LME) has been forecasting futures prices for metals for many decades and that country growth forecasts, available capacity to supply commodities and commodity price elasticity have been used to inform the forecast commodity prices. However, based on recent reviews of commodity price movements and our own analysis, we consider that the degree of potential inaccuracy of commodities forecasts is significant. We do not reject the merit of attempting to forecast commodity prices as suggested by Jacobs, but rather we maintain that the forecast needs to be robust and reliable.

<sup>203</sup> AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

<sup>204</sup> Jacobs, *ActewAGL - Cost Escalation Factors Commodity Price Forecasting*, January 2015, pp. 16-19.

Jacobs concurred with our view that exchange rate fluctuations are more difficult to project than commodity price movements.<sup>205</sup>

#### *Robust real materials cost escalation*

As noted above, we are aware that Jacobs has and continues to produce commodity forecasts for utilities, regulators and State and Federal Governments. Although Jacobs stated that during the commodity boom it successfully demonstrated that distributors' capital costs were strongly linked to commodity prices of steel, copper and aluminium, it did not provide any evidence in its report to support this claim.

We acknowledge that businesses use forecasts for planning and budgeting purposes. However, we are not satisfied that ActewAGL's proposed forecast is based on a sound and robust methodology and accordingly, consider that it does not reasonably reflect the capex criteria.<sup>206</sup> Our conclusion is based on the degree of potential inaccuracy of commodities forecasts and the paucity of evidence to support how accurately ActewAGL's materials escalation model forecasts reasonably reflect changes in prices paid by ActewAGL for physical assets in the past.

#### *Substantiation of the potential inaccuracy of commodities forecasts*

We consider that we have substantiated our conclusion.<sup>207</sup> As we stated in our draft decision, our view on the potential inaccuracy of commodities forecasts is informed by:<sup>208</sup>

- recent studies which show that forecasts of crude oil spot prices based on futures prices do not provide a significant improvement compared to a 'no-change' forecast for most forecast horizons, and sometimes perform worse
- evidence in the economic literature on the usefulness of commodities futures prices in forecasting spot prices is somewhat mixed. Only for some commodities and for some forecast horizons do futures prices perform better than 'no change' forecasts; and
- the difficulty in forecasting nominal exchange rates (used to convert most materials which are priced in \$US to \$AUS). A review of the economic literature of exchange rate forecast models suggests a "no change" forecasting approach may be preferable to the forward exchange rate produced by these forecasting models.

In our draft decision we also reviewed the CEG report commissioned by ActewAGL.<sup>209</sup> The CEG report included a number of statements and information which support our view on the potential inaccuracy of commodities forecasts, including:

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<sup>205</sup> Jacobs, *ActewAGL - Cost Escalation Factors Commodity Price Forecasting*, January 2015, p. 16.

<sup>206</sup> NER, clause 6.5.7(c).

<sup>207</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, p. 6-115.

<sup>208</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, p. 6-108.

<sup>209</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-109-111.

- futures prices will be very unlikely to exactly predict future spot prices given that all manner of unexpected events can occur
- the view expressed by the International Monetary Fund:

While futures prices are not accurate predictors of future spot prices, they nevertheless reflect current beliefs of market participants about forthcoming price developments.

- analysis of LME three month, 15 month and 27 month aluminium and copper futures data shows that the longer the futures projection period, the less accurate are LME futures in predicting actual commodity prices. Futures forecasts also have a greater tendency towards over-estimating of actual aluminium and copper prices over the 20 year period (particularly for aluminium)
- there is always a high degree of uncertainty associated with predicting the future. Although CEG consider that it obtained the best possible estimates of the NSPs' future costs at the present time, the actual magnitude of these costs at the time that they are incurred may well be considerably higher or lower than we have estimated in this report. This is a reflection of the fact that while futures prices and forecasts today may well be a very precise estimate of current expectations of the future, they are at best an imprecise estimate of future values
- acknowledgement that its escalation of aluminium prices are not necessarily the prices paid for aluminium equipment by manufacturers. CEG provided the example of producers of electrical cable who purchase fabricated aluminium which has gone through further stages of production than the refined aluminium that is traded on the LME, and
- CEG forecast indexed real aluminium, copper, steel and crude oil real prices which showed a trend of higher prices compared to the historical trend.

As reported in our draft decision, we also reviewed material cost escalation reports by Sinclair Knight Mertz (SKM) and BIS Shrapnel submitted by TransGrid and Jemena Gas Networks respectively as part of their revenue proposals.<sup>210</sup> These reports also included a number of statements and information which support our view on the potential inaccuracy of commodities forecasts, including:<sup>211</sup>

- SKM caution that there are a variety of factors that could cause business conditions and results to differ materially from what is contained in its forward looking statements;
- in modelling the exchange rate, SKM in part adopted the longer term historical average of \$0.80 USD/AUD as the long term forecast going forward consistent with our view that longer term historical commodity prices should be considered when reviewing and forecasting future prices;

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<sup>210</sup> SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013 and BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014.

<sup>211</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-111-113.

- LME futures contracts for copper and aluminium are only available for three years out to December 2016 and that in order to estimate prices beyond this data point, it is necessary to revert to economic forecasts as the most robust source of future price expectations;
- LME steel futures are still not yet sufficiently liquid to provide a robust price outlook;
- in respect to the reliability of oil future contracts as a predictor of actual oil prices, futures markets solely are not a reliable predictor or robust foundation for future price forecasts; and
- BIS Shrapnel forecasted the Australian dollar to fall to US\$0.77 from mid-2016 to mid-2018 which is significantly lower than the exchange rate forecasts by SKM of between US\$0.91 to US\$0.85 from 2014-15 to 2018-19. BIS Shrapnel stated that exchange rate forecasts are not authoritative over the long term.

In our draft decision we also compared the material cost escalation forecasts derived by the three consultants.<sup>212</sup> Our review showed that there is considerable variation between the consultant's commodities escalation forecasts. We concluded in our draft decision that these forecast divergences between consultants further demonstrate the significant uncertainty in the modelling of material input cost escalators to reliably and accurately estimate the prices of intermediate outputs used by service providers to provide network services.<sup>213</sup> This conclusion is further supported by our review of the commodity forecasts provided by CEG in December 2013 and December 2014 which likewise showed considerable variation, in the direction as well as the magnitude, in commodity cost escalation forecasts between the two dates.

#### *Bias of Jacob's material input escalation model*

As discussed above, there is still insufficient evidence to support how accurately ActewAGL's materials escalation model forecasts reasonably reflect changes in prices paid by ActewAGL.

We also consider that the escalation of commodities are not necessarily the prices paid by manufacturers where the commodity has gone through further stages of production than that traded on the LME. We are of the view that the value of the input escalation model is diminished by the extent that these value adding processes for each commodity are not captured by the model which only includes the forecast value of commodities prior to any transformation. We also consider that there may be some inputs which impact on the price of assets purchased by ActewAGL that are not included in the input escalation model.

#### **Other factors affecting input cost prices**

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<sup>212</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-113-114.

<sup>213</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, p. 6-114.

Our draft decision highlighted a number of factors we consider impacts on ActewAGL's input costs, namely:<sup>214</sup>

1. exogenous factors which may impact on the accuracy and reliability of using commodity forecasts to predict input costs. Such factors include changes in technologies which affect the weighting of commodity inputs, suppliers of the physical assets changing their sourcing for the commodity inputs and the general volatility of exchange rates
2. input cost mitigation, including
  - potential commodity input substitution as the price of a commodity increases relative to other commodities
  - the substitution potential between opex and capex when the relative prices of operating and capital inputs change
  - the scale of any operation change to the electricity service provider's business that may impact on its capex requirements, including an increase in capex efficiency, and
  - increases in productivity that have not been taken into account by ActewAGL in forecasting its capex requirements
3. strategic contracts with suppliers to mitigate the risks associated with changes in material input costs
4. the impact that material input cost escalation has on reducing the incentives for electricity service providers to manage their capex efficiently, and
5. the relevance of material input cost escalation post the 2009 commodities boom experienced in Australia.

These factors lend further support to our view that ActewAGL's revised regulatory proposal real material cost escalators do not reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014-19 period. ActewAGL did not address these factors in its revised regulatory proposal.

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<sup>214</sup> AER, *Draft Decision ActewAGL distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-107-109.