



FINAL DECISION
Essential Energy 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 Essential Energy's regulatory 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

Attachment 15 - Pass through events

Attachment 16 - Alternative control services

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Attachment 19 - Analysis of financial viability

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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
NNSW	Networks NSW
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
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
VCR	value of customer reliability
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 Essential Energy's total revenue requirement.¹

This Attachment sets out our final decision on Essential Energy'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 - Real material cost escalation

6.1 Final decision

We are not satisfied that Essential Energy's proposed total forecast capex of \$2,577.9 million (\$2013–14) reasonably reflects the capex criteria. We have substituted our estimate of Essential Energy's total forecast capex for the 2014–2019 period. We are satisfied that our substitute estimate of \$2401.0 million (\$2013–14) reasonably reflects the capex criteria. Table 6-1 outlines our draft decision.

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

	2014–15	2015–16	2016–17	2017–18	2018–19	Total
Essential Energy's revised proposal	527.7	534.7	527.5	503.4	484.6	2,577.9
AER final decision	497.5	500.9	490.7	465.6	446.2	2,401.0
Difference	-30.1	-33.8	-36.7	-37.8	-38.4	-177.0
Percentage difference (%)	-6%	-6%	-7%	-8%	-8%	-7%

Source: Essential Energy, response to AER information request Essential 050 (escalated to real \$2013-14); 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 Essential Energy's revised regulatory proposal. In the table we present our reasons largely by

¹ NER, clause 6.4.3(a).

‘capex driver’ such as augex and repex. This reflects the way in which we tested Essential Energy'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 Essential Energy's proposal, such as customer connections and 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 Essential Energy's proposal associated with some capex drivers, in particular augex and repex, revealed inefficiency inconsistent with the NER. Consequently, our findings on augex and repex largely explain why we are not satisfied with Essential Energy'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 Essential Energy'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 Essential Energy'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>We conclude that Essential Energy'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 their 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 Essential Energy'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 review. We have also addressed the deficiencies in Essential Energy's key assumptions about demand, forecast materials escalation rates and labour escalation rates.</p>
Augmentation capex	<p>We do not accept Essential Energy's revised proposed augex forecast. We have instead included in our alternative estimate of overall total capex an amount of \$686.3 million (\$2013–14) for augex, which is 15 per cent less than Essential Energy's revised proposal. In arriving at our alternative estimate, we accept Essential Energy's revised proposal except for the following:</p> <ul style="list-style-type: none"> Essential Energy's forecast to augment its high voltage network because it is overstated and does not take into account the forecast decline in spatial demand growth. We reduced this forecast to reflect the forecast decline in network growth (using forecast customer connections rates as a proxy).

	<ul style="list-style-type: none"> Essential Energy's proposed additional capex to address low clearance span because Essential Energy has not sufficiently demonstrated that this forecast expenditure is required given that its revised proposal, and our alternative estimate, already factors in expenditure to replace assets to meet its existing network requirements. We further consider this in our assessment of Essential Energy's proposed repex.
Customer connections capex	<p>We accept Essential Energy's \$29.1 million (\$2013-14) proposed connections capex forecast and \$353.9 million (\$2013-14) proposed customer contributions forecast. We maintain our position from the draft decision that this expenditure is consistent with forecast construction activity in NSW.</p>
Asset replacement capex (repex)	<p>We do not accept Essential Energy's revised proposed repex forecast of \$827 million (\$2013-14), excluding overheads. We have instead included in our alternative estimate an amount of \$775 million (\$2013-14), excluding overheads. Our estimate is six per cent lower than Essential Energy's revised proposal. This reduction reflects the outcomes of our predictive modelling and evidence that Essential Energy has a bias towards conservative risk assessment and has programs of expenditure which are not adequately justified. We incorporated updated data from Essential Energy in our predictive modelling for pole staking, service lines, and switchgear. Remodelling based on updated data from Essential Energy resulted in an increase to forecast repex of \$94 million compared to our draft decision estimate.</p> <p>We are satisfied our alternative estimate reasonably reflects the capex criteria. It includes:</p> <ol style="list-style-type: none"> \$683 million of expenditure for six modelled asset categories based on Essential Energy's own 'business as usual' asset management practices, its current tolerance for risk and its proposed forecast unit costs. Essential Energy's proposed forecast repex of \$86 million for supervisory control and data acquisition (SCADA) and pole top structures . \$4.3 million for additional "step change" projects that are required to address a specific need and are not already included within expenditure under other capex drivers.
Non-network capex	<p>We accept Essential Energy's revised non-network capex proposal of \$306.2 million (\$2013-14). This forecast is consistent with Essential Energy's initial proposal, which we accepted in our draft decision as a reasonable estimate of efficient costs required for this category. Essential Energy has forecast significant reductions in each category of non-network capex.</p>
Capitalised overheads	<p>We accept Essential Energy's proposed capitalised overheads of \$608.3 million on the basis of information that it provided that its total overheads are fixed.</p> <p>Logically, we consider that reductions in Essential Energy'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.</p>
Real cost escalators	<p>We are not satisfied that Essential Energy'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.</p> <p>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 Essential Energy's forecast capex for standard control services.</p> <p>Essential Energy accepted our approach to labour cost escalation (leading to increases above CPI) set out in our draft decision. We have applied our approach outlined in our draft decision (refer to Attachment 7).</p>

Source: AER analysis

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

- Providing direct control network services; and
- Complying with its regulatory obligation 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 Essential Energy's network. We consider this capex forecast is sufficient for a prudent and efficient service provider in Essential Energy's circumstances to be able to maintain the safety, service quality, security and reliability of its network consistent with its current obligations.

6.2 Essential Energy's revised proposal

Essential Energy's revised regulatory proposal includes a total forecast capex of \$2,531 million (\$2013–14) for the 2014–2019 period. This is 34 per cent higher than our draft decision and 1.5 per cent lower than Essential Energy's initial regulatory proposal.

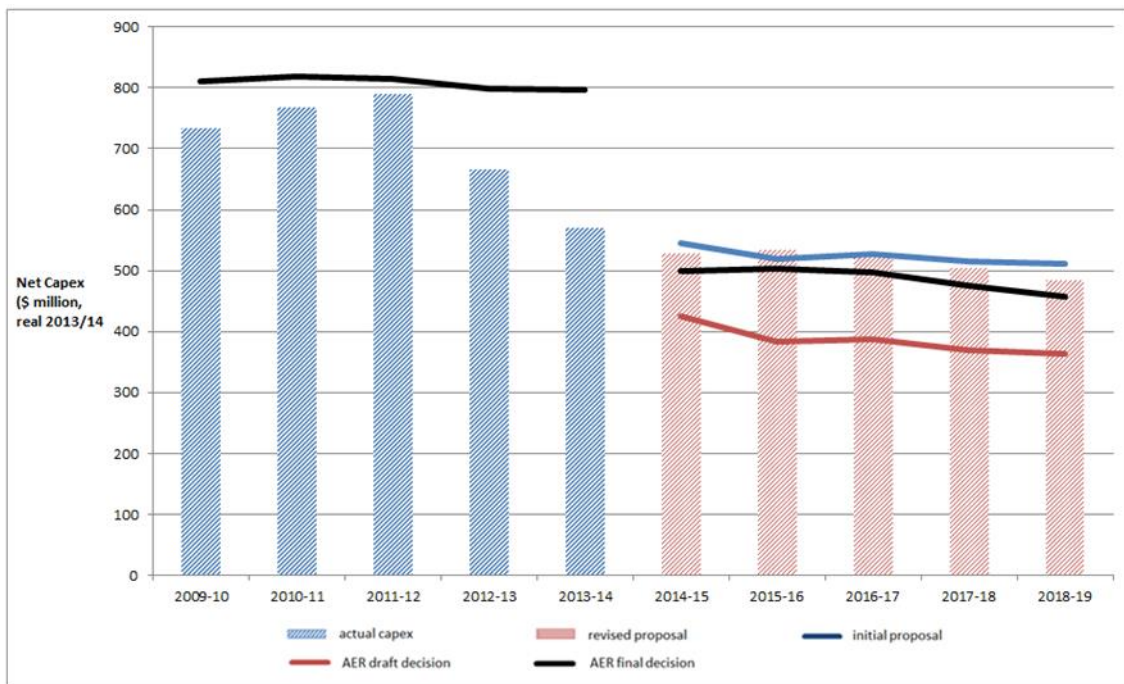
Figure 6-1 shows the decrease between Essential Energy's proposal for the 2014–2019 period and the actual capex that it spent during the 2009–2014 regulatory control period. Essential Energy submits the reasons for the reduction between its initial and revised proposals are due to:³

- updated real labour escalation – it amended its proposed estimate of labour cost escalators to incorporate the AER's method, noting it will be updated in the final determination
- LiDAR – it increased augex to account for updated asset condition information resulting from its LiDAR program
- labour productivity
- updated VCR – it decreased augex programs by applying the updated VCR values as suggested by the AER in its draft decision.

² NEL, sections 7A

³ Essential Energy, *Revised Regulatory Proposal*, p.110

Figure 6-1 Essential Energy's total actual and forecast capex 2009–2019



Source: AER analysis

A reconciliation between the AER's draft decision and Essential Energy's revised proposal is shown in section 6.5.

6.3 AER's 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 the distributor in its revised proposal. At the same time as Essential Energy submitted its proposal, it also submitted its response to our RIN. We have also sought further clarification from Essential Energy 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 Essential Energy's revised proposal.⁴ We apply our various assessment techniques, both qualitative and quantitative, to assess the different elements of Essential Energy's proposal at the total level and at the capex driver level such as its proposed augex and repex. This analysis not only informs our view on whether Essential Energy's proposal

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

reasonably reflects the capex criteria set out in the NER⁵ 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 the service provider'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 the service provider'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 '[t]hese criteria broadly reflect the NEO [National Electricity Objective]'.⁶ The capital expenditure objectives (capex objectives) referred to in the capex criteria, are to:⁷

- 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
- 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 AEMC has described our role in these terms:⁸

⁵ NER, cl. 6.5.7(c).

⁶ 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).

⁷ NER, cl. 6.5.7(a).

⁸ AEMC, Economic Regulation Final Rule Determination, p. vii.

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 Essential Energy's proposed total forecast capex reasonably reflects the capex criteria, we have regard to the capex factors. The capex factors are:⁹

- the AER's most recent annual benchmarking report and benchmark capex that would be incurred by an efficient 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.¹⁰ We have not had regard to any additional factors in this final decision for Essential Energy.

In taking these factors into account, the AEMC has noted that:¹¹

...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.

⁹ NER, cl. 6.5.7(e).

¹⁰ NER, cl. 6.5.7(e)(12).

¹¹ AEMC, Economic Regulation Final Rule Determination, p. 115.

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.¹²

Expenditure Assessment Guideline

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).¹³ 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 Essential Energy, our framework and approach paper (published in January 2014) stated that we would apply the Guideline, including the assessment techniques outlined in it.¹⁴ 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 in response to our draft decision, Essential Energy submitted that we failed to engage with the detail of its initial proposal and consider its obligations and circumstances in our assessment.¹⁵ We have in this final decision more clearly set out our engagement with the information Essential Energy has included in its revised proposal including the reports submitted from its consultants. Essential Energy further submitted that we:¹⁶

... did not utilise the capital expenditure by driver proposed by Essential Energy as this included capitalised overheads. Instead, the AER analysed the RIN data which had capital expenditure by different drivers exclusive of overheads.

Essential Energy also provided an audit report by PWC indicating that care needs to be taken in using RIN data.¹⁷ We note that the RIN data forms part of a distributor's regulatory proposal.¹⁸ In our Expenditure Guideline 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.¹⁹ Accordingly, we consider that our intention to materially rely upon the RIN data was made clear as part of the Expenditure Guideline. However, we do acknowledge that the differences between Essential Energy's initial proposal and the RIN created differences of understanding between us and Essential Energy on the figures underlying the overall

¹² NEL, ss. 7A and 16(2).

¹³ AEMC, Economic Regulation Final Rule Determination, p. 114 and AER Expenditure Forecast Electricity Distribution Guideline.

¹⁴ AER, Framework and approach paper, p.35

¹⁵ Essential Energy, Revised Regulatory Proposal, p.114

¹⁶ Essential Energy, Revised Regulatory Proposal, p.117

¹⁷ Essential Energy - 1.10 - PWC - Independent expert advice on appropriateness of RIN data for benchmarking comparison, Jan 2015

¹⁸ NER, clause 6.8.2(c2) and (d).

¹⁹ AER, *Expenditure Forecast Electricity Distribution Guideline*, p. 25.

capex total. We have reconciled these numerical differences in section 6.5 of this Attachment and consider our final decision is made on an appropriate basis.

6.3.1 Building an alternative estimate of total forecast capex

Our starting point for building an alternative estimate is Essential Energy's revised proposal.²⁰ 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. Essential Energy has submitted further information on its forecast methodology in its revised proposal and we have addressed this below.²¹

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 are 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 forecast²². Once we approve total revenue, which will be determined by reference to our analysis of the proposed capex, the service provider is then free 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 period and make sound decisions taking into account their individual circumstances.

As explained in our Guideline:

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

²⁰ AER Expenditure Forecast Electricity Distribution Guideline, p. 9; see also AEMC Economic Regulation Final Rule Determination, pp. 111 and 112.

²¹ Essential Energy, *Attachment 1.4 - Jacobs, System Capex and Maintenance Prudency Assessment*

²² AEMC, Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, 29 November 2012, p. vii

techniques when determining total capex ... forecasts. We typically would not infer the findings of an assessment technique in isolation from other techniques.²³

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 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. We have clarified to what extent we rely on each technique when assessing expenditure under the different capex drivers in response to Essential Energy's submissions that we had given inappropriate weighting to certain techniques in our draft decision.²⁴

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 distributors 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 Table 6-4.

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.²⁵
- Past expenditure was sufficient for Essential Energy to manage and operate its network in that previous period, in a manner that achieved the capex objectives.²⁶

²³ AER Expenditure Forecast Electricity Distribution Guideline, p. 12.

²⁴ Essential Energy, Revised Regulatory Proposal, p.119

²⁵ AER Expenditure Forecast Electricity Distribution Guideline, pp. 8 and 9. The Tribunal has previously endorsed this approach: see : Application by Ergon Energy Corporation Limited (Non-system property capital expenditure) (No 4) [2010] ACompT 12; Application by EnergyAustralia and Others [2009] ACompT 8; Application by Ergon Energy Corporation Limited (Labour Cost Escalators) (No 3) [2010] ACompT 11; Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14; Application by United Energy Distribution Pty Limited [2012] ACompT 1; Re: Application by ElectraNet Pty Limited (No 3) [2008] ACompT 3 ; Application by DBNGP (WA)

²⁶ AER Expenditure Forecast Electricity Distribution Guideline, p. 9.

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 estimate of the total forecast capex, we can test Essential Energy's proposed total forecast capex. This includes comparing our alternative estimate of forecast total capex with its proposal. Essential Energy'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:²⁷

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 Essential Energy'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 of our assessment in this determination. We consider that a prudent and efficient service provider would consider the changing environment throughout the regulatory period and make sound decisions taking into account their individual circumstances to address any unanticipated issues. 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 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

²⁷ AEMC, *Economic Regulation Final Rule Determination*, p. 112.

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 Essential Energy has a reasonable chance to recover its efficient costs. Rather, we note that Essential Energy is able to respond to any unanticipated issues that arise during the 2014-2019 period and in the event that the approved total revenue underestimates the total capex required, Essential Energy 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.

Further to the 2012 rule change, the AEMC in a 2013 rule change amended the expenditure objectives. This addressed the problem that the previous expenditure objectives relating to reliability, security and quality of supply:²⁸

...could be interpreted so that the expenditure an NSP includes in its regulatory proposal is to be based on maintaining the NSP's existing levels of reliability, security or quality, even where an NSP is performing above the required standards for these measures, or where required standards for those measures are lowered.

Consequently, where standards have been lowered for reliability or security and supply, the expenditure objectives now clarify that the relevant standards are those standards in place at the time of our determination and not any previous standards. We consider the implementation of the STPIS in a practical sense requires us to fund Essential Energy to maintain its average level of reliability commensurate with the STPIS targets. We note that this level of performance is higher than the minimum standards Essential Energy is required to achieve under its licence obligations.

6.4 Reasons for final decision

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

²⁸ AEMC, Final Rule Determination, National Electricity Amendment (Network Service Provider Expenditure Objectives) Rule 2013 No. 5, p. ii.

Table 6-3 sets out the capex amounts by capex driver that we have included in our alternative estimate of Essential'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
Augex	133.4	155.5	141.1	133.7	122.6	686.3
Connections	9.7	5.7	5.6	4.5	3.5	29.1
Repex	142.6	151.7	160.7	160.4	160.1	775.5
Non-network	81.2	59.0	61.1	53.7	51.2	306.2
Capitalised overheads	129.6	129.4	123.8	114.9	110.6	608.3
Materials escalation adjustment	0.9	-0.4	-1.5	-1.6	-1.8	-4.5
Net Capex (excluding capital contributions)	497.5	500.9	490.7	465.6	446.2	2401.0
Capital Contributions	89.2	64.4	68.5	65.6	66.2	353.9
Gross Capex (includes capital contributions)	586.7	565.4	559.2	531.2	512.4	2754.9

Source: AER analysis

Note: Numbers may not add up due to rounding.

Our assessment of Essential Energy's forecasting methodology, key assumptions and past capex performance is discussed in the section below. In relation to past performance, we specifically consider the impact on expenditure of past licence conditions for reliability and network design and planning standards, and the removal of those conditions as of 1 July 2014

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 Essential Energy 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.²⁹ Essential Energy's key assumptions are set out in its regulatory proposal.³⁰

²⁹ NER, cll. S6.1.1(2), (4) and (5).

³⁰ Essential Energy, *Regulatory Proposal*, May 2015, p. 54; Essential Energy, *Regulatory Proposal*, Attachment 0.06.

We have assessed Essential Energy's key assumptions in the appendices to this capex attachment. In addition, we have some specific concerns about Essential Energy's key assumption about its legal and organisational structure. Essential Energy submits that its "current ownership and legal structure [does] not incorporate any impacts associated with a potential change of ownership ... [and] this is a reasonable assumption basis given that there has been no formal announcement by the current owner that a sale of the company will proceed in the 2014–19 period".³¹ This appears to imply that a change in ownership, if it were to occur, would affect the amount of forecast capex that would be required to achieve the capex objectives. In our view, this is not the case and there is no logical basis for this assumption.

6.4.2 Forecasting methodology

Essential Energy is required to inform us about the methodology it proposes to use to prepare its forecast capex allowance before it submits its regulatory proposal.³² It is also required to include this information in its regulatory proposal.³³ The main points of Essential Energy's forecasting methodology are set out in its regulatory proposal.³⁴

In its revised proposal Essential Energy clarified that its forecasting process involves both top down and bottom up methods in developing its capital expenditure forecast. It submits that its proposal outlined the use of historic expenditure trend analysis, individual asset investment business case development, probabilistic load forecasting for planning and Network NSW's (NNSW) portfolio prioritisation of the program.³⁵

In our draft decision, we identified three aspects of Essential'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:

- Essential'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).³⁶
- Essential's cost-benefit evaluation of each of its capital projects or programs reveals that its underlying risk assessment is excessively conservative.³⁷
- Essential's forecast methodology lacks a clear delivery strategy or plan.³⁸

³¹ Essential Energy, *Regulatory Proposal*, Attachment 0.06, May 2014, p. 3.

³² NER, cl. 6.8.1A and 11.56.4(o); Essential Energy, *Expenditure Forecasting Approach: 2014–19 Regulatory Proposal*, November 2013.

³³ NER, cl. S6.1.1(2); Essential Energy, *Regulatory Proposal*, May 2014, pp. 50–55; Essential Energy, *Expenditure Forecasting Approach: 2014–19 Regulatory Proposal*, November 2013, May 2014, pp. 8–12.

³⁴ Essential Energy, *Regulatory Proposal*, May 2014, pp. 50–55.

³⁵ Essential Energy, Revised Regulatory Proposal, p.105

³⁶ AER, Draft Decision Essential distribution determination 2015-2019, Attachment 6, p. 30

³⁷ AER, Draft Decision Essential distribution determination 2015-2019, Attachment 6, p. 30

³⁸ AER, Draft Decision Essential distribution determination 2015-2019, Attachment 6, pp. 30

Essential Energy disagreed with our position in the draft decision and stated that it used both top down and bottom up methods in developing its capex forecast and that the view by the AER that a top down review was not conducted is incorrect.³⁹ Essential Energy provided a report by Jacobs which stated that the NSW distributors had applied a top down assessment to their capex forecasts.⁴⁰

We re-examined Essential Energy's forecasting approach and acknowledge that elements of a top down assessment were applied in the formulation of its regulatory proposal and enhanced in its revised regulatory proposal. We also note the view of our consultant EMCa that:⁴¹

we are now satisfied that Essential Energy has followed the multi-level and iterative process established by the NNSW Board. A number of decision support tools were used in the 'top down' assessment that resulted in an 11 per cent (\$175m) reduction of the original 'bottom up' proposed repex program.

However, EMCa also found that:⁴²

we consider that Essential Energy has retained a residual bias towards conservative risk assessment and has programs of expenditure which are not adequately justified, as summarised below:

- there remains evidence of a conservative bias in Essential Energy's risk assessment approach through the application of its Riskex tool
- Essential Energy typically has not undertaken or presented robust quantitative cost-risk analysis to demonstrate economically optimal timing and volume of work
- Essential Energy has not adequately justified the average wood pole replacement cost, nor justified that its wood pole strategy is the most effective way to reduce risk at the most efficient cost
- Essential Energy has not adequately justified the prudence of its CONSAC cable replacement program.

We note the improvements in Essential Energy's forecasting approaches but we remain concerned that there still exists a conservative bias in Essential Energy's forecasts. While Essential Energy has used top down assessment techniques, these approaches do not appear to have been sufficient to remove this conservative bias.

EMCa previously noted that while Essential Energy's objective of containing network tariff increases to CPI could be construed as a cost forecasting discipline, this objective is not within the remit of the NER which, more appropriately, supports the determination of tariffs based on prudent and efficient expenditure allowances.⁴³ We

³⁹ Essential Energy, Revised Regulatory Proposal, p.125

⁴⁰ Essential Energy, Attachment 1.4 - Jacobs, System Capex and Maintenance Prudency Assessment p.30

⁴¹ EMCa, Review of Proposed Replacement Capital Expenditure in Essential's Revised Regulatory Proposal, p.5

⁴² EMCa, Review of Proposed Replacement Capital Expenditure in Essential's Revised Regulatory Proposal, p.ii

⁴³ EMCa Review of Proposed Replacement Capex in Essential's Regulatory Proposal 2014 - 2019p.12

agree with EMCa's view that the CPI price constraint applied by NNSW does not actually reflect the efficient operation of the network. Instead, it appears to be a strategy predicated on an assumption that prices need to continuously increase regardless of the actual need for network expenditure. We also note that Essential Energy's consultant, Advisian, appears to agree with this assessment. Advisian stated in its review of the NNSW methodology that:⁴⁴

In endorsing the improvements made in accordance with our recommendations, Advisian must point out that CASH is not yet a project prioritisation process. It is a risk scoring model. Project evaluation, including cost benefit analysis, is to be completed using "business as usual" evaluation processes outside of CASH. It does not automatically follow that a project with a high risk score in CASH is a high priority project – it may not be economic to significantly reduce the level of risk on a cost / benefit basis.

Advisian also stated that:⁴⁵

The model therefore flags projects / programs that should proceed to the next stage of capital evaluation to determining if enterprise investment criteria are met. It does not do this in its own right. This analysis is performed externally to CASH using "business as usual" investment guidelines. Some information, such as project identifiers and projects costs are linked back to CASH. However, portfolio optimisation, sizing of work programs and the like is performed outside of CASH.

We conclude, despite the presence of some top down assessment techniques, that Essential Energy'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. Our review reflects the submission made by the National Generators Forum:⁴⁶

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

⁴⁴ Essential, Advisian - Networks NSW independent review of the risk based prioritisation process for Networks NSW - post implementation review, p. 2

⁴⁵ Essential, Advisian - Networks NSW independent review of the risk based prioritisation process for Networks NSW - post implementation review, p. 7

⁴⁶ National Generators Forum, Submission to the Revenue Determinations (2014–2019) of the NSW Distribution Network Service Providers, p. 9.

setting a top down overall efficient level of capex within which distributors can prioritise individual projects.

Essential Energy in its revised proposal submitted we have not properly engaged with the granular evidence in its proposals and have rather relied on high level analysis that does not account for its drivers and circumstances.⁴⁷ On the contrary, we engaged with Essential Energy's proposals, both initial and revised, in order to understand whether in the context of its overall capex proposal, its expenditure reasonably reflects the capex criteria. We accept that a particular project or program of capex may appear to be justified. However, our application of certain techniques reveals that when such programs are considered in the context of the entire portfolio of projects, it may not be prudent or efficient to undertake that overall level of expenditure. For this reason, top down techniques are well suited to assessing the efficient and prudent level of total capex.

Essential Energy's lack of a cost-benefit evaluation for each of its capital projects or programs reveals that its underlying risk assessment is excessively conservative. We agree with the assessment of Essential Energy's consultant Advisian that the CASH model is useful for identifying potentially necessary projects or programs.⁴⁸ We also agree with Advisian that this process does not determine if enterprise investment criteria are met.⁴⁹ As such, we maintain our view from the draft decision that Essential Energy has failed to fully justify the timing and priority of its proposed forecast capex. The same views have also been expressed by EMCa in its review of Essential Energy's capex.⁵⁰

Essential Energy typically has not undertaken or presented robust quantitative cost-risk analysis to demonstrate economically optimal timing and volume of work.

6.4.3 Interaction with the STPIS

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 Essential Energy 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 Essential Energy'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 Essential Energy's network. We consider our

⁴⁷ Essential Energy, Revised Regulatory Proposal, p 112.

⁴⁸ Essential, Advisian - Networks NSW independent review of the risk based prioritisation process for Networks NSW - post implementation review, p. 2

⁴⁹ Essential, Advisian - Networks NSW independent review of the risk based prioritisation process for Networks NSW - post implementation review, p. 7

⁵⁰ EMCa, Review of Proposed Replacement Capital Expenditure in Essential's Revised Regulatory Proposal, p.ii

substitute estimate is sufficient for Essential Energy 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.

Essential Energy submitted that our substitute capital expenditure is detrimental to the long term interests of customers and is insufficient to maintain a safe and reliable network for the 2014-19 period and beyond.⁵¹ It provided reports from R2A Due Diligence and Jacobs in support of its position.⁵² These contend that our capex forecast would negatively impact safety and reliability. We note the starting position of both consultant reports appears to be that any reduced capex forecast will result in the deferment of necessary reliability activities and that this necessarily has a negative impact on reliability.

We do not accept the underlying premise of these reports - that our approved capex results in the deferral of projects required to maintain reliability. 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 Essential Energy to over forecast the work required in the forthcoming regulatory period. Accordingly, with proper prioritisation of its capital program Essential Energy will be able to manage the safety and reliability of its network. This is evidenced in our auxex and replex analysis as set out in Appendix B.

Because we do not accept the starting premise that our approved capex forecast will result in Essential Energy deferring necessary maintenance tasks, we do not accept that the conclusions about safety and reliability found in the Jacobs and R2A report are correct. We note that Essential Energy is required to continue to maintain its network in accordance with its existing regulatory obligations. Whilst we consider our alternative capex estimate reasonably reflects the capex criteria, we also note that the regulatory framework provides some mitigation strategies should unforeseen circumstances lead to an overspend of the capex amount approved in this determination as part of total revenue.

6.4.4 Essential Energy's capex performance

We looked at a number of historical metrics of Essential Energy's capex performance against that of other distributors in the NEM. These metrics are largely based on outputs of the annual benchmarking report and other analysis undertaken using data

⁵¹ Essential Energy, Revised Regulatory Proposalp.96

⁵² Essential Energy, Attachment 1.4 - System Capex and Maintenance Prudency Assessment and Essential Energy, Attachment 1.2 - Asset System Failure Safety Risk Assessment

provided by the distributors for the annual benchmarking report. This includes Essential Energy's relative partial and multilateral total factor productivity (MTFP) performance, capex and RAB per customer and maximum demand, and Essential Energy's historic capex trend.

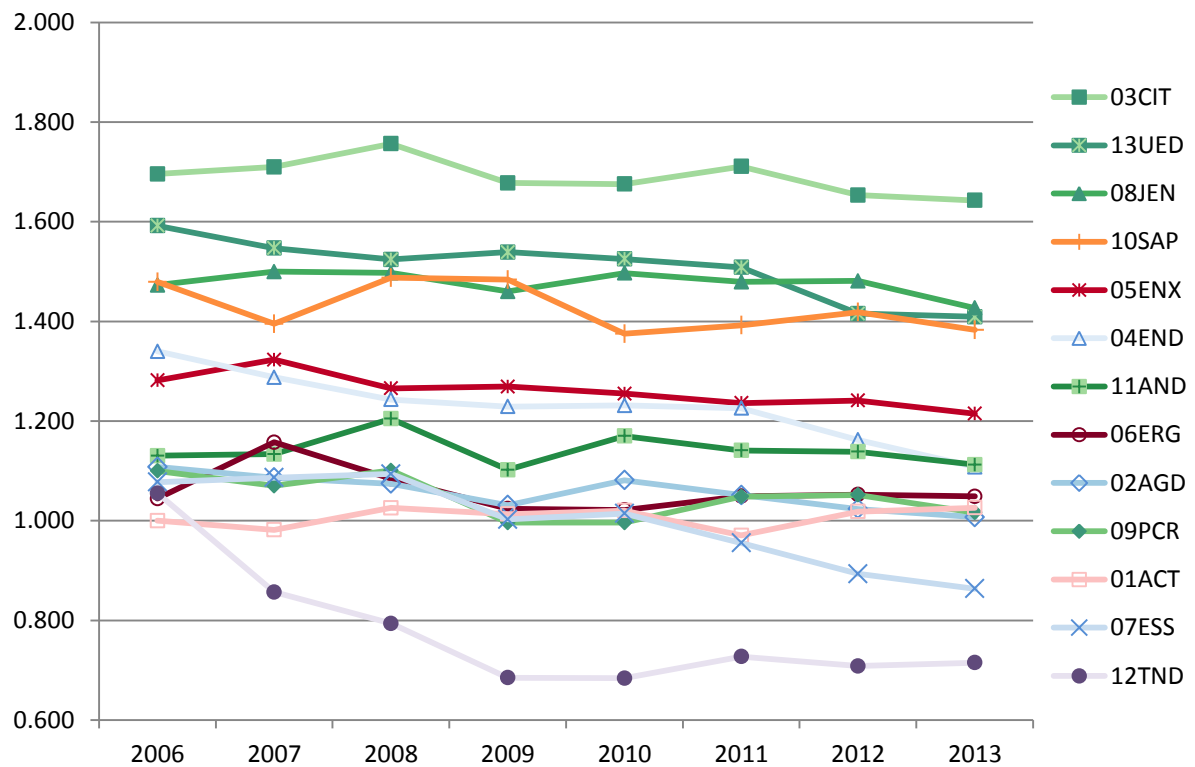
We note that the NER sets out that we must have regard to our annual benchmarking report.⁵³ This section shows how we have taken it into account. We consider this high level benchmarking at the overall capex level is suitable to gain an overall understanding of Essential Energy's proposal in a broader 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 Essential Energy has room to find some efficiencies in its capex program. We have not used this analysis deterministically in our capex assessment

6.4.5 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. Essential Energy had the second lowest level of partial factor productivity of capital of the distributors in the NEM, and the lowest of the NSW and ACT distributor. It is substantially lower than the Victorian and South Australian distributors.

⁵³ NER, cl. 6.5.7(e).

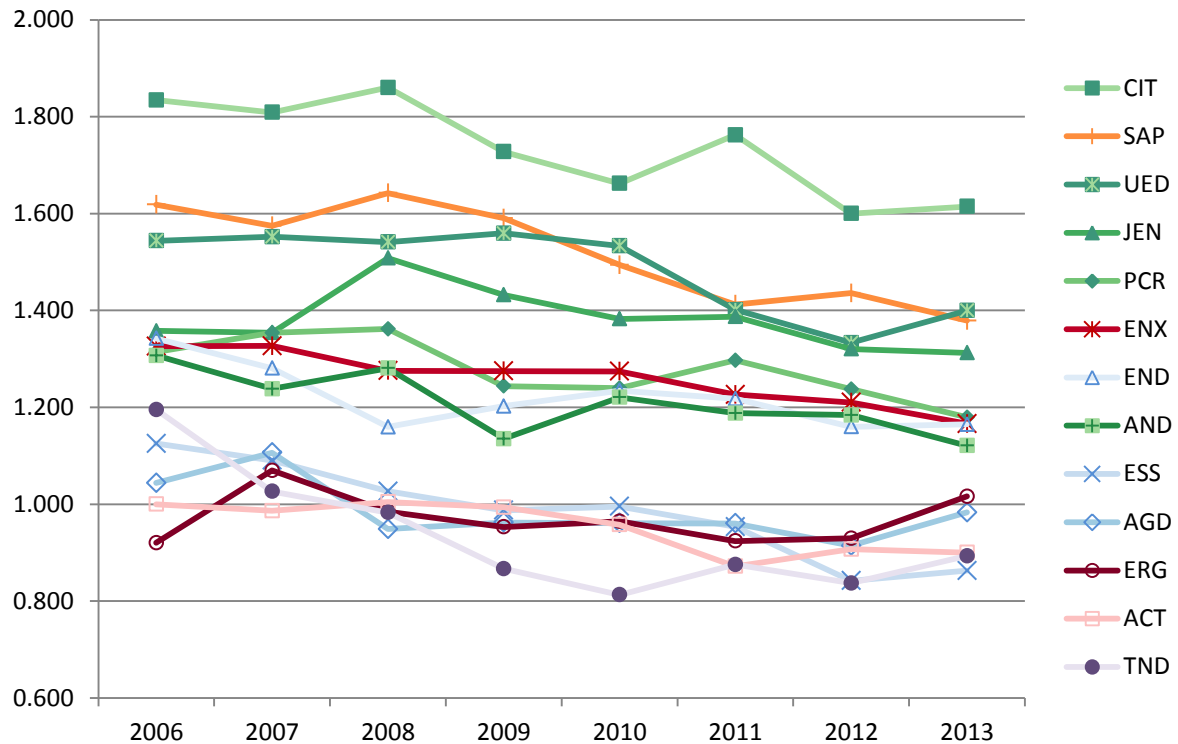
Figure 6-2 Partial factor productivity of capital (transformers, overhead and underground lines)



Source: AER annual benchmarking report.

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

Figure 6-3 Multilateral total factor productivity



Source: AER annual benchmarking report.

6.4.5.1 Relative capex efficiency metrics

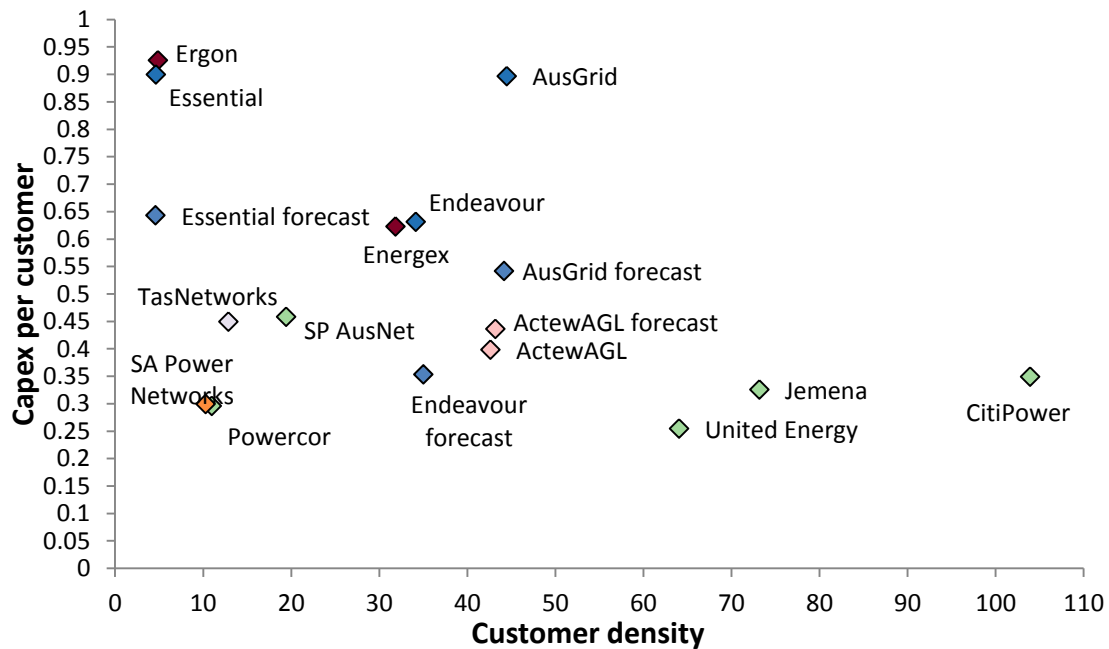
Figure 6-4 and Figure 6-5 shows capex per customer and per maximum demand, against customer density. Capex is taken as a five year average for the years 2008–12. For the NSW distributors and ActewAGL, we have also included proposed capex of these service providers for the 2014–2019 period. We have considered capex per customer as it reflects the amount consumers are charged for additional capital investments.

Figure 6-4 shows that Essential Energy had one of the highest levels of capex per customer in the NEM for the 2008–2012 period. Essential Energy's capex per customer will reduce for the 2014–2019 period based on their proposed forecast capex. However, Essential Energy's capex per customer is still high when compared with the Victorian and South Australian distributors. Essential Energy's proposed forecast capex for the 2014–2019 period would have to reduce by approximately 48 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.

The results also show that Essential Energy has achieved similar levels of capex per customer as Ausgrid, despite Ausgrid having higher customer density. However, Essential Energy's relatively high capex per customer cannot be wholly explained by

the basis of customer density as a number of other distributors have achieved lower levels of capex per customer despite having similar levels of customer density.

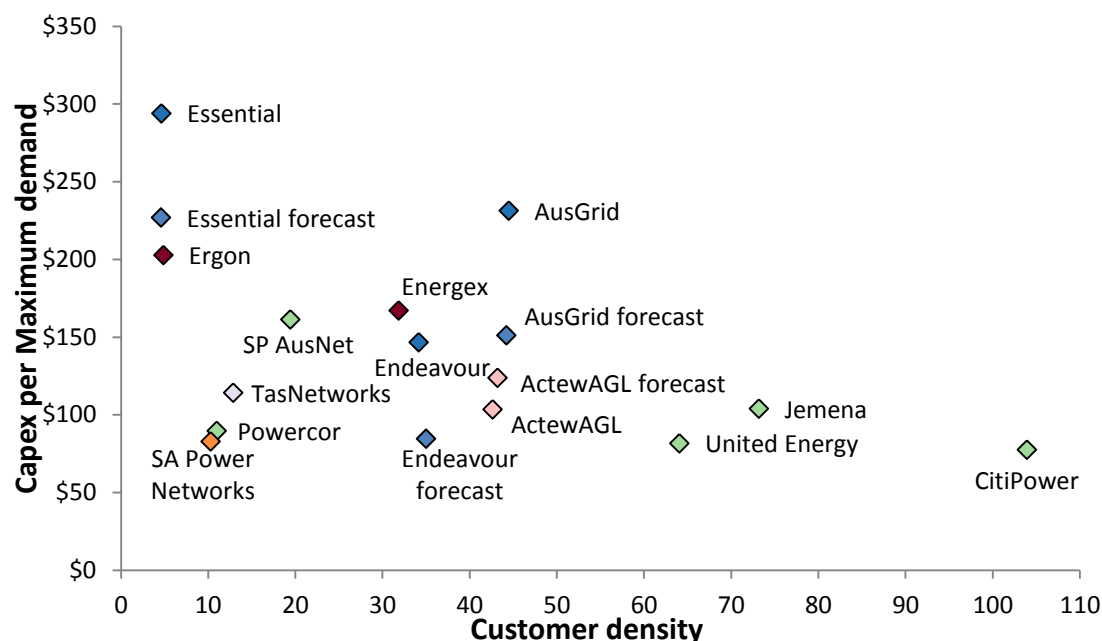
Figure 6-4 Capex per customer (000s, \$2013-14), against customer density



Source: AER analysis.

Figure 6-5 shows that Essential Energy had the highest level of capex per maximum demand for the 2008–2012 period. Capex per maximum demand is forecast to reduce for Essential Energy in the next period but is still the highest in the NEM. Essential Energy's proposed forecast capex for the 2014–2019 period would have to reduce by approximately 56 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.

Essential Energy submitted that we relied on benchmarking analysis that contains errors and which does not meet the Australian Productivity Commission's criteria for a valid benchmark.⁵⁴ Essential Energy generally indicated that we have not properly accounted for the scale of their network, stated that they had received a similar amount of repex as Endeavour Energy for a network that is 546 per cent longer.⁵⁵ Essential Energy is of the view that capex is even less suited to benchmarking than is opex given its non-recurrent and/or lumpy nature.⁵⁶

We have considered the submissions raised by all parties in response to our benchmarking approach. 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.

Essential Energy further submits that its detailed engineering analysis provided to support its proposed capex should receive considerably more weight than what it

⁵⁴ Essential Energy, Revised Regulatory Proposal, p 118

⁵⁵ Essential Energy, Revised Regulatory Proposal, p 122

⁵⁶ Essential Energy, Revised Regulatory Proposal, p 122

considers to be a high level, error prone tool.⁵⁷ We have considered the engineering material Essential Energy has put before us but as we are assessing capex at an overall level, such evidence will not necessarily provide us with an answer as to what is efficient expenditure. Bottom up builds based on such engineering material have a number of shortcomings and in the broad context of our evaluation, we may assess that less weight should be given to these.

Related to this, Essential Energy submits that we have misunderstood the AEMC's removal of the reference to a distributor's 'individual circumstances' as it is necessary to conduct a detailed review in order for the AER to be satisfied that the capex forecast which forms part of Essential Energy's revenue allowance satisfies the NEO. Essential Energy stated that:

The individual circumstances and obligations of a business must be considered rather than constructing a hypothetical benchmark distributor. In relying on benchmarking and high level analysis the AER has not understood the implications of its decision on safety and reliability outcomes and our ability to efficiently meet our obligations as a distributor.⁵⁸

We note that there is little disagreement between us and Essential Energy insofar as we accept that the AEMC removed the focus on a business' 'individual circumstances' in order to "clarify the ability of the AER to undertake benchmarking"⁵⁹ and remove any impediment to the use of benchmarking by the AER.⁶⁰ We agree with Essential Energy that "the intent of the AEMC was to provide additional tools to the AER to help simplify its approach and focus its assessment on key areas."⁶¹ We also note that we have considered the safety and reliability outcomes in Appendix B.

6.4.6 Essential Energy historic trend and licence conditions

We have compared Essential Energy's capex proposal for the 2014–2019 period against the long term historical trend in capex levels. We have specifically considered how Essential Energy's capex allowance should change to reflect current trends in demand and changes in licence conditions.

NNSW has commented that at the time of submitting their regulatory proposals for the previous determination, the distributors needed to address the legacy of previous under-investment in their networks. While it is arguable that earlier periods may reflect unsustainable expenditure, for the reasons outlined below, we consider the 2009–2014 regulatory period is likely to overstate capex levels.

⁵⁷ Essential Energy, Revised Regulatory Proposal, p.123

⁵⁸ Essential Energy, Revised Regulatory Proposal, p.116

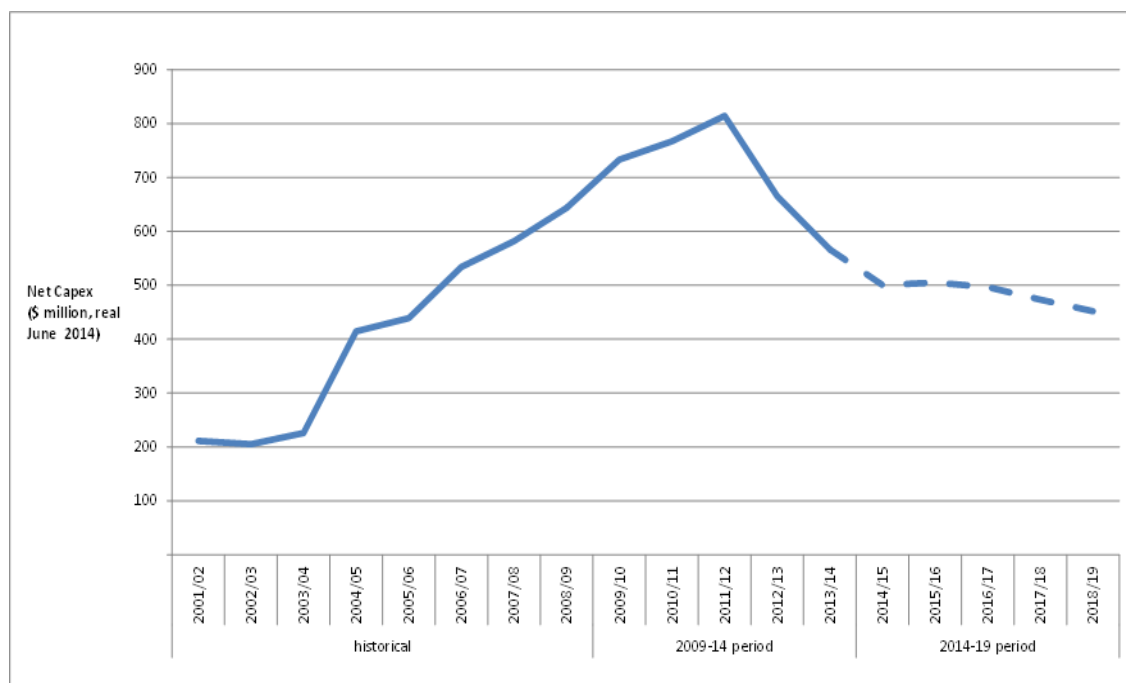
⁵⁹ AEMC, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, November 2012, pg. 85

⁶⁰ AEMC, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, November 2012, p. 97.

⁶¹ Essential Energy, Revised Regulatory Proposal, p 115

Figure 6-6 shows actual historic capex and proposed capex between 2001–12 and 2018–19. This figure shows that Essential Energy's proposed capex for the 2014–2019 period is relatively high when compared with the historical average.

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



Source: Historical: IPART Regulatory Accounts (prior to 2010/11) and AER Annual RINs (2010–11 to 2013–14)
2014–2019 period: Essential Energy's Reset RIN, Table 2.1.1 - Standard control services capex).

In our draft decision we stated that a key driver of capex from 2005 was the NSW licence conditions around design standards and that these were removed in July 2014.⁶² As outlined in our draft decision, we anticipate that removing the design planning requirements should reduce capex requirements for NSW distributors based on the following.⁶³ AEMO estimated:

NSW customers could save up to \$50 a year on their electricity bills from 2015 without any detrimental effect to current reliability levels if a probabilistic approach to distribution reliability was adopted over the current and next financial year.⁶⁴

⁶² AER, Draft Decision Essential distribution determination 2015-2019, Attachment 6, p. 6-28

⁶³ AER, Draft Decision Essential distribution determination 2015-2019, Attachment 6, p. 6-27

⁶⁴ AEMO, Submission to AEMC's Review of Distribution Reliability Outcomes and Standards, Draft Report - NSW Workstream, p. 1

The AEMC estimated that capex could reduce by '\$140 million under the modest reduction scenario to \$530 million under the extreme reduction scenario' over a five year timeframe for the three NSW distributors.⁶⁵

Even without the change in standards, it could be expected that NSW distributors' capex would come down for the 2014–2019 period given the significant capex invested from 2005–06 to meet the standards. As noted by the AEMC:

We note that significant investment has been made since the NSW distribution reliability requirements were increased in 2005 and that future investment will be incremental in order to maintain reliability at the current level.⁶⁶

Essential Energy submitted that their capital program has been substantially reduced compared to the 2009-14 regulatory period and a contributing factor to this was achieving compliance with the licence conditions as at 30 June 2014.⁶⁷ They consider that we are incorrect in concluding that the removal of the design planning standards was a key driver of reduced expenditure.⁶⁸ Essential Energy also submits that we did not provide any evidence to demonstrate relying on capex trends prior to 2005 is a reasonable view.⁶⁹ In this final decision, we have not used our observations on trend analysis prior to 2005 as a starting point or to support our position on the level of expenditure required by Essential Energy.

We note that one of the capex factors that the AER is expressly required to have regard to is the actual and expected capex of the distributor during the preceding regulatory control periods.⁷⁰ That is, the NER recognises that past expenditure is an important factor to consider in assessing forecast expenditure.

As a starting point, past expenditure is indicative of future expenditure if the operating environment remains similar over the time period. If there is a material change in operating environment, then this needs to be factored into any trend analysis. We consider that the removal of design planning standards from the licence conditions in 2014 is such a material change. For this reason, we maintain our position that at the total capex level, our trend analysis indicates that the 2009-14 regulatory period is likely to be higher than the efficient level of capex in the 2014-19 period.⁷¹

⁶⁵ AEMC, Review of Distribution Reliability Outcomes and Standards, Final Report - NSW Workstream, 31 August 2012, p. vi, <http://www.aemc.gov.au/media/docs/NSW-workstream-final-report-160466c4-733b-4cf2-b4e3-4095c6d9819b-0.pdf>.

⁶⁶ AEMC, Review of Distribution Reliability Outcomes and Standards, Final Report - NSW Workstream, 31 August 2012, p. iii, <http://www.aemc.gov.au/media/docs/NSW-workstream-final-report-160466c4-733b-4cf2-b4e3-4095c6d9819b-0.pdf>.

⁶⁷ Essential Energy, Revised Regulatory Proposal, p.124

⁶⁸ Essential Energy, Revised Regulatory Proposal, p.125

⁶⁹ Essential Energy, Revised Regulatory Proposal, p.125

⁷⁰ NER, cl. 6.5.7(e)(5).

⁷¹ We have applied trend analysis deterministically for non-network capex, because we consider there is a high level of recurrent expenditure in this category.

6.4.7 Interrelationships

There are a number of interrelationships between Essential Energy's total forecast capex for the 2014–2019 period and other components of its distribution determination that we have taken into account in coming to our draft decision. Table 6-4 summarises these other components and their interrelationships with Essential Energy'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 Essential Energy's total forecast opex that are interrelated with its total forecast capex. These are:</p> <ul style="list-style-type: none"> the labour cost escalators that we approved in Attachment 7. the amount of maintenance opex that is reflected in Essential Energy's opex base year that we approved in Attachment 7. <p>The labour cost escalators are interrelated with capex because Essential Energy'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 Essential Energy's total forecast opex. This is because the amount of maintenance opex that is reflected in Essential Energy's opex base in part determines the extent to which Essential Energy needs to spend repex during the 2014–2019 period.</p>
Forecast demand	<p>Forecast demand is related to Essential Energy'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 interrelated to Essential Energy's total forecast capex. In particular, the effective application of the CESS is contingent on the approved total forecast capex being efficient, and that it reasonably reflects the capex criteria. As we noted in the capex criteria table above, 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 Essential Energy's regulatory asset base. In particular, the CESS will ensure that Essential Energy bears at least 30 per cent of any overspend against the capex allowance. Similarly, if Essential Energy 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, Essential Energy risks having to bear the entire overspend.</p>
Service Target Performance Incentive Scheme (STPIS)	<p>The STPIS is interrelated to Essential Energy'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 Essential Energy 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 Essential Energy systematically under- or over performing against its targets.</p>
Contingent project	<p>A contingent project is interrelated to Essential Energy'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 Essential Energy's total forecast capex for the 2014–2019 period.</p> <p>We did not identify any contingent projects for Essential Energy during the 2014–2019 period.</p>

Source: AER analysis.

6.4.8 Consideration of the capex factors

In deciding whether or not we are satisfied Essential Energy's forecast reasonably reflects the capex criteria, we have had regard to the following 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 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 Essential Energy'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 Essential Energy's capex performance.
The actual and expected capex of Essential Energy during any preceding regulatory control periods	<p>We have had regard to Essential Energy's actual and expected capex during the 2009–2014 and preceding regulatory control periods.</p> <p>This can be seen in our assessment of Essential Energy's capex performance. It can also be seen in our assessment of the forecast capex associated with the capex drivers that underlie Essential Energy'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 Essential Energy in the course of its engagement with electricity consumers	We have had regard to the extent to which Essential Energy's proposed total forecast capex includes expenditure to address consumer concerns that have been identified by Essential Energy. On the information available to us, including submissions received from stakeholders, we have been unable to identify the extent to which Essential Energy'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 Essential Energy's proposed real cost escalation factors for materials. We discuss this in Appendix D.
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 Essential Energy'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 Essential Energy	We have had regard to whether Essential Energy's proposed total forecast capex is consistent with the CESS and the STPIS. See our discussion about the interrelationships between Essential Energy'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 Essential Energy's proposed total forecast capex or our alternative estimate that is referable to arrangements with a person other than Essential Energy that do not reflect arm's length terms. We did not identify

Capex factor	AER consideration
	any parts of Essential Energy'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 Essential Energy'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 Essential Energy has considered and made provision for efficient and prudent non-network alternatives	We have had regard to the extent to which Essential Energy made provision for efficient and prudent non-network alternatives as 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 Essential Energy in writing, prior to the submission of its revised regulatory proposal under cl.6A.12.3, 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, some discrepancies arose due to our treatment of Essential Energy's capital contributions. Essential Energy submitted that the AER's decision contains substantive errors in the capital expenditure numbers assessed and substituted.⁷²

We now understand that the capital contributions are assets that are paid for by connecting consumers and then are gifted to the distributor to be managed and operated for the remainder of their life. We accept that no funds are received for these assets and as such the value that Essential Energy ascribes to them should be excluded from the calculations.

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. The change that we have adopted to the treatment of gifted assets does not change the underlying analysis set out in our draft decision.

⁷² Revised proposal p. 111

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	744.6	744.6	475.2	807.4	686.3
Connections	366.1	366.1	366.1	29.1	29.1
Replacement	856.9	856.9	675.7	826.8	775.5
Reliability improvement	0.0	0.0	0.0	0.0	0.0
Other system assets	0.0	0.0	0.0	0.0	0.0
Non-Network	306.4	306.4	306.4	306.2	306.2
Capitalised overheads	681.0	681.0	474.4	608.3	608.3
Materials escalation adjustment	0.0	0.0	-31.6	0.0	-4.5
Balancing item	0.0	0.0	0.0	0.0	0.0
Capcons (Gifted Assets)	(in connections)	(in connections)	(in connections)	353.9	353.9
TOTAL GROSS CAPEX	2,955.0	2,955.0	2,266.2	2,931.7	2,754.8
Capcons	336.1	336.1	336.1	353.9	353.9
TOTAL NET CAPEX	2,618.9	2,618.9	1,930.1	2,577.8	2,400.9

Source: AER Analysis

A Assessment Techniques

This appendix describes the assessment approaches we have applied in assessing Essential Energy'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:⁷³

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 Essential Energy'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.⁷⁴ Economic benchmarking applies economic theory to measure the efficiency of a distributor's use of inputs to produce outputs, having regard to environmental factors.⁷⁵ 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.⁷⁶ As stated by the AEMC, 'benchmarking is a critical exercise in assessing the efficiency of a NSP'.⁷⁷

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 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

⁷³ Expenditure assessment guideline p.8

⁷⁴ NER, cl. 6.5.7(e)(4).

⁷⁵ AER, Explanatory Statement: Expenditure Forecasting Assessment Guidelines, November 2013.

⁷⁶ NER, cl. 6.5.7(c).

⁷⁷ AEMC, Economic Regulation Final Rule Determination, p. 25.

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.⁷⁸ Once such exogenous factors are taken into account, we would 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.⁷⁹

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 to under the NER.⁸⁰

Trend analysis involves comparing NSPs' 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 business' capex forecast reasonably reflects the capex criteria, we need to consider whether the forecast will allow the business to meet expected demand, and comply with relevant regulatory obligations.⁸¹ 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 business is deciding what augmentation projects will be required in an upcoming regulatory control period. However, to the extent that the forecast demand changes, a business should incorporate this updated information and reassess the need for the projects. Growth in a business' network will also drive augmentation and connections related capex. For these reasons it is

⁷⁸ AEMC, Economic Regulation Final Rule Determination, p.113. Exogenous factors could include geographic factors, customer factors, network factors and jurisdictional factors.

⁷⁹ AER, Annual Benchmarking Report, 2014.

⁸⁰ NER, cl. 6.5.7(e)(5).

⁸¹ NER, cl. 6.5.7(a)(3).

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.⁸² The models draw

⁸² 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.⁸³

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. IT compares utilisation thresholds with forecasts of maximum demand to identify the parts of a network segment that may require augmentation.⁸⁴ 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.⁸⁵ 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.⁸⁶ 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 business 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.

⁸³ NER, cl. 6.5.7(e)(5).

⁸⁴ Asset utilisation is the proportion of the asset's capability under use during peak demand conditions.

⁸⁵ For more information, see: AER, Guidance document: AER augmentation model handbook, November

⁸⁶ 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:⁸⁷

- 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 operator would require to achieve the capex objectives. A prudent 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.⁸⁸
- 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 an 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 alternatives⁸⁹)
- whether the timing of the project is efficient
- unit costs and volumes, including comparisons with relevant benchmarks

⁸⁷ NER, cl. 6.5.7(c).

⁸⁸ 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, Ausgrid submission, 8 May 2014, p. 7.

⁸⁹ NER, cl. 6.5.7(c)(10).

- whether the project should more appropriately be included as a contingent project⁹⁰
- 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 expenditure⁹¹
- 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 terms⁹², 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.⁹³ 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.

⁹⁰ This principally relates to augex. See NER, cl. 6.5.7(e)(9A).

⁹¹ This principally relates to augex. See NER, cl. 6.5.7(e)(6) and (e)(9A).

⁹² NER, cl. 6.5.7(e)(9).

⁹³ NER, cl. 6.5.7(e)(5A).

B Assessment of capex drivers

We present our detailed analysis of the sub-categories of Essential Energy'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 not satisfied that Essential Energy'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 Essential Energy'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 section 6.3.

This appendix sets out our findings and views on 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.5: forecast capitalised overheads
- Section B.6: non-network capex
- Section B.7: 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 Essential Energy'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 A. Our weighting of each of these techniques, and our response to Essential Energy's submissions on the weighting that should be given to particular techniques, is set out under the capex drivers below.

We have considered the interaction between the removal of the design planning standards, the minimum reliability standards and the historical reliability that Essential Energy has been achieving. We consider that our decision takes into account the removal of the design planning standards and provides a level of capex that is

commensurate with the removal of this standard. Further, we consider Essential Energy will be able to maintain both its average reliability level and meet its minimum reliability standards within our approved capex forecast. Our approved capex forecast must also be considered in the context of the significant capex program undertaken in the previous regulatory period.

We are satisfied that our alternative estimate reasonably reflects the capex criteria.

B.2 AER findings and estimates for augmentation expenditure

Essential Energy proposed a forecast of \$803 million (\$2013–14) for augmentation capex (augex) in its revised proposal (excluding overheads). This is an 8 per cent increase compared to the \$745 million (\$2013-14) augex forecast in its initial proposal.

B.2.1 Position

We do not accept Essential Energy's revised augex proposal. We have instead included an amount of \$686.3 million (\$2013-14) for augex in our alternative estimate of overall total capex (excluding overheads). This is 15 per cent lower than Essential Energy's revised proposal. We are satisfied that this amount, when combined with the rest of our capex decision, reasonably reflects the capex criteria.

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

Table B-1 Essential Energy augex forecasts comparisons (\$2013–14, million)

	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Initial augex forecast	169.1	154.8	143.7	140.3	136.7	744.6
AER draft decision	113.9	100.2	89.9	87.0	84.1	475.2
Revised Proposal	155.0	178.9	165.7	159.3	148.6	807.4
AER final forecast	133.4	155.5	141.1	133.7	122.6	686.3

Source: AER Analysis

Our final decision forecast amount reflects the following:

- We reduced Essential Energy's forecast capex for its high voltage (HV) network feeders by \$43.8 million (\$2013-14), or 15 per cent, based on forecast declines in network growth. We accept Essential Energy's revised proposal that localised or spatial demand growth rather than whole-of-system demand growth is the appropriate driver of Essential's HV feeders capex. However, we do not consider

that Essential Energy's approach to forecasting its HV feeder capex adequately reflects the expected decline in localised network growth drivers over the 2014–19 period.

- We accept that Essential Energy's \$18 million (\$2013-14), or 11 per cent, reduction to its sub-transmission augex forecast reasonably reflects the efficiency savings Essential Energy can achieve through risk-assessed cost-benefit analysis. Based on the information provided by Essential Energy in its revised proposal, we accept this 11 per cent reduction reasonably reflects the capex criteria. We have not applied the 20 per cent reduction to Essential Energy's total augex forecast, as we applied in our draft decision, which at that time reflected what we considered were the efficiencies that could be gained by applying risk-assessed cost-benefit analysis.
- We have not included Essential Energy's additional \$77.4 million capex (\$2013-14) to address low clearance of rural overhead lines in our alternative augex estimate. Essential Energy characterise the driver of its additional low spans remediation program as augmentation rather than replacement. We consider the forecast low spans remediation program is primarily repx driven. Consequently, we consider this forecast capital expenditure as part of our assessment of repx driven capex.

Table B-2 below sets out a breakdown of the forecast augex we have included in our alternative estimate.

Table B-2 AER's alternative estimate of augex (\$2013–14, million)

	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Augex revised proposal	155.0	178.9	165.7	159.3	148.6	807.4
Reduction to HV network augex	-6.1	-7.9	-9.1	-10.1	-10.5	-43.8
Removal of low spans augex	-15.48	-15.48	-15.48	-15.48	-15.48	-77.4
AER alternative estimate	133.4	155.5	141.1	133.7	122.6	686.3

Source: AER analysis

B.2.2 Revised proposal

Essential Energy's revised proposal of \$804 million (\$2013–14) is higher than its initial proposal.⁹⁴ Following our draft decision, Essential Energy adjusted its augex proposal by:

⁹⁴ Essential Energy's augex forecast in its initial proposal was \$745 million (\$2013-14), as reported in its reset RIN. Essential Energy does not provide an updated augex forecast in its revised proposal, but rather outlines the

- decreasing the forecast by \$18 million (\$2013–14) based on a review of its augex projects using revised probabilistic planning criteria and the AEMO value of customer reliability (VCR) methodology and the review of major sub-transmission projects⁹⁵
- increasing the forecast by \$77 million (\$2013–14) for a new augmentation program for what it proposes is required to address low clearance of rural overhead lines.⁹⁶

In developing its revised proposal, Essential Energy did not agree with key aspects of our draft decision. It submitted:

- Our adjustment to Essential Energy's HV feeder capex was inappropriate because its HV feeders augex was largely unrelated to demand growth, and we incorrectly calculated its change in ratcheted demand.⁹⁷
- Our additional 20 per cent reduction to the augex forecast based on estimated efficiencies from applying risk-assessed cost benefit analysis would have led to an understated augex forecast.⁹⁸

B.2.3 AER approach

In our draft decision of Essential Energy's augex forecast, we applied three assessment techniques:⁹⁹

- trend analysis, comparing the proposed augex with historic expenditure levels, taking into account changes in demand, network capacity and design and planning standards;
- an engineering review of Essential Energy's forecasting processes and methodology conducted by our consultant WorleyParsons; and
- the augex model to generate trends in network utilisation.

We concluded also that Essential Energy proposed augex forecast is likely to be higher than it requires to meet localised demand growth in its network based on observations in network utilisation and capacity.¹⁰⁰

changes it proposes to its initial proposal. We have calculated the \$804 million augex figure based on the Essential Energy's \$745 million initial proposal and then made the relevant adjustments as identified in the revised proposal.
⁹⁵ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 19

⁹⁶ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 26

⁹⁷ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, pp. 9-15

⁹⁸ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, pp. 18-21

⁹⁹ AER, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 47

¹⁰⁰ AER, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, pp. 49-57

Submissions from AGL, Origin, the Energy Retailers' Association of Australia (ERAA) and the Energy Markets Reform Forum (EMRF) endorsed our draft decision:

- AGL submitted that it supported our draft decision because it is hard to justify that Essential Energy requires high levels of capex given that they are facing no demand or energy growth in the 2009–14 period.¹⁰¹
- Origin submitted that our alternative program represents the most representative alternative that meets the capex criteria as set out in the NER. In support of this, it supports our view that the excess capacity in the network needs to be utilised before supporting further augmentation and agree with our approach to apply a ratcheted demand to provide an indication of the potential need for augmentation.¹⁰²
- The ERAA submitted that our alternative program better reflects the capex criteria set out in the NER. In support of this the ERAA stated that the improvements in network utilisation, coupled with downgraded demand and security of supply requirements, should drive an observable reduction in the amount of required capex over the 2014-19 period.¹⁰³
- The EMRF noted that we undertook a number of studies (benchmarking, trend analysis, utilization studies, review of forecasting methodology, value of customer reliability impacts and a modelling of augex needs based on inputs) that all delivered similar results and contradicted Essential Energy's augex forecast.¹⁰⁴

However, the Energy Users Association of Australia (EUAA) submitted that we should adopt further reductions to Essential Energy's augex proposal.¹⁰⁵ In support of this, EUAA submitted that:

- We should substitute Essential Energy's demand forecasts with forecasts provided by credible independent forecasters. It notes that Essential Energy's augex is built on demand forecasts that are not supported by independent forecasting from AEMO.¹⁰⁶
- We did not quantify the impacts of Essential Energy's excess capacity and did not demonstrate that it has been appropriately considered in our augex assessments.¹⁰⁷
- Whilst there are likely to be areas in the networks that have genuine capacity expansion needs, the EUAA does not consider that our assessment process has appropriately scrutinised the networks' augex justifications.¹⁰⁸

¹⁰¹ AGL submission to NSW DNSP s draft decisions, p. 2

¹⁰² Origin submission to NSW DNSP s draft decisions, pp. 10-12

¹⁰³ ERAA submission to NSW DNSP s draft decisions, p. 2

¹⁰⁴ EMRF submission to NSW DNSP s draft decisions and revised proposals, p. 59

¹⁰⁵ EUAA submission to NSW DNSP s draft decisions, p. 34

¹⁰⁶ EUAA submission to NSW DNSP s draft decisions, p. 31 and 34

¹⁰⁷ EUAA submission to NSW DNSP s draft decisions, p. 32

¹⁰⁸ EUAA submission to NSW DNSP s draft decisions, p. 31

- Our adjustments to address the implications of the reduced reliability standards (as reflected in the removal of deterministic planning criteria from the licence condition) do not sufficiently reflect the Essential Energy's reduced reliability-capex requirements.¹⁰⁹

Our final decision on Essential Energy's demand forecasts is set out in Appendix C. In summary, we are satisfied that the demand forecasts for the 2014–19 period proposed by Essential Energy in its revised proposal reasonably reflect a realistic expectation of demand.

In relation to the use of network capacity trend, in our draft decision we used trends in network utilisation rates in order for us, as well as stakeholders, to gain a broader understanding of trends over time particularly against aggregated augex trends. On the basis of these observations, we sought further detailed analysis based on a technical review by our consultants WorleyParsons. Our reductions to Essential Energy's augex forecast were based on the findings of this technical review. In this final decision, we also have not made any specific adjustments based on our utilisation analysis.

In relation to the technical review, we have reassessed our conclusions from the engineering review based on further evidence submitted by Essential Energy in its revised proposal (as discussed in detail below). In particular, in light of evidence submitted in the revised proposal, we reviewed our draft decision on:

- Essential Energy's HV network feeders forecast
- the efficiencies that Essential Energy can achieve through risk-assessed cost benefit analysis.

On the basis of our further review of these matters, we have increased our alternative estimate of the prudent capex required to augment Essential Energy's HV network forecast compared to our draft decision and modified our estimate of the likely efficiencies that Essential Energy can achieve through risk-assessed cost benefit analysis. While our estimates in the final decision are lower than Essential Energy's revised proposal, they are both higher than our draft decision.

Finally, we consider the forecast low spans remediation program is primarily repex driven. Consequently, we have considered this forecast capital expenditure as part of our assessment of repex driven capex. As a consequence, our alternative estimate of Essential Energy's augex forecast does not include the proposed \$77.4 million (\$2013-14) for low spans remediation.

We consider that our revised estimate of augex, as part of our total capex forecast, meets the capex criteria. Our reasons are considered in detail below.

¹⁰⁹ EUAA submission to NSW DNSP's draft decisions, p. 33

B.2.4 HV feeders capex

Essential Energy's forecast capex for its HV network accounted for \$422 million (\$2013–14), or 56 per cent, of its initial augex forecast. Our draft decision reduced this forecast by \$150 million (\$2013–14) based on an estimated decrease in Essential Energy's demand forecasts for 2014-19.¹¹⁰

Essential Energy's revised proposal did not accept our adjustment and stated that it would result in an understated augex forecast because:

- Essential Energy's HV feeders forecast is driven by spatial network growth rather than projected system peak demand.¹¹¹
- The projected capex works are reactive in nature (for example, work is only carried out in response to actual network demand and demonstrated network issues rather than forecast constraints). Essential Energy forecasts the capex requirements over 2014-19 based on historical capex in 2012-13 and 2013-14.¹¹²
- The AER made an error when calculating Essential Energy's change in demand forecasts between the 2013 and 2014 forecasts because it excluded two substations from the 2014 forecast. If these substations are included, there is actually an 8 per cent increase in demand rather than the 35.67 per cent decrease applied by the AER.¹¹³

In light of these views, Essential Energy's revised proposal does not make any adjustments to the HV feeder augex forecast in the initial proposal.

We have reviewed Essential Energy's revised proposal and its supporting arguments. For the reasons set out below, we agree the primary driver of the HV network capex is spatial network growth rather than forecast system demand. This means that making an adjustment to the augex forecast based on a change in system-wide demand forecasts may not result in a capex allowance that reflects Essential Energy's efficient and prudent capex requirements for its HV network, given a realistic expectation of the demand forecast and cost inputs. Nonetheless, we are not satisfied that Essential Energy's own forecasting methodology adequately accounts for the forecast decline in spatial growth over 2014–19.

¹¹⁰ AER, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, pp. 62-64. In the draft decision, we used evidence from one of Essential Energy's peers, Ausgrid, HV network capex forecast to determine that there is a linear relationship between a change in demand forecast and the augex requirements for its HV network. We applied this linear relationship to Essential Energy's HV feeder forecast.

¹¹¹ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 11

¹¹² Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 11 and 14

¹¹³ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 10

Table B-3 below shows the drivers of Essential Energy's HV feeders forecast as set out in the revised proposal. This shows that the vast majority of the forecast is not driven by thermal capacity constraints on the network (of which peak demand is the primary driver). Rather, 58 per cent of the forecast is driven by the expected consequences of spatial demand driven network growth (including voltage issues, fault levels, and quality of supply) and the other 42 per cent is driven by reliability, compliance-related and demand management capex.

Table B-3 Drivers of Essential Energy's HV network augex

HV network capex	Proportion of capex	Driver
Growth (Voltage issues)	18%	Voltage constraints based on voltage requirement to new customers. Driven by spatial growth.
Growth (Thermal constraint)	12%	Demand constraint when new connection is required. Driven by demand and spatial growth
Growth (Fault levels)	12%	Faults in asset protections based on spatial growth.
Growth (Customer)	6%	Additional work required at the time of new customer connections. Driven by customer numbers.
Quality of supply	10%	Voltage fluctuations based on customer complaints. Driven by spatial growth.
Reliability	27%	Program to maintain the number of poor performing feeders under the licence condition. Independent from spatial growth.
Compliance	13%	Compliance with safety requirements. Independent from spatial growth.
Demand management	2%	Proactive program aimed at reducing overall network demand.

Source: Essential Energy revised proposal, pp. 11-12

Essential Energy's revised proposal states that the growth related augex forecast is calculated based on the average of the actual 2012–13 and 2013–14 growth capex.¹¹⁴ Essential states that this is likely to be at the lower end of the prudent and efficient level of augex because 2012–13 and 2013–14 experienced the lowest level of growth on its network.¹¹⁵

We consider that it is reasonable to calculate a forecast based on past capex if the underlying trend is expected to be similar in each period. In Essential Energy's approach, trending forward the capex in 2012–13 and 2013–14 assumes that the spatial growth of the network is expected to be similar in 2014–19 as it was in 2012–13 and 2013-14. However, for the reasons set out below, we consider that the

¹¹⁴ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 13

¹¹⁵ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 15

growth will be lower than assumed by Essential Energy and hence its augex forecast remains overstated and does not reasonably reflect the capex criteria.

Spatial network growth is driven by the expansion of customers into new areas (or increases in customer density within the existing network). While there are a number of different drivers of spatial network growth, a reasonable indicator (or proxy) of spatial network growth is the number and rate of new customer connections.¹¹⁶ Essential Energy customer connections asset management plan shows that new customer connection rates have been falling for several years and this decline is forecast to continue in 2014–19. This is shown in Table B-4 below.

Table B-4 New customer connections growth (historical and forecast)

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
New customer connections	7,474	7,229	6,984	6,741	6,490	6,245	6,000	5,755
New customer connection growth		-3.3%	-3.4%	-3.5%	-3.7%	-3.8%	-3.9%	-4.1%

Source: AER analysis, CEOM8018-03 Customer Connections AMP 2014-19, pp. 17-18

Note: Essential Energy's customer connections asset management plan provides historical numbers for overhead connections only. We calculated the number of underground connections using the ratio of underground to overground connections as stated by Essential Energy on page 17 this document.

We have calculated an alternative growth capex forecast by applying the declining new customer connection rates to Essential Energy's actual capex in 2013-14 that were driven by spatial growth.¹¹⁷ Table B-5 shows that this will result in a \$43.8 million (2013-14), or 15 per cent, reduction in Essential Energy's growth related capex as forecast in its revised proposal.

Table B-5 AER alternative growth capex forecast 2014-19 (\$2013-14, million, excluding overheads)

	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total 2014-19
	Historical			Forecast				
Growth capex proposal	60.8	54.8	59.0	58.9	58.1	57.2	55.7	289
Alternative	N/A	N/A	52.9	50.9	49.2	47.1	45.1	245.1

¹¹⁶ This is recognised in Essential Energy's customer connections asset management plan for 2014-19 which states that network growth is the driver of new premise connections growth. See CEOM8018-03 Customer Connections AMP 2014-19, p. 17.

¹¹⁷ These are the voltage, thermal, fault, customer and quality of supply capex set out in Table B-3 above.

forecast

Difference	-6.1	-7.9	-9.1	-10.1	-10.5	-43.8
Difference (percentage)	-3.4%	-3.7%	-3.8%	-3.9%	-4.1%	16%

Source: AER analysis; Response to AER Essential 044, Attachment 1 Growth Report Attachment Q5

Note: Growth capex in this table includes voltage, thermal, fault, customer and quality of supply capex. Based on information provided by Essential Energy in its revised proposal, power quality is also driven by spatial network growth like the other growth capex components. We have therefore adjusted Essential Energy's proposed capex for power quality by the trend in customer connections growth.

We consider that our \$245 million (\$2013–14) alternative growth capex forecast is more likely to reflect Essential Energy's prudent and efficient capex requirements over 2014–19, given a realistic expectation of the demand forecast and cost inputs, because it reflects the forecast trend in spatial network growth.¹¹⁸ We have therefore applied this reduction in calculating our alternative estimate of total capex. This decline in forecast growth capex is also consistent with Essential Energy's reduction in forecast connections capex between 2009–14 and 2014–19, which we accepted [as discussed in section B.3.section].

B.2.5 Risk assessed cost benefit analysis

Our draft decision reduced Essential's Energy's total augex forecast by 20 per cent to reflect estimated efficiencies that Essential Energy could achieve by applying risk-assessed cost benefit analysis to projected capex programs in the context of its revised licence conditions.¹¹⁹ We also stated that we expect Essential Energy to take into account AEMO's recent VCR results when preparing its revised proposal.¹²⁰

Our reduction followed qualitative advice from engineering consultants WorleyParsons based on its review of Essential Energy's initial augex proposal.¹²¹ However, WorleyParsons did not quantify the likely efficiency gains that Essential Energy could achieve. Rather, we applied the 20 per cent reduction based on WorleyParsons findings that Essential Energy could achieve a 10 to 20 per cent saving on its augex

¹¹⁸ Note that Essential Energy's actual growth capex for the first half of 2014/15 was \$28.74 million (see Essential Energy response to AER Essential 044, 26 February 2015). If doubled this would result in approximately \$56 million over 2014/15, which is \$6 million more than our alternative estimate. The major driver of the higher capex in the first half of 2014/15 is capex on thermal constraints. Reviewing Essential Energy's historical capex on thermal shows that the average annual cost and average cost per project varied significantly. Therefore we do not consider that higher capex on thermal projects in the first half of 2014/15 will necessarily continue for the remainder of 2014/15.

¹¹⁹ AER, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, pp. 56-60

¹²⁰ AER, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 61

¹²¹ WorleyParsons, *Review of proposed augmentation capex in NSW DNSP regulatory proposals 2014 –2019*, 17 November 2014

forecast through more comprehensive risk-assessed cost benefit analysis.¹²² We considered it was reasonable to apply similar cost savings for Essential Energy, given the similarities in the governance structures across all NSW distributors.

Essential Energy's revised proposal submitted that our draft decision would result in an understated augex allowance.¹²³ In support of this, Essential Energy references a review of our draft decision conducted by consultants Jacobs Group Australia (Jacobs).¹²⁴ Jacobs concluded that:¹²⁵

- The AER's identified range of 10-20 per cent is a speculation that is not robustly substantiated and is discussed only with respect to Endeavour Energy. Jacobs submitted that the advice from WorleyParsons' report does not indicate any basis for their conclusion that the reductions for Essential Energy would be in the order expected for Endeavour Energy.
- The AER does not appear to consider that Essential Energy made specific augex program reductions prior to submitting its initial proposal based on a cost-benefit review in relation to the changes to its licence conditions. Jacobs submitted that this resulted in a reduction of \$45.2 million (\$2013–14) to the augex forecast.
- Essential Energy should apply further detailed analysis to determine the potential for any additional reductions beyond that which it has previously identified.

In light of this advice, Essential Energy did not apply our 20 per cent reduction to its revised augex forecast. Instead, it carried out further risk-based review of its proposed sub-transmission augex projects. It also incorporated changes to the VCR which we asked Essential Energy to take into account in our draft decision. This led to an \$18.6 million (\$2013–14), or 11 per cent, reduction from Essential Energy's \$168 million (\$2013–14) subtransmission augex forecast.¹²⁶

Essential Energy did not agree with our proposed adjustments to its distribution network augex programs. Essential Energy's distribution augex forecast is \$520 million (\$2013–14), of which \$422 million (\$2013–14) is for HV feeders. As noted above, Essential Energy forecasts its HV feeders augex requirements based on past capex on reactionary projects and is driven by spatial network growth rather than forecast demand growth. This forecasting methodology is also applied to the remaining

¹²² WorleyParsons, *Review of proposed augmentation capex in NSW DNSP regulatory proposals 2014–2019*, 17 November 2014, p. 8. AER, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 59

¹²³ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 18

¹²⁴ Jacobs' review was commissioned by Networks NSW and reviews our draft decisions on Ausgrid, Endeavour Energy and Essential Energy's capex forecasts.

¹²⁵ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, pp. 22-23

¹²⁶ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, Appendix A, p. 28

distribution forecast.¹²⁷ Essential Energy submits that it cannot reduce this forecast through risk assessment because it is taking on the maximum risk allowed to maintain mandatory supply standards.¹²⁸

We have reviewed Essential Energy's revised proposal and the supporting arguments and evidence.

First, we recognise that Essential Energy has conducted a further review of its augex projects based on the principles we highlighted in our draft decision. This resulted in an additional \$18.6 million (\$2013–14) reduction to its augex forecast. Essential Energy reviewed major new sub-transmission projects using AEMO's VCR and probability assessment of load-at-risk, and decided to defer some projects.

Second, as noted above, Essential Energy's forecasting methodology for its distribution network is based on a historical trend rather than addressing forecast demand constraints. As Essential Energy does not forecast based on specific projects with projected demand requirements, the application of risk-assessed cost-benefit analysis using VCR may not be relevant. As noted in the previous section, we have adjusted the HV feeder augex forecast to more accurately reflect spatial network growth, the underlying driver of the capex.

Finally, Essential Energy has demonstrated that its augex forecast already excludes \$45 million (\$2013–14) based on a review of a number of projects in light of the changes to its licence conditions. Our 20 per cent reduction to Essential Energy's augex forecast did not take these existing project reductions into account, and in this respect our adjustment may have been overstated.¹²⁹

Based on these findings, we accept that a top down 20 per cent reduction is unlikely to reflect Essential Energy's efficient and prudent capex requirements given a realistic expectation of the demand forecast and cost inputs. We have modified our position from the draft decision. Instead, we accept that the reductions proposed by Essential Energy in its revised proposal reasonably reflect efficient reductions based on the application of risk-assessed cost-benefit analysis for the 2014–19 period.

We note that risk-assessments have not been common practice in Essential Energy's planning and investment decision process,¹³⁰ and when it is applied, there is evidence that Essential Energy is overly conservative and overestimates the amount of work

¹²⁷ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, p. 19

¹²⁸ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, Attachment 6.7, pp. 13-14

¹²⁹ WorleyParsons identified that Essential Energy had reduced its forecast by \$45 million by deferring 6 subtransmission projects in light of the revised licence conditions. However, because our 20 per reduction was based on findings for Endeavour Energy, it may not accurately reflect the specific projects already deferred by Essential Energy.

¹³⁰ WorleyParsons, *Review of proposed augmentation capex in NSW DNSP regulatory proposals 2014 - 2019*, 17 November 2014, p. 19

required. WorleyParsons noted that new planning processes methodologies are being developed by Networks NSW and the NSW distribution businesses in the context of the revised licence conditions.¹³¹ We would expect these methods to be used more extensively by Essential Energy in future.

B.3 AER findings and estimates for connections and contributions

The contestability framework in New South Wales allows customers to choose their own accredited service provider and negotiate efficient prices for connection services. Given the competition between service providers, we do not regulate the majority of connection services in New South Wales. There is, however, a cost involved in augmenting and extending the shared networks to connect new commercial and industrial sites, and multi-unit residential developments. These costs, referred to as 'connections' in this decision, are regulated and funded by all consumers.

In NSW, capital contributions are made up of the value of assets constructed by third parties which are then gifted to Essential Energy to be operated and maintained. These contributions are subtracted from total gross capex and as such decrease the revenue that is recovered from all consumers.

B.3.1 Position

We accept Essential Energy's revised proposal for connections capex of \$29.1million (\$2013–14). Similarly, we accept Essential Energy's proposed forecast for capital contributions of \$353.9 million (\$2013–14).

In our draft decision, we accepted Essential Energy's proposed connections forecast and customer contributions 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 NSW. Our draft decision set out our full reasons for accepting the Essential Energy's forecasts.

Essential Energy accepted our draft decision.¹³² Essential Energy has not altered its connections forecast from the initial proposal, except for adjustments to reflect the removal of gifted assets.¹³³ The Energy Users Association of Australia notes the uncertainty in the NSW networks' customer connection forecasts and the AER has received various submissions challenging the assumptions of the underlying

¹³¹ WorleyParsons, *Review of proposed augmentation capex in NSW DNSP regulatory proposals 2014 - 2019*, 17 November 2014, p. 20

¹³² Essential Energy, Revised Regulatory Proposal 1 July 2014–30 June 2019, 20 January 2015, p. 114.

¹³³ As discussed in the capex attachment, due to the change in approach to allocating capital contributions and gifted assets between our draft and final decisions, the amounts set out in the draft decision are not directly comparable with the revised proposal and final decision. The change that we have adopted to the treatment of gifted assets for the final decision does not change the underlying analysis set out in our draft and final decision.

forecasts.¹³⁴ We still consider that forecast dwelling growth and construction expenditures are reasonable proxies for growth in connection services. In this final decision we maintain our view that both the connection and customer contribution forecasts are reasonable having regard to the trend of construction activity in NSW.

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.¹³⁵ 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 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 period, and be replaced in subsequent regulatory periods.

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

B.4.1 Position

We do not accept Essential Energy's revised proposed repex. We have instead included in our alternative estimate of overall total capex, an amount of \$775 million (\$2013-14) for repex, excluding overheads. This is six per cent lower than Essential Energy's revised proposal, but is an increase from that included in our draft decision. This increase is due to our assessment of updated information from Essential Energy in relation to its poles, service lines and switchgear. We are satisfied that this amount reasonably reflects the capex criteria.

B.4.2 Revised proposal

Essential Energy included \$827 million¹³⁶, excluding overheads, for repex in its revised proposal. The AER's draft decision included \$675 million for repex. Essential Energy submitted further material in support of its revised proposal. These submissions are considered as part of our assessment below.

¹³⁴ EUAA submission to NSW DNSP s draft decisions, pp. 34–35.

¹³⁵ 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.

¹³⁶ Essential Energy's initial proposal RIN included \$857 million for repex.

Essential Energy also forecast capital expenditure of \$77 million relating to the remediation of low spans on its overhead network. Essential Energy characterised the driver of this expenditure as augmentation rather than replacement. However, we consider the forecast low spans remediation program is primarily repex driven. Consequently, we have considered this forecast capital expenditure as part of our assessment of repex driven capex.

B.4.3 Explanation of AER approach

We applied several assessment techniques to assess Essential Energy's forecast of repex against the capex criteria. These techniques were:

- analysis of Essential Energy's long term total repex trends;
- predictive modelling of repex based on Essential Energy's assets in commission;
- technical review of Essential Energy's approach to forecasting, costs, work practices and risk management;
- consideration of various asset health indicators and performance metrics.

In response to Essential Energy'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 Essential Energy has provided in its revised proposal.

We primarily use our predictive modelling to assess 82 per cent of Essential Energy's proposed repex in combination with the findings of EMCa's technical review.

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 of EMCa's technical review.

We note that the other assessment techniques were considered, but were not ultimately used to reject Essential Energy's forecast of repex or develop our alternative estimate, though our findings from those other assessment techniques are consistent with our overall conclusion.

Trend and category analysis

We recognise the limitations of expenditure trends, especially in circumstances where replacement needs may change over time (for example, 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 Essential Energy's forecast of repex or develop our alternative estimate.

Predictive modelling

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

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 Essential Energy's proposal. Our other techniques, which are mostly qualitative in nature, allow us to form a view on whether or not 'business as usual' expenditure appropriately reflects 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 EMCa's technical review, 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.¹³⁷

We recognise that our predictive modelling cannot perfectly predict Essential Energy's necessary replacement volumes and expenditure over the next regulatory 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 F of our draft decision.¹³⁸

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 Essential Energy's entire stock of network assets, along with Essential Energy'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.

¹³⁷ AER, Better Regulation, Expenditure Forecast Assessment Guideline, Explanatory Statement, November 2013, p. 189

¹³⁸ AER, Draft decision, Essential Energy distribution determination 2015-16 to 2018-19, Attachment 6: Capital expenditure, Appendix F, November 2014.

Technical review

Essential Energy's proposed repex was subject to a technical review by Energy Market Consulting Associates (EMCa). EMCa assessed Essential Energy's approach to forecasting, including whether it has had regard to robust cost-benefit analysis where appropriate. It also assessed Essential Energy's costs, work practices and risk management approach. This was to identify whether risk was systematically overestimated and, in turn, whether its approach to repex and repex forecasts were in accordance with its risk profile in the next regulatory period. EMCa provided a further report in response to Essential Energy's revised proposal. We evaluated EMCa's findings in its subsequent report in the course of our repex assessment in this final decision.

As set out above, we have relied on EMCa's reports to assess whether Essential Energy's risk profile is different in the next regulatory period, such that it requires repex above the 'business as usual' prediction of our repex model. We have also relied on it, in combination with analysis of historical repex at the category level, to inform our assessment of repex programs to which we did not apply our predictive modelling.

Asset health indicators and comparative performance metrics

We have used a number of asset health indicators with a view to observing asset health. Asset utilisation is one such indicator. We have relied on changes in asset utilisation to provide an indication as to whether Essential Energy's assets are likely to deteriorate more or less than would be expected given the age of its assets. Utilisation in particular 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 indicators we have used are aged based. We acknowledge that these are 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 these age-based indicators to any extent to inform our alternative estimate. We do note that Essential Energy has also used age based indicators in its revised proposal.¹³⁹ Essential Energy'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 our draft decision in assessing Essential Energy's repex allowance was its performance on relevant performance metrics. Similar to trend analysis our use of these high level benchmarks has been to inform the relative efficiency of Essential Energy's previous repex. However, we have not used this analysis in determining our alternative estimate.

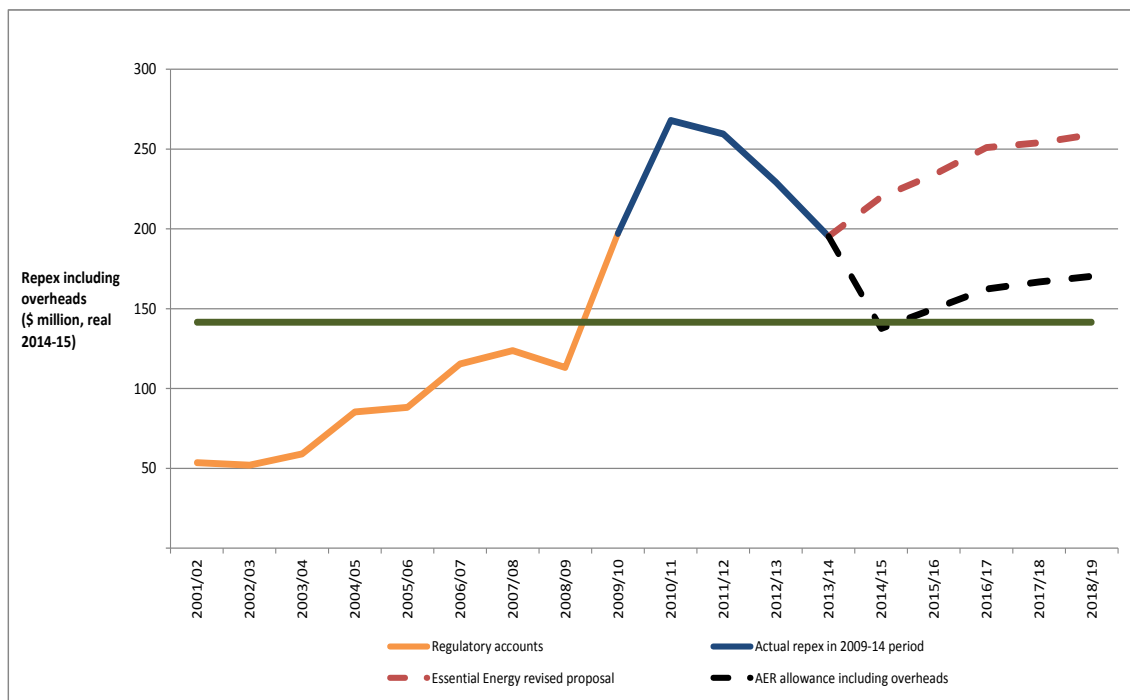
¹³⁹ Essential Energy, *Attachment 6.6 Response to AER Draft Decision on Replacement Expenditure*, Jan 2015, p.50.

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-1 below shows the trends in Essential Energy's actual and expected repex compared to the long run average level of repex.

Figure B-1 Trends in Essential Energy's repex including overheads (real \$ million June 2014)



Source: AER analysis

¹For illustrative purposes we have included the long term average actual repex across this time series and the AER approved allowance.

Essential Energy in its revised proposal submitted that changes in accounting practices (for example, in capitalisation and overhead policies) across time impact on the correlation between forecast repex and its long term average.¹⁴⁰ We acknowledge that the data may not be strictly consistent prior to the 2009-14 regulatory period given any changes in accounting policies.¹⁴¹ However, we are satisfied that (shown in Figure B-1)

¹⁴⁰ Essential Energy, *Attachment 6.6 Response to AER Draft Decision on Replacement Expenditure*, Jan 2015

¹⁴¹ We sourced the data for the initial years in Figure 1 from the Essential Energy's regulatory accounts submitted to IPART. Essential Energy's actual repex for the 2009-14 period is sourced from Essential Energy's Reset RIN, Table 2.1.1 - Standard control services capex. With the revised proposal sourced from Essential Energy's response to Information Request AER Essential 050. Note that we have included overheads on a proportional

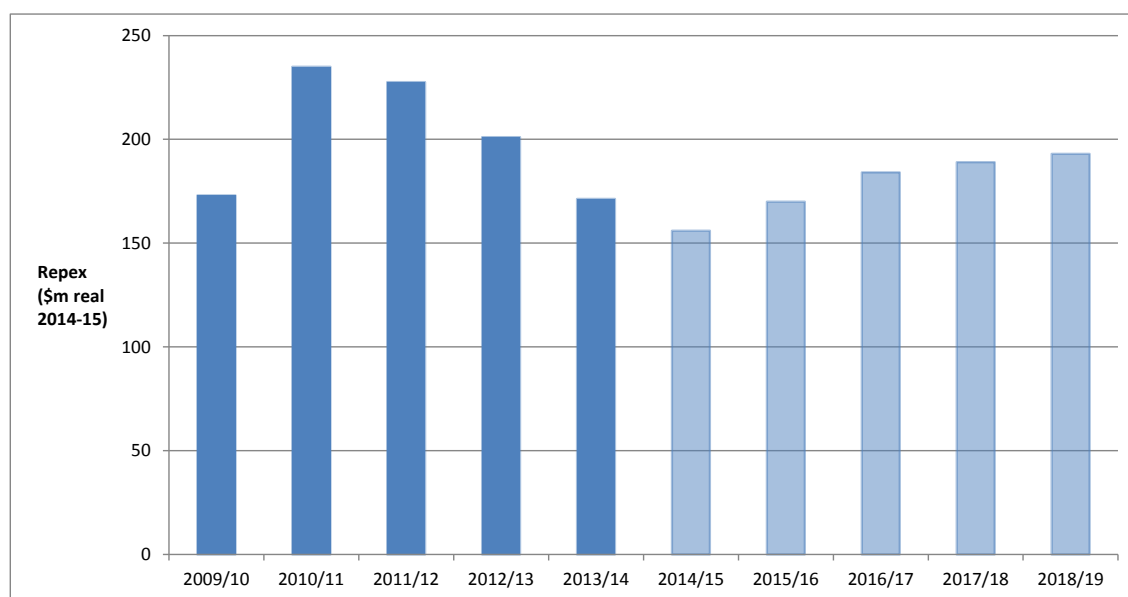
recent actual and expected repex is materially above that which Essential Energy incurred in the early years of the trend period.

Essential Energy in its revised proposal submitted that the long term average repex covers the 2001-2014 period to determine expenditure that the AER considers reasonable without reference to the age and condition of the assets.¹⁴²

As discussed above we have clarified the extent to which we have relied on trend analysis. We consider this analysis can be informative as a starting point for our analysis as it does provide insights regarding the scale of its proposed repex against previous repex. In particular, this analysis indicates that while Essential Energy's proposed expenditure is similar to the previous regulatory control period it is high relative to the long term trend.

Consistent with our earlier discussion that expenditure trends are used as a starting point on whether Essential Energy's proposed repex for the 2014-19 period reasonably reflects the capex criteria, we have compared its proposal to that incurred in the 2009-14 period.¹⁴³ Figure B-2 below is a subset of Figure 1 and compares the year on year profile for actual and expected repex across the 2009-14 and 2014-19 periods.

Figure B-2 Actual and expected repex direct costs (\$ million real June 2014)



Source: AER analysis

basis for the 2009-14 period at an overhead accrual rate consistent with the ratio of overheads to direct costs actually incurred in this period. Including overheads improve comparability with the regulatory accounts. We have applied CPI deflators to historical nominal expenditure from CPI figures published by the ABS (Series Cat no 6401.0) with an assumption of expenditure being incurred half-way through the financial year.

¹⁴² Essential Energy Revised Regulatory Proposal 2015-19 p.137

¹⁴³ NER 6.5.7(e)

From the above we note Essential Energy's revised repex proposal for the 2014-19 period sharply inclines in the initial years of the forecast period before flattening out in the later years. Figure B-2 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.

In its revised proposal Essential Energy submitted that its repex spend is expected to increase as a result of:¹⁴⁴

- increased asset management maturity since the formation of Essential Energy in 2001 (then named Country Energy)
- increased failure rates and deteriorating network health indicators as increasing numbers of assets enter the wear out phase.

We have scrutinised Essential Energy's risk management framework and any condition related issues by asset category as part of the technical review conducted by EMCa.

We agree with Essential Energy that indicators of network health provide some insights regarding expected changes in repex requirements. We discuss these in our specific section on network health indicators below.

Predictive modelling

We use predictive modelling to estimate how much repex Essential Energy 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.¹⁴⁵ This modelling outcome gave an estimate of \$683 million for the six modelled asset categories. We have reached this conclusion only after evaluating this outcome against other of our techniques. When combined with forecast unit costs based on Essential Energy's data, this results in an estimate that reflects Essential Energy's existing approach to managing risk. We have decided to apply this estimate only after considering the findings from our other techniques.

This 'business as usual' repex estimate is based on:

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

¹⁴⁴ Essential Energy Revised Proposal Attachment 6.6 p.108

¹⁴⁵ AER, *Draft decision Essential Energy distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014 p.6-62.

This estimate uses Essential Energy's own forecast unit costs, but it effectively 'calibrates' the proposed forecast replacement volumes to reflect a volume of replacement that is consistent with Essential Energy'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 Essential Energy's forecast unit costs and the average benchmarked unit cost from all service providers in the NEM to provide a range of outcomes.¹⁴⁶

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

Essential Energy sought to exclude additional categories from assessment under the repex model. Essential Energy submits that these projects relate to step changes without historical expenditure, and are not captured by our predictive model. We discuss these assets in the un-modelled repex section below.

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 (that is, on average, how old assets are when they are replaced).
- The unit cost input is the unit cost of replacement (that is, on average, how much each asset costs to replace).

In the draft decision, we described using the repex model to create three modelling 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 Essential Energy's asset age profile (how old Essential Energy'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; and
- how much it costs to replace it.

¹⁴⁶ AER, *Draft decision Essential Energy distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014 p.6-62.

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. In doing this it calculates how many assets are likely to need replacement in the near future.¹⁴⁷ The model then applies a 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-6 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 Essential Energy'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 Essential Energy's past five years of actual replacement data. These reflect Essential Energy's recent past approach to replacement.¹⁴⁸

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 F in our draft decision.¹⁴⁹

Table B-6 Repex model inputs

Input	AER comments in draft decision
Mean replacement lives	
Essential Energy estimated replacement lives	When used in the repex model, Essential Energy'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 Essential Energy's own repex forecast. 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 Essential Energy 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.
Calibrated replacement lives based on Essential Energy data	As set out above, we considered Essential Energy's estimated replacement lives were not appropriate. By contrast, calibrated replacement lives reflect Essential Energy's actual approach to replacement in the most recent five years.
Benchmark estimated replacement lives	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 each category.

¹⁴⁷ The repex model predicts replacement volumes for the next 20 years.

¹⁴⁸ For discussion on how we prepared each of the inputs see AER, *Draft decision Essential Energy distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure, Appendix F: Predictive modelling approach and scenarios*, November 2014

¹⁴⁹ AER, *Draft decision Essential Energy distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure, Appendix F: Predictive modelling approach and scenarios*, November 2014

	As with Essential Energy'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 Essential Energy's own forecasts.
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 Essential Energy, the average benchmark generated an estimate higher than Essential Energy's, while the third quartile and frontier estimates were lower. 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 Essential Energy's calibrated lives were reasonable against its peer service providers in the NEM.</p>
Unit cost of replacement	
Essential Energy unit costs (historic)	When used in the repex model, Essential Energy'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 Essential Energy's own repex forecast.
Unit costs achieved in the most recent five years	This indicates historic unit costs are not likely to reflect a realistic expectation of input costs.
Essential Energy unit costs (forecast)	As outlined above we considered it was not appropriate to use Essential Energy's historic unit costs. We compared industry benchmark unit costs to Essential Energy's forecast unit costs and observed that Essential Energy's forecast unit costs did not result in significantly higher forecasts. As a result we accepted the use of Essential Energy's own forecast unit costs rather than industry benchmarks.
Unit costs Essential Energy forecasts for the next five years	
Industry benchmark unit costs	<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> <p>Applying the average benchmark unit costs in the repex model for Essential Energy gave an outcome that was lower than Essential Energy's forecast, but higher than models using Essential Energy's forecast unit costs. Meanwhile, the outcomes when using the first quartile and lowest unit cost benchmark numbers were 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 Essential Energy's recent asset replacement practices to estimate a replacement life for each asset type. These replacement lives are calculated by using Essential Energy's past five years of replacement volumes, and its current asset age profile (which reveals how many, and how old, Essential Energy's assets are) to find the age at which, on average, Essential Energy replaces

its assets. The calibrated replacement life represents this age. We explain the process of calculating calibrated lives in our repex model handbook.¹⁵⁰

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 (for example, 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.

Essential Energy submitted a report by Jacobs raising issues for all NSW distributors regarding our predictive modelling approach.¹⁵¹ We have reviewed this report in the context of Essential Energy's revised proposal and maintain our reasoning from the draft decision.

Jacobs submitted the calibration process was not transparent.¹⁵² Our predictive modelling approach is well established having been used by us in previous distribution determinations and by other regulators. It 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

¹⁵⁰ AER, Replacement expenditure model handbook, November 2013, p. 20

¹⁵¹ Essential Energy, revised regulatory proposal attachment 5.08 *Jacobs Review of AER Draft Decision - Repex*

¹⁵² Essential Energy, revised regulatory proposal attachment 5.08 *Jacobs Review of AER Draft Decision - Repex* p. 30

one which involves manipulation of inputs 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.¹⁵³ 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 Essential Energy'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 is of the view that we did not substantiate why the base case replacement lives were inappropriate (that is, the replacement lives proposed by Networks NSW distributors), or why the calibrated lives were most suitable. As discussed in our draft decision, we considered the asset lives Essential Energy 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 Essential Energy'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 Essential Energy'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 Essential Energy 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 Essential Energy'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 Essential Energy's recent observed practices.

Updated predictive modelling

Essential Energy submitted further information in relation to our predictive modelling of poles, service lines and switchgear. These are addressed below.

Staking rate

Essential Energy exhibits lower staking rates than most service providers in the NEM. Information provided by Essential Energy indicates that its staking rate is around 17 per cent. This is in contrast with Ausgrid's staking rate of around 50 per cent.

The staking rate strongly affects the cost of replacing a wooden pole. Staking provides a life extension of anywhere between 10 and 20 years, at around a tenth of the cost of replacing the pole outright. Because of this, assuming the same volume of

¹⁵³ Essential Energy, revised regulatory proposal attachment 5.08 *Jacobs Review of AER Draft Decision - Repex p.i*

replacement, an NSP with a higher staking rate will require less replacement expenditure for wooden poles than an NSP with a lower rate.

In its report on the initial proposal, EMCa noted, in relation to Essential Energy's pole staking rate, that:

If a higher ratio of pole reinforcement to replacement was prudent, it would deliver a lower overall program cost. Based on an average pole reinforcement cost of one-sixth to one-seventh of the average pole replacement cost, industry-common life extension results for Essential should lead to a superior economic outcome for equivalent risk.¹⁵⁴

In the draft decision, we considered that a staking rate of below 20 per cent was not consistent with an efficient pole replacement program. Taking this into account, and the findings of EMCa, along with observations of staking rates from other service providers in the NEM, we formed the view that Essential Energy's staking rate was too low. To address this issue, we used Ausgrid's staking rates to estimate pole replacement expenditure in our predictive model.

In its revised proposal, Essential Energy challenged the application of Ausgrid's staking rate to its assets. Essential Energy, unlike Ausgrid, has a high proportion of rural pole assets. We observe that Essential Energy appears to allow its poles to remain in commission longer than Ausgrid, such that it attains longer operational lives from these assets.¹⁵⁵ We understand that differences in these replacement lives between Essential Energy's and Ausgrid's wooden poles are likely to reflect differences in risk. In particular, Essential Energy submits that the differences between Ausgrid's and its pole serviceability criteria are reflective of Essential Energy's low customer density.¹⁵⁶ However, Essential Energy appears to suggest that by keeping poles in service for a longer period before replacement, its assets are less likely to have sufficient sound wood at the end of their un-staked life to allow for the successful application of a life extending stake when compared to Ausgrid.

By observing the replacement life outcomes of the repex model for wooden poles, Essential Energy does achieve longer asset lives than Ausgrid, which is consistent with the statement above. We recognise that the failure of an individual pole has a lower risk consequence for Essential Energy's rural network than it does on Ausgrid's predominately urban network. This may, to some extent, explain the longer lives achieved by Essential Energy, as Ausgrid may be more conservative in its replacement practices given differences in the risk of pole failure.

We accept that, by running its wooden pole assets for a longer period on its rural network, Essential Energy may be less successful in achieving life extension through

¹⁵⁴ EMCa, *Review of Essential Energy's repex*, October 2014, p.21

¹⁵⁵ Essential Energy, revised regulatory proposal, p.18.

¹⁵⁶ Essential Energy, revised regulatory proposal, attachment 6.6., p. 18.

staking its oldest poles.¹⁵⁷ While Essential Energy may achieve the same staking ratio as Ausgrid on its urban feeders, it is less likely to achieve the same ratio on rural feeders for the current stock of assets approaching replacement in the 2014–19 period. Due to the high proportion of the rural feeders on Essential Energy's network and given Essential Energy poles remain in commission for longer than Ausgrid, we have not applied Ausgrid's staking rate.

We have updated our predictive model to use Essential Energy's staking ratio. Using this data increases the forecast of replacement expenditure on wooden poles by \$50 million compared to our draft decision estimate.

Service lines

Essential Energy advised the AER of a mismatch between the service line volumes reported in template 2.2.1 of the RIN (which were based on number of spans) and the asset age data in template 5.2 (which was in kilometres)¹⁵⁸. Essential Energy advised that the average span is 21.06 metres in length.¹⁵⁹ We have used this information to update the service line data used in the repex model. Remodelling on the basis of this information leads to a forecast that is approximately \$33 million higher than the modelling used in the draft decision. This is broadly consistent with the repex forecast by Essential Energy for service lines.

Switchgear

Essential Energy advised the AER that certain data provided in RIN template 2.2.1 was incorrect.¹⁶⁰ This data related to the switchgear category. We have used this information to update the switchgear data used in the repex model. Remodelling of this information leads to a forecast that is \$11 higher million than the modelling used in the draft decision.

Essential Energy's concerns with the AER's use of predictive modelling

Essential Energy has raised a number of general and specific concerns with the AER's application of predictive modelling in the draft decision. These concerns are addressed below.¹⁶¹

¹⁵⁷ While Essential Energy's oldest poles may not achieve a significant life extension, there is scope for it to extend the life of its other pole assets through staking (particularly those that it would otherwise replace in future regulatory control periods).

¹⁵⁸ Essential Energy, *revised regulatory proposal, Attachment 6.6: Response to AER Draft Decision on Replacement Expenditure* p.15

¹⁵⁹ Essential Energy, *revised regulatory proposal, Attachment 6.6: Response to AER Draft Decision on Replacement Expenditure* p.16

¹⁶⁰ Essential Energy, *revised regulatory proposal, Attachment 6.6: Response to AER Draft Decision on Replacement Expenditure* p.19

¹⁶¹ Ausnet Services and Energy Networks Association expressed similar concerns to Essential Energy; 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

The outcomes of the repex model and the AER's reasonable range

Essential Energy submitted that there were inconsistencies in our assessment of the three NSW service providers. Essential Energy noted that:¹⁶²

There are inconsistencies resulting from using the Repex Model output directly to determine the repex allowance. Endeavour Energy has not been provided with a "reasonable range" of repex, rather they have been provided with one specific value deemed to be reasonable, as shown in Table 4-6. It appears that this has resulted from the fact that the lowest outcome of the „reasonable range" for Endeavour's modelled repex being above that proposed by Endeavour. This compares very differently with the other two DNSPs and further suggests that rather than utilising the outputs of the Repex Model as an indicator of prudent expenditure it has been used directly to determine the level of expenditure without a due diligence review of inputs that set the level of expenditure forecast. These discrepancies highlight the importance of reviewing the reasonableness of the Repex Model inputs, specifically the level of historic repex relative to the level expected of a prudent operator, when determining the reasonableness of Repex Model's output.

In the draft decision, we considered a reasonable range of repex model outputs, based on calibrated asset lives. The top of the range was based on the use of an industry benchmarked unit cost, while the bottom of the range was based on Essential Energy's own forecast of expenditure and volumes.

This range was then weighted in light of the outcomes of our other assessment techniques to arrive at an efficient estimate of repex. EMCa's technical review, our observations of long term trends and comparisons with other service providers on selected performance metrics suggested that Essential Energy's repex forecast was higher than the prudent and efficient level. Ultimately, we decided that the service provider's own data provided the best estimation of unit cost, and applied Essential Energy's forecast costs rather than the industry benchmark. In Essential Energy's case, this meant that our draft decision resulted in a forecast at the low end of the range. This is the same view reached in the draft decisions for Ausgrid, ActewAGL and Endeavour Energy, where the forecast unit costs were used to weight the volume output of the repex model.

We remain of this view in the final decision. As described earlier, the calibration process uses asset volumes from the last period to predict a 'business as usual' forecast of future volumes, given the shape of the asset age profile. In this case, the

¹⁶² Essential Energy, *revised regulatory proposal*, Attachment 6.6: *Response to AER Draft Decision on Replacement Expenditure* p.24

calibrated model, in aggregate, estimates lower asset replacement volumes than Essential Energy's forecast.

Essential Energy outperforms our estimation of the benchmarked average unit cost. This indicates that Essential Energy is capable of managing its replacement capital program at a lower direct cost per unit of replacement than an estimation of the industry standard. This does not immediately imply that our estimation of business as usual" repex should be weighted by the higher, benchmarked average estimate. Rather, we consider it most appropriate to make a proportional adjustment based on the change in volume. Using the forecast unit costs achieves this objective.

Using the forecast unit costs results in a repex forecast that is lower in proportion to replacement volumes predicted by the repex model. We consider such a proportional reduction to be justified given the lower aggregate volumes.

Accuracy of the Repex Model

Essential Energy has submitted specific claims around the accuracy of the repex model, relating to the model's sensitivity to inputs, the use of Essential Energy's recent historical expenditure and its trending forward of the last regulatory period's risk, without regard to changes in the next regulatory period. The specific claims are addressed later in this section. However, we consider the repex model is fit for the purpose described earlier in this section. Indeed, Essential Energy explicitly acknowledges that the model is based on the service provider's risk profile in the last regulatory control period.¹⁶³

As noted above, the repex model, following calibration to take account of the last five years of replacement, is used to trend forward a service provider's risk profile and find an estimate of repex under the assumption that this risk profile continues.

Taking into account the updated information from Essential Energy, and using its wooden pole staking rate, the repex model is \$684 or 11 per cent below Essential Energy's forecast.

We have used our technical review and other assessment techniques to determine whether there has been a change in underlying asset risk, such that an increase or decrease in repex from the repex model may be justified.

Reasonableness of the forecast when compared to Endeavour Energy's Draft Decision

Essential Energy did not consider the AER's repex forecast was intuitively reasonable when compared to Endeavour Energy's repex forecast.¹⁶⁴

¹⁶³ Essential Energy, *revised regulatory proposal, Attachment 6.6: Response to AER Draft Decision on Replacement Expenditure* p.15

¹⁶⁴ Essential Energy, *revised regulatory proposal, Attachment 6.6: Response to AER Draft Decision on Replacement Expenditure* p.15

We have updated the repex model forecast from our draft decision to take account of updated information provided in Essential Energy's revised proposal. The outcome of Essential Energy's repex model is now 17 per cent higher than Endeavour Energy's. It is reasonable to assume that Essential Energy, which has more assets in commission than Endeavour, would undertake greater replacements. The updated repex modelling reflects this.

Low historical repex

The repex model is used to trend forward the asset risk profile from the last regulatory control period last in order to find a 'business as usual' forecast of repex that maintains the current risk profile. Essential Energy submits that its repex in the 2009-14 regulatory control period was historically low. As a consequence, it submitted that trending forward volumes from this period will underestimate its repex for the 2014-19 period.

As noted in the trend analysis section of this appendix, Essential Energy's claim of low historical expenditure is not supported. In addition, the repex model is used to trend forward risk, not volumes or expenditure.

Changes in risk

Essential Energy submitted that the calibrated repex model gives an output related to the service provider's risk profile over the previous regulatory control period. It also notes that the repex model does not account for changes in risk or approach to risk in the next regulatory control period.

As we have explained above, the purpose of estimating a calibrated repex model is to trend forward the risk profile from the last regulatory control period. We separately assess whether there has been a change in risk that would justify a step increase in repex for the next regulatory period.

The sensitivity of modelled outputs to a valid range of inputs

Essential Energy submitted that the sensitivity of the repex model to its inputs makes it inappropriate for use directly as a replacement forecast for a service provider's expenditure.

The AER does not agree with this view. We consider it appropriate to consider the reasonableness of the inputs when applying the repex model. In addition, the model is not used in isolation and is considered along with other assessment techniques.

The repex model is sensitive to the input data used. If a very short asset replacement life is assumed, the model will predict that assets need to be replaced more frequently. This will increase the predicted replacement volumes and the output of the model. If a longer life is used, the model will assume that assets will stay in commission longer, and predict a lower volume of replacement. The repex model showed the greatest sensitivity to the base case asset replacement lives put forward by Essential Energy. These resulted in a very significant estimation of repex, far above the calibrated forecast or Essential Energy's own forecast. A summary of the reasons why we did not consider this data reasonable is included in Table B-6 above. In general, the

replacement lives put forward by Essential Energy did not accord with the actual lives achieved, as evidenced by the number of older in commission assets that remained in its network.

The outcome of the calibration scenario is far closer to Essential Energy's proposal for repex than the base case scenario. The outcome of our various repex model input scenarios suggests that Essential Energy's submitted replacement lives are far too conservative, rather than suggesting the model itself is too sensitive to inputs. As noted earlier, it uses recent historical replacements and the asset age profile to estimate Essential Energy's actual replacement lives. It is a deliberate and systematic method of estimating replacement lives, and hence required replacement volumes, based on Essential Energy's actual current approach to managing its asset risk. It represents the most reasonable method of estimating 'business as usual' repex.

Deterministic use of high level tools

Essential Energy also noted that the use of high level tools deterministically may lead to erroneous outcomes. Essential Energy submitted the following points about the AER's approach and use of the repex model¹⁶⁵:

1. It does not account for changes in risk for the forthcoming regulatory control period and therefore needs to be used in conjunction with a detailed technical review.
2. Without a detailed technical review it is not possible to demonstrate that the repex model provides a reasonable substitute forecast, where its results differ from a DNSP's proposal.

It is important to note that no one assessment approach has been used in a purely "deterministic" fashion. The repex model is used to assess an aspect of Essential Energy's repex, being an estimate of its repex needs if it maintained its current risk profile. A decision on repex is made after weighing all assessment techniques, and includes a technical assessment where we have regard to whether Essential Energy's risk profile has changed, such that a higher/lower level of repex is likely to be prudent and efficient.

The rate of asset replacement is low

Essential Energy has also submitted that the AER has imposed a lower replacement rate on it than the other NSW service providers. We note that Essential Energy's replacement rate is influenced by asset age profile. In particular, the majority of Essential Energy's underground cable and switchgear has been installed recently, and is not near the age at which it would be expected to be replaced. It is worth noting that the 'business as usual' output of the repex model does not differ significantly from Essential Energy's forecast. This indicates that Essential Energy also acknowledges that its network condition is not such that wide-spread replacement is necessary.

¹⁶⁵ Essential Energy, revised regulatory proposal, p.141.

Technical review

Our draft decision sets out our approach to engaging EMCa to undertake a technical review to test Essential Energy's repex forecast against the capex criteria. We engaged EMCa to test whether Essential Energy's:

- repex forecast is reasonable and unbiased
- costs and work practices are prudent and efficient; and
- risk management is prudent and efficient.

Broadly, on these aspects EMCa found in its October 2014 report that:¹⁶⁶

- Essential Energy applies its risk criteria overly-conservatively, and its investment decision making relies heavily on risk-based justification.
- it is unclear, at a detailed level, how Essential Energy estimated its proposed repex program.
- Essential Energy's repex strategies were not informed by robust options analysis or adequate cost-benefit analysis. Essential Energy has enough asset information to determine which assets need attention, but data quality shortcomings compromise its decision making.
- Essential Energy's options analysis is inadequate due to a lack of robust input data and assumptions. For example, in some cases only the recommended option or 'do nothing' option was considered. It was not always clear how Essential Energy derived its proposed replacement volumes.
- Essential Energy's cost-benefit analysis was not robust and was often characterised by qualitative assessment. Considering the magnitude of Essential Energy's proposed repex program EMCa would expect to see comprehensive quantitative analysis.
- Finally, EMCa could not establish how Essential Energy constructs its cost estimates, and whether or how it applies contingency amounts. EMCa were unconvinced that Essential Energy's cost estimation approach is sufficiently robust to support efficient outcomes.

We engaged EMCa to consider whether Essential Energy's revised proposed forecast repex reflected an efficient and prudent expenditure forecast. EMCa reviewed new information Essential Energy provided with its revised proposal in response to EMCa's October 2014 report.

EMCa was of the view that Essential Energy has substantively addressed the systemic issues EMCa identified in its October 2014 report. EMCa were satisfied that Essential Energy has mitigated its concerns regarding elements of the asset management approach, cost estimation and deliverability risk. However, EMCa still considered

¹⁶⁶ EMCa, *Review of Essential Energy's repex*, October 2014, pp. 13–17.

Essential Energy has retained a residual bias towards conservative risk assessment and has programs of expenditure which are not adequately justified. EMCa considered this indicates Essential Energy's revised repex proposal does not represent a reasonable forecast of prudent and efficient expenditure. EMCa summarised:¹⁶⁷

- there remains evidence of a conservative bias in Essential Energy's risk assessment approach
- Essential Energy typically has not undertaken or presented robust quantitative cost-risk analysis to demonstrate economically optimal timing and volume of work
- Essential Energy has not adequately justified the average wood pole replacement cost, or that its wood pole strategy is the most effective way to reduce risk at the most efficient cost
- Essential Energy has not adequately justified the prudence of its CONSAC cable replacement program.

Taking into account updated information from Essential Energy, and responding to Essential Energy's criticism of its approach, EMCa remained unconvinced that Essential Energy had identified and justified the prudent volume and timing of activity for all the programs EMCa reviewed. EMCa also considered Essential Energy's risk assessment methodology contributed to conservative risk assessment. Finally, while Essential Energy appears to be focussing on the appropriate assets, EMCa remain unconvinced that Essential Energy's options analysis has been optimised and that the activity forecasts are prudent in all cases.¹⁶⁸

We consider EMCa's revised findings support the outcomes of our overall assessment which is that a lower amount of repex than Essential Energy's revised proposed amount reasonably reflects the efficient costs of a prudent operator, given a realistic expectation of the demand forecast and cost inputs.

Un-modelled repex

As with the draft decision, repex categorised as: supervisory control and data acquisition (SCADA), network control and protection (collectively referred to hereafter as SCADA) and pole top structures in Essential Energy's RIN response was not included in the repex model. As noted in Appendix F 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.¹⁶⁹ Together, these categories of repex account for \$86 million of Essential Energy's proposed repex.

¹⁶⁷ EMCA, Review of Proposed Replacement Capital Expenditure in Essential Energy's Revised Regulatory Proposal, April 2015, p. ii.

¹⁶⁸ EMCA, Review of Proposed Replacement Capital Expenditure in Essential Energy's Revised Regulatory Proposal, April 2015, p. 6.

¹⁶⁹ AER, *Draft decision Essential Energy distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure, Appendix F: Predictive modelling approach and scenarios*, November 2014 p. 6-71

In the draft decision, we considered Essential Energy's forecast of \$86 million for the un-modelled repex categories was likely to be reasonable. We remain of the view that this amount is likely to be reasonable for the same reasons outlined in the draft decision.¹⁷⁰

Essential Energy has also proposed five “step change” projects as part of its proposal, which total \$31 million in proposed repex. Essential Energy submitted that these were not properly assessed in our draft decision, as the projects are for assets that have historically low (or no) replacement.¹⁷¹ It further submitted that it requires increased capex for these projects to account for a change in risk.

The projects are:

- Cable replacement (CONSAC) - \$18.9 million
- Utility black-spot programme - \$7.75 million
- Sub-transmission Polymer Termination Replacement - \$0.82 million
- LV protection programme far west - \$2.04 million
- Broken Hill asset refurbishment - \$1.4 million

Cable replacement (CONSAC)

Essential Energy initially proposed approximately \$19 million of repex for its CONSAC cable replacement program. In its initial proposal, Essential Energy considered two options in relation to the risk presented by CONSAC cable: run to fail, and proactive removal of 96km of the worst-condition cable. Essential Energy proposed the proactive replacement option.¹⁷²

In its report to us on Essential Energy's initial proposal, EMCa noted that its concerns that Essential Energy had conducted a rudimentary unit cost and options analysis, and concluded that Essential Energy had not provided compelling evidence that it has derived a prudent and efficient repex forecast for its cables.¹⁷³

Following the draft decision, Essential Energy considered five options for CONSAC cable replacement, and ultimately decided that reactive replacement upon failure of the cables was the preferred approach. Essential Energy also noted that other DNSPs with CONSAC cable have adopted the same approach.¹⁷⁴ Essential Energy noted that:

¹⁷⁰ AER, *Draft decision Essential Energy distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014 p.6-55

¹⁷¹ Essential Energy, revised regulatory proposal, p.143.

¹⁷² Essential Energy, *revised regulatory proposal, Attachment 6.6: Response to AER Draft Decision on Replacement Expenditure* p.28.

¹⁷³ EMCa, *Review of Essential Energy's repex*, October 2014, p. 30.

¹⁷⁴ Essential Energy, *revised regulatory proposal, Attachment 6.6: Response to AER Draft Decision on Replacement Expenditure* p.76

The option analysis has resulted in a reactive run to failure replacement program which provides the most cost effective outcome...Essential Energy deems the systematic replacement of all CONSAC cables in the regulatory control period to be unnecessary based on the failures experienced.

Essential Energy also determined that the unit cost assumed in the initial proposal was underestimated because of the limited availability of installation cost data. In its revised proposal, Essential Energy updated its unit costs, based on recent CONSAC projects. EMCa estimates that the updated cost is 285 per cent higher than the initial estimate used in the initial proposal.

After updating its replacement strategy (which reduced volumes) and unit cost (which increase the cost per unit of replacement), Essential Energy forecast an identical amount of repex in the revised proposal as in the initial proposal.

EMCa reviewed Essential Energy's revised proposed cable replacement (CONSAC) expenditure as part of its report to the AER.¹⁷⁵

While EMCa considered its specific concerns from the initial proposal had been addressed, it considered the revised proposal raised new issues relating to whether the forecast expenditure has been adequately justified, namely:

- Essential Energy provided a new 'project selection guide' that does not match the supporting information it provided. EMCa did not consider that this was a robust approach to determining the economically prudent and efficient program of works for this asset class.
- EMCa did not consider it credible that the forecast repex from the revised proposal would exactly match the initial proposal, as Essential Energy has adopted a new replacement strategy and incorporated a unit cost that is 285 per cent higher than in its initial proposal.

EMCa noted that it appears that the new risk evaluation parameters have been combined with the new cable replacement unit cost to forecast a level of expenditure that is not adequately justified. This further supports its initial view that the 2015-19 period expenditure was not adequately justified.

Having considered the views of EMCa, we consider that Essential Energy has not provided sufficient evidence that its proposed CONSAC cable replacement expenditure reasonably reflects the efficient costs that a prudent operator would require to achieve the capex objectives given a realistic expectation of the demand forecast and cost inputs.

Consequently, we do not consider our forecast of repex needs to be adjusted to take account of this proposed expenditure for CONSAC cable replacement.

¹⁷⁵ EMCa, Review of Proposed Replacement Capital Expenditure in Essential Energy's Revised Regulatory Proposal, April 2015, pp. 17-18.

Utility black-spot programme

Essential Energy noted that:

This programme has been developed to address the frequency of vehicles colliding with power poles on sides of roadways. It is a collaborative effort with the NSW Centre for Road Safety and the NSW State Government to curb the road toll and trauma associated with pole crashes.¹⁷⁶

We do not accept the \$7.75 million forecast because we consider that the proposed program is not required to maintain the safety or reliability of Essential Energy's distribution system, and does not reasonably reflect the costs that a prudent operator, acting efficiently, would require to achieve the capex objectives.

The capex objectives require Essential Energy to include capex required to maintain the safety of the distribution system through the supply of standard control services, and to comply with regulatory obligations or requirements, including in relation to reliability. The distribution system includes electricity poles that are adjacent to roads. Road safety is important for the community and many organisations are tasked with managing the related risks. For distributors, road accidents may potentially affect the safety and reliability of its distribution network (such as by causing damage to poles and wires). Under the NER, for example, it is possible that a distributor's forecast capex may include expenditure that addresses this risk and in such circumstances, its electricity consumers would fund programs to minimise the road safety risks associated with the network.

However, the information provided to us by Essential Energy indicates that this capex program is focused on improving road-safety rather than maintaining network safety or complying with network reliability requirements.¹⁷⁷ We therefore are not satisfied that the forecast expenditure proposed by Essential Energy is required to achieve the capex objectives.

Other "step change" projects

The other three proposed step changes account for \$4.3 million over the 2014-19 period. We accept these additional step changes as they are required to address a specific need and expenditure for these projects is not already included within expenditure under other capex drivers.

Low clearance spans capex

Essential Energy's revised proposal includes an additional \$77.4 million (\$2013-14) capex for the 2014–19 period to address low clearance of rural overhead lines. This

¹⁷⁶ Essential Energy, Revised proposal, Attachment 6.6, p28

¹⁷⁷ Essential Energy, Revised Regulatory Proposal, p.38, Attachment 6.6. p.28.

amount is incremental to the historical level of expenditure Essential Energy has incurred in the past for asset replacement, including in regard to low spans.

Essential Energy states that since submitting its initial proposal it has been able to identify a number of additional low clearance lines that do not comply with minimum height requirements or otherwise pose a safety risk. Essential Energy proposes to replace or remediate a percentage¹⁷⁸ of poles and pole tops to address low conductors spans that do not meet statutory height requirements, or otherwise pose a level of risk to public safety from inadvertent human contact.¹⁷⁹ Essential Energy also submits that it will assist in containing the pole top assembly failure rate and in so doing assist in maintaining existing reliability performance.¹⁸⁰

We accept that Essential Energy has an obligation to manage or remediate low clearance spans that are non-compliant with statutory height requirements and/or pose a safety risk to the public. We also accept that a prudent service provider would do so in accordance with its obligations.¹⁸¹ Significantly, Essential Energy's clearance and safety obligations have not changed, rather Essential Energy is proposing additional capex in response to new information about the condition of its network.

As set out further below, improved information about the condition of its network will allow Essential Energy to better identify where there is non-compliance within its network. Essential Energy submits that because it has identified more asset defects and potential non-compliance, this means there is an escalating risk within the network that will require addressing through additional capital works.¹⁸²

We do not accept that the nature of the inherent risk in the network has increased. The condition of the network has not changed prior to Essential Energy latest network survey and the drivers of asset defects and deterioration remain the same. Indeed, Essential Energy has been able to manage and maintain its level of risk in the previous regulatory control period, consistent with its obligations.

Nevertheless, we do accept that the identification of more non-compliant spans may materially impact upon the expenditure required to remediate these spans and maintain the condition of the network. This is because more works may be required to maintain the condition of the network when compared to historical activities. For us to include an incremental amount of capex within Essential Energy's capex allowance, we would need to be satisfied that Essential Energy, acting as a prudent operator, is unable to maintain safety levels on its network through efficient management of its total asset replacement and reliability programs.

¹⁷⁸ Essential Energy propose to remediate 57 per cent of identified additional low spans in the 2014-19 period

¹⁷⁹ Essential, Revised Regulatory Proposal 2015-19, Attachment 6.8, p. 3

¹⁸⁰ Essential, Revised Regulatory Proposal 2015-19, Attachment 6.8, p. 3

¹⁸¹ For example, Essential Energy refers to *Courts v Essential Energy (aka Country Energy)* [2014] NSWSC 1483 as relevant to its evaluation of its obligations.

¹⁸² Essential, Revised Regulatory Proposal 2015-19, Attachment 6.8, p. 4

Based on the information before us, we conclude that Essential Energy can address its identified low clearance spans within the capex allowance we have provided for in this final decision. Our conclusion is based on the following information:

- The replacement of poles and pole tops to address low clearance spans is an on-going requirement that Essential Energy has undertaken in previous regulatory periods and will continue to undertake in the future. While Essential Energy may have identified more defective assets through new surveillance techniques, a prudent operator would not consider this in isolation from the way it manages its assets more generally within their total asset replacement program. Essential Energy has not demonstrated the extent to which the proposed incremental expenditure builds on, complements or is otherwise integrated into its existing replacement programs which it has used to meet its obligations.
- The benefit of its low spans survey is that it provides more accurate information about the condition of specific individual assets than more traditional inspection techniques. In response to new information about the condition of its network, we would expect that a prudent distributor would re-prioritise its work program to reduce the risks on its network more effectively than previously. As set out further below, Essential Energy has previously recognised the benefits of more accurate information in terms of more effective and efficient risk management without the need to increase expenditure levels.¹⁸³
- The proposed additional volume of replacement activity to address low spans also appears to be overstated. This is because evidence from separate engineering assessments of its asset management and governance frameworks demonstrates that Essential Energy systematically overestimates the volume of replacement work that is required on its network, which applies equally to the low spans work. In addition, Essential Energy has forecast its entire remediation works based on a sample of its network without demonstrating that this sample is representative of the remainder of its network.

These reasons are set out in more detail below.

Asset replacement expenditure already included

Essential Energy identified the incremental expenditure on low clearance of rural overhead lines as augex because it is “based on a compliance design requirement rather than the condition of the asset”.¹⁸⁴ However, we consider that Essential Energy, acting as prudent service provider, would have included such expenditure in its proposed ‘business as usual’ repex forecast. This is because Essential Energy is not proposing to enhance the functionality of its conductors, or meet a changed network planning standard. Rather, it is proposing to replace assets to meet existing supply, safety and other regulatory obligations.

¹⁸³ Essential Energy, response to AER augex questions, 5 September 2014, p.33

¹⁸⁴ Essential, Revised Regulatory Proposal 2015-19, Attachment 6.7, p. 26

These are the same drivers that underpin business as usual asset replacement. As set out in this appendix, our alternative estimate includes \$775 million (\$2013-14) for the replacement of assets that no longer meet network requirements. Low span remediation is an ongoing and existing work program that forms part of this overall replacement program. Our estimate is based on Essential Energy's own asset age profile and observed replacement practices. Of this \$775 million, our analysis suggests that \$254 million (\$2013-14) will be required to replace poles and pole tops, which is an increase on the amount Essential Energy actually spent to replace poles in 2009-2014.

In addition, our alternative estimate of augex includes \$113 million (\$2013-2014) to meet reliability standards for high voltage feeders, as was proposed by Essential Energy.¹⁸⁵ We included expenditure of this kind based on Essential Energy's proposal to replace poles and pole tops to improve the reliability of its worst performing high voltage feeders and feeder segments.¹⁸⁶ Essential Energy's analysis indicates that about 30 per cent of degraded reliability performance of its high voltage feeders is attributable to equipment failure such as pole top components and conductors.¹⁸⁷

The key drivers of low clearance spans are the gradual degradation of poles, pole top structures and conductors due to the aging nature of the network (as recognised by Essential Energy).¹⁸⁸ These are the same drivers as the 'business as usual' asset replacement and reliability capex programs.

Prudence of proposed volume of work

Essential Energy has proposed the low clearance spans program as an additional body of work to specifically remediate low clearance spans by replacing poles and pole top structures as if it is completely separate to work it already undertakes. Essential Energy's submission has not demonstrated whether it considered the integration of the low spans work with its other repx programs. Essential Energy has presented this additional work program such that it has been developed in isolation from its substantive asset replacement proposal; there is no consideration by Essential Energy of the extent to which it builds on, complements or is otherwise integrated into its existing remediation programs.

As noted in section 6.4.2 (forecasting methodology), considering programs in isolation of each other has the potential to overstate required allowances as they do not adequately account for inter-relationships and synergies between projects or areas of work. We consider that this lack of an integrated approach means that we do not have confidence that Essential Energy's scope of programs do not overstate and duplicate the number of works required to remediate low clearance spans and replace defective

¹⁸⁵ As set out in the augex appendix, 27 per cent of Essential Energy's \$422 million high voltage feeder proposal is for reliability. Our alternative estimate in our final decision includes this amount.

¹⁸⁶ Essential Energy, CEOP2463 Reliability Strategy 2012-19, May 2014, p. 19 and 32

¹⁸⁷ Essential Energy, response to AER augex questions, 5 September 2014, p. 25 and 30

¹⁸⁸ Essential, Revised Proposal, Attachment 6.8, p. 3

assets. The risk is that consumers will incur increased costs because of this forecast duplication.

Essential Energy's governance and management framework suggest that Essential Energy has a tendency to bias towards overestimating the timing and volumes of replacement activity required. As set out above in the discussion of our technical review, our consultant EMCa reviewed Essential Energy's governance and management framework that it uses to plan and approve its asset replacement projects and programs. EMCa noted that Essential Energy systemically overstates risk relative to a prudent operator by assuming unreasonably high frequency of events with major and catastrophic consequences. As set out above, we have relied on EMCa's reports to assess whether Essential Energy's risk profile is different in the next regulatory period, such that it requires repex above the 'business as usual' prediction of our repex model.

In addition, the proposed capex is based on a survey of 27 per cent of its rural network, from which a forecast volume of low clearance remediation work is constructed for the remainder of the network. Essential Energy plans to eventually survey 91 per cent of its rural network.¹⁸⁹ We consider that the other areas of the network could conceivably have significantly different low clearance rates to the 27 per cent sample, depending on the nature and age of the assets in these areas. Essential Energy has not demonstrated whether the 27 per cent sample is representative of the remainder of its network such that surveying a larger portion of its network would result in a similar level of work.

Prudent prioritisation of replacement activity

The additional low span capex contained in Essential Energy's revised proposal is based on an Aerial Patrol and Analysis (APA) survey conducted in the second half of 2014. This survey used high-definition photography and Light Detection and Ranging (LiDAR) technology to more accurately detect asset defects. Essential Energy submits that the application of the new surveillance technique means that it now has to "contain an otherwise escalating level of risk."¹⁹⁰ However, for the reasons set out below, Essential Energy has not demonstrated that there is an escalating level of risk level nor that this cannot be managed through the application of prudent prioritisation.

The benefit of the APA survey is that Essential Energy can identify and prioritise the replacement of poles and pole top structures that pose the highest risk to safety, and defer or deprioritise those that pose a lower risk.

The low spans survey provides more accurate information about the condition of specific individual assets than more traditional inspection techniques. Better information on asset condition will allow a business acting prudently and efficiently to maintain safety across its network at the lowest sustainable cost.

¹⁸⁹ Essential, Revised Proposal, Attachment 6.8, p. 3

¹⁹⁰ Essential, Revised Proposal, Attachment 6.8, p. 4

This has been previously recognised by Essential Energy in information provided for our assessment of the initial regulatory proposal.

It noted that such a process [the APA survey] has the potential to lead to higher defect rectification costs to the business(es), at least in the medium term. However, even if budgets are fixed, this data can be used to prioritise and address bushfire defects related to the electricity network in a structured manner which overtly considers the risk relating to location and defect type, therefore achieving a greater risk reduction for a given defect rectification expenditure level.¹⁹¹

Box 6-1 The benefit of new inspection techniques for risk management

Due to the labour intensive nature of conventional asset inspection methods for many asset classes, network asset managers only have current asset condition information on a small portion of their assets. The ability of asset managers prioritise work based on risk is confined to the small portion of assets of which they have current knowledge. That is, they would inevitably direct resources to rectify those lower risk defects found through inspection, even though they know from experience that there are likely to be higher risk defects in the networks that are not yet located through inspection.

In comparison, the use of new technology such as LiDAR for asset inspection allows the asset managers to collect asset condition data across a substantial portion or all of an asset class under their management within a relatively short time period. With more accurate and timely information of the asset conditions across their management portfolios, the asset managers are able to prioritise asset maintenance and replacement programs based on the level of risks of all found asset defects or non-compliances. The prioritisation should achieve more effective risk management outcomes since the high risk defects can be addressed in a more timely way.

Source: AER analysis

Essential Energy submits that it has identified more defective poles through the use of new technology compared to traditional inspections. It submits that it has identified more asset defects than using traditional inspection techniques (at least within a sample of its network). For us to include an incremental amount of capex above that which Essential Energy has is provided for asset replacement, we would need to be satisfied that Essential Energy, acting as a prudent operator, is unable to maintain safety levels on its network through efficient re-prioritisation of its total asset replacement program. Given that Essential Energy proposes this incremental capex after its initial proposal, and in isolation from the remainder of its repex program of work, it has not demonstrated this to our satisfaction.

¹⁹¹ Essential Energy, response to AER augex questions, 5 September 2014, p.33

When combined with our finding that the volume of work proposed by Essential Energy to remediate low spans is likely overstated, and our acceptance of additional capex to replace poles and pole tops to meet relevant obligations, we are not satisfied that Essential Energy's additional \$77 million capex is required.

Network health indicators and comparative performance metrics

In preparing a proposal, distributors should factor in the condition or health of its network assets when determining the level of capex it requires to maintain the quality, reliability and security of supply.¹⁹² Consistent with our draft decision we consider an important determinant of Essential Energy's repex requirements is the condition of its assets currently in commission.¹⁹³ In assessing this, we have considered:

- utilisation of the network (where spare capacity should be correlated to asset condition).
- the age of Essential Energy's network.

Asset utilisation

Consistent with our draft decision, another indicator of asset health we examined related to the effect changes in the utilisation level of network assets have on their need for replacement¹⁹⁴. As we discuss in the augex appendix above, Essential Energy has significant spare capacity in its network based on past investments to meet expected demand that did not eventuate. All else being equal we expect a positive correlation between asset condition and lower network utilisation exists. All else being equal this should reduce repex compared to the past.

In our draft decision, we stated:

...with the lower expected demand and the lower value of customer reliability, the cost of in service asset failure is reduced compared to past periods. This should increase the deferral period for the efficient timing of asset replacement which should reduce replacement costs relative to the past. In addition, lower demand should provide opportunities for some assets to be replaced at a lower capacity which should also reduce replacement costs compared to the past.¹⁹⁵

In its revised proposal Essential Energy submitted there is no evidence or engineering review to suggest a correlation between asset utilisation and asset deterioration is realistic.¹⁹⁶ Essential Energy stated:

¹⁹² NER 6.5.7(3)

¹⁹³ AER, *Essential Energy Draft Decision Attachment 6: Capital Expenditure* p. 6-55

¹⁹⁴ AER, *Essential Energy Draft Decision Attachment 6: Capital Expenditure* p. 6-59

¹⁹⁵ AER, *Essential Energy Draft Decision, Attachment 6: Capital Expenditure*, p. 6-60.

¹⁹⁶ Essential Energy, *Revised Regulatory Proposal and Preliminary Submission*, p. 99.

Electricity network assets do not exhibit wear out characteristics that relate to usage levels like automobiles might. While overloading of assets can shorten the life of the asset due to thermal degradation of components, running assets at less than rated loading does not prolong their life.

Further, Essential Energy submitted in its revised proposal that transformers assets (representing 11 per cent of its repex program) are the only class of its assets impacted by utilisation, albeit marginally.¹⁹⁷ It noted that the marginal impact of utilisation on asset condition was because of the following:

- The Essential Energy network, due to its remote nature and with some 134,000 distribution substations to supply just 812,000 customers, has always had and will always have low utilisation.
- As the network is so lightly loaded and in the main voltage constrained, not thermally constrained, all the switchgear on the network is rated substantially more than the required load carrying capacity or fault interrupting capacity because the minimum available ratings are typically far more than adequate.

We maintain our view that a correlation does exist between utilisation and conditional deterioration of an asset. This relationship is evidenced in the design standards for all distributors. However we recognise that;

- The relationship between asset utilization and condition is not uniform between asset types (for example, poles and fuses).
- The relationship is not necessarily linear (for example, condition may not be materially impacted until a threshold point is reached).
- The condition of the asset may be difficult to determine (for example, overhead conductor). As such early-life asset failures may be due to utilisation or, more commonly, a combination of factors (for example, utilisation and vibration).

Table B-7 below describes our view regarding the general relationship between an asset type's utilisation and its condition and major asset classes.

Table B-7 Utilisation and asset deterioration by asset type

Asset type	Generalised observation
Poles and pole-top structures	Generally not impacted by electrical utilisation.
Overhead conductors	Impacted by high levels of electrical utilisation. Low and moderate utilisation will have a minimal impact on condition, while increasing utilisation above design standards will have a compounding impact on condition. Conductors that have been historically overloaded may exhibit reduced tensile strength and increased brittleness and therefore be more prone to conductor failure.
Underground Cables	Impacted by high levels of electrical utilisation. Low and moderate utilisation will have a minimal impact on condition, while increasing utilisation above design standards will have a compounding impact on condition. Underground cables

¹⁹⁷ Essential Energy, Revised Proposal, Attachment 6.6, p.29.

that have been historically overloaded may exhibit overheating and therefore be more prone to conductor failure through joint failure or insulation failure.

Transformers	Impacted by high levels of electrical utilisation. Low and moderate utilisation will have a minimal impact on condition, while increasing utilisation above design standards will have a compounding impact on condition. High levels of utilisation can result in failure of the insulating materials and a short-circuit.
Switchgear	Impacted by electrical load and by duty cycle. All utilisation can impact condition (where utilisation is measured as both the number of operations and the load made or broken when operated). Typically operation of the unit will result in degradation of the contact surfaces. Both the duty cycle and the electrical current that is connected/interrupted will impact condition.
Non-network assets	Generally not impacted by electrical utilisation.

Source: AER analysis

We do note that high levels of utilisation can occur through many practices. Even for assets that are generally lightly loaded, emergency and switching conditions can introduce short term levels of utilisation that may impact the condition of the asset. In general, a lightly loaded network will also be less subject to overload conditions from emergency and switching conditions.

Asset age

As set out in our draft decision we are satisfied that asset age is a reasonable proxy for asset condition which affects the repex requirements on the network. It appears to be industry practice for distributors to consider asset age when determining forecast repex requirements. Networks NSW stated that asset age provides an indication of asset condition.¹⁹⁸ Further we note Essential Energy uses asset age as an input to how it determines its asset management strategies.¹⁹⁹

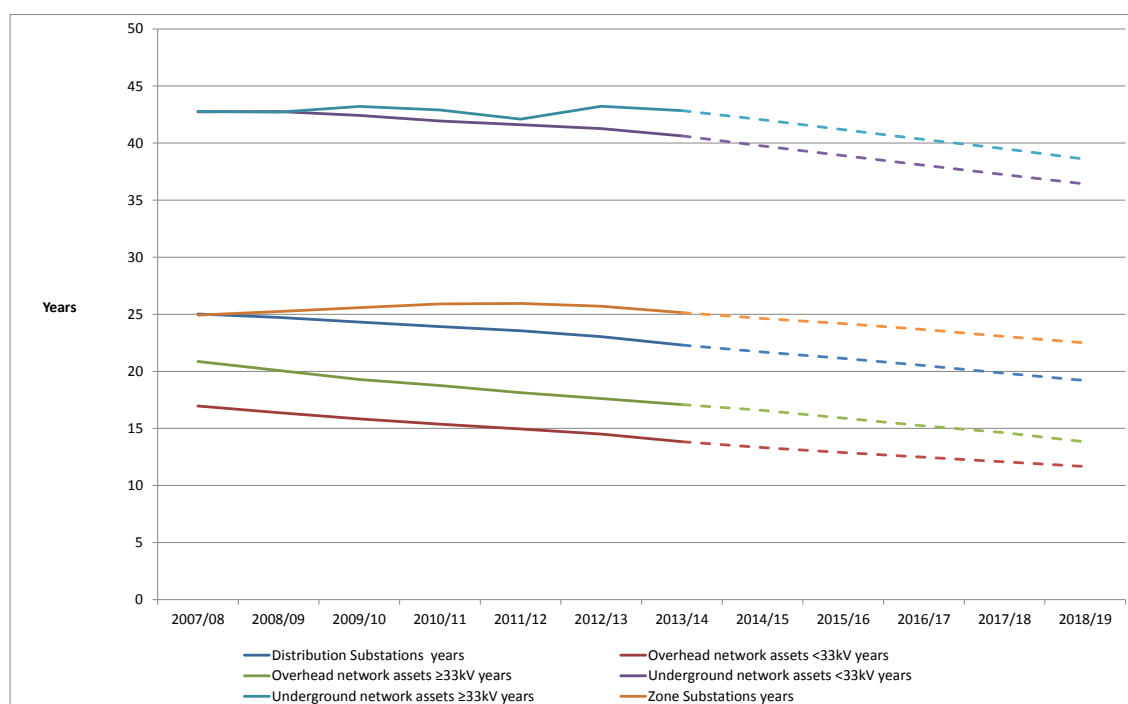
In our draft decision we observed that Essential Energy's residual lives were expected to increase over the forecast period consistent with the historical trend. In its revised proposal, Essential Energy has resubmitted this data which now reflects a decreasing trend in residual lives for most asset classes.

Figure B-3 shows the estimated residual service life of different asset classes on based on Essential Energy's resubmitted data.

¹⁹⁸ Networks NSW, *DNSPs' Response to the AER's Issues Paper*, 8 August 2014, p. 9.

¹⁹⁹ Essential Energy, *Regulatory Proposal*, May 2014, p. 45.

Figure B-3 Essential Energy Asset Lives – estimated residual service life



Source: Essential Energy- Response to AER Information Request 053

Figure 3 shows the historical trend in residual lives of Essential Energy's assets has been declining over time (for most asset classes). Using age as a proxy for health suggests that the health of Essential Energy's asset base has declined for some asset classes whilst being maintained or improved over the last seven years for other asset classes. We note that recent historical decline in residual lives appears to 'flatten' out or increase for most asset categories. Overall we consider that the recent improvements in residual asset lives may reflect the relatively high levels of repex in the previous regulatory control period observed in our trend analysis.

Comparative performance metrics

In our draft decision we collated several performance metrics to compare Essential Energy's repex across distributors.²⁰⁰ These comparisons allow us to compare and contrast Essential Energy with different networks to ascertain the unique network characteristics driving Essential Energy's repex. For example characteristics such as the number of customers served, network size, operating environment and asset mix, have a bearing on the amount of repex Essential Energy incurs.

Essential Energy agreed in its revised proposal that the performance metrics included in our draft decision were informative. However they contended that that they are not

²⁰⁰ AER, *Draft decision Essential Energy distribution determination 2015–16 to 2018–19 Attachment 6: Capital expenditure*, November 2014 p.6-51

the most relevant metrics to use with regard to repex.²⁰¹ Essential Energy in its revised proposal has submitted several metrics relating to comparisons on asset volume basis.

In particular, Essential Energy submitted that asset volumes are a more appropriate comparative metric:²⁰²

As repex is about replacing aged assets in poor condition, it has a direct correlation to the volume of assets on the network, their condition and cost of replacement. This is already recognised by the AER in that the AER's repex model is based on the number of assets, implied condition of assets and replacement cost of assets. As this high level benchmarking cannot consider age or condition then the benchmarking should in the first case consider the number of assets in the pool to be managed. Other outputs such as customers, capacity and RAB have little to no effect.

Consistent with our draft decision we consider there are limitations with these metrics. In particular we acknowledge deriving the relative positioning of distributors relies on back-casting of historical data of varying quality. We have used them to understand the unique characteristics of Essential Energy's network. We have greater confidence in the denominators applied to our network scale metrics, customer and capacity density. These measures are derivable from observable characteristics of the network such as customer numbers, route line length and installed capacity. However, we have not used this analysis to reject Essential Energy's forecast or develop our alternative estimate.

B.5 AER findings and estimates for capitalised overheads

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

B.5.1 Position

Whilst we have concerns with Essential Energy's forecast, in the absence of sufficiently robust evidence to the contrary, we accept Essential Energy's revised proposal of \$608.3 million (\$2013-14) of forecast capitalised overheads reasonably reflects the capex criteria.

B.5.2 Revised proposal

Essential Energy's revised proposal included \$608.3 million (\$2013-14) of forecast capitalised overheads, which is unchanged from its initial proposal. Essential Energy

²⁰¹ Essential Energy Revised Proposal Attachment 6.6 p.9

²⁰² Essential Energy Revised Proposal Attachment 6.6 p.10

did not accept our approach in our draft decision.²⁰³ Essential Energy considered our draft decision was incorrect and contravenes Australian Accounting Standards and the AER approved CAM.²⁰⁴ Further, it assumed overheads are purely variable costs. Essential Energy considers that any reductions to overheads must be made by assessing the costs within this category rather than arbitrarily applying a capped allocation percentage.²⁰⁵

B.5.3 AER approach

As a logical proposition we consider that reductions in Essential Energy's forecast expenditure should see some reduction in the size of Essential Energy's total overheads. Our assessment of Essential Energy's proposed direct capex, demonstrates that a prudent and efficient distributor would not undertake the full range of direct expenditure contained in Essential Energy's revised proposal and it follows that we would expect some reduction in the size of Essential Energy'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.

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.²⁰⁶ Accordingly, we do not consider it appropriate to apply our draft position in the final decision.

We have engaged in considerable consultation with Essential Energy regarding its overheads.²⁰⁷ We sought to understand how overheads vary with the size of Essential Energy's expenditure program and in particular to quantify the proportion of overheads that are fixed and varied. Essential Energy submitted that:²⁰⁸

- we explained that the majority of overheads have a strong correlation to the size of our network and are relatively fixed in nature.
- Essential Energy also detailed a number of major overhead components that it considered are relatively fixed in nature and are not materially impacted by the size of the capital works program.²⁰⁹

In our view, it is unlikely that these costs are wholly fixed. We provided some regression analysis to Essential Energy and the other NSW/ACT distributors, which

²⁰³ Essential Energy, Revised Regulatory Proposal, p.143

²⁰⁴ Essential Energy, Revised Regulatory Proposal, p.143

²⁰⁵ Essential Energy, Revised Regulatory Proposal, p.143

²⁰⁶ Endeavour, Revised Regulatory Proposal, p132. Essential, Revised Regulatory Proposal, p.144

²⁰⁷ AER, Info request Essential 047 plus follow-ups requests

²⁰⁸ Essential, Response to AER information request Essential 047

²⁰⁹ Essential, Response to AER information request Essential 047

attempted to quantify the relationship between expenditure and capitalised overheads.²¹⁰ 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. Essential Energy 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. Service providers submitted that factors which undermine this trend analysis include:²¹¹

- 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 Essential Energy's capitalised overheads. Without evidence to the contrary, we accept Essential Energy'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 and communications technology, motor vehicles, buildings and property, and tools and equipment.

In our draft decision, we accepted Essential Energy's forecast of non-network capex on the basis that:²¹²

- Essential Energy has forecast capex for this category at historically low levels
- the significant forecast reductions in each category of non-network capex reflect the high level drivers of expenditure in these categories
- the forecast reduction in non-network capex does not simply reflect a reallocation of expenditure from capex to opex.

Essential Energy's revised proposal for non-network capex of \$306.2 million (\$2013-14) for the 2014–19 period is consistent with both its initial proposal and our draft decision.²¹³ We accept that Essential Energy's forecast of non-network capex is a

²¹⁰ AER, Info request Essential 047 plus follow-ups requests I

²¹¹ 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.

²¹² AER, *Essential Energy Draft Decision - Attachment 6: Capital expenditure*, November 2014, pp. 6-73 to 6-75.

²¹³ Essential Energy, *Revised regulatory proposal*, 20 January 2015, p. 114.

reasonable estimate of the efficient costs required for this capex category. We have included it in our 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).²¹⁴

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 distributors 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 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.²¹⁵ 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 Essential Energy'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

²¹⁴ AER, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 77

²¹⁵ NER, clause 6.5.7(3)(10)

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.²¹⁶

B.7.2 Revised proposal on demand management

In its revised proposal, Essential Energy noted its consideration that the current RIT-D and Annual Planning Report alone did not provide the most appropriate approach in providing incentives for the optimal amount of demand management. Essential Energy submitted that a broad incentive scheme must be employed to ensure low cost options particularly those with broad, whole of market benefits are employed appropriately.²¹⁷

Further, Essential Energy submitted that the appropriate capex/opex trade-off that should be included "goes to the core" of the AEMC's upcoming demand management incentives review expected to commence consultation in early 2015. Essential Energy agreed that it was not appropriate to pre-empt the outcome of this reform, but did not provide support for a simplified D-factor type mechanism.²¹⁸

The AEMC is currently considering a rule change to strengthen the incentives for distributors to consider non-network alternatives.²¹⁹ The AEMC is currently considering submissions to its consultation on the rule change. We do not consider it appropriate to develop an alternative incentive structure in parallel to the AEMC's review through Essential Energy's regulatory proposal. The AEMC will be able to consider how any changes to the NER can be implemented in the 2014-19 period through transitional arrangements. Further details on our demand management incentive scheme are contained in attachment 12.

²¹⁶ NER Clause 6.5.7(e)(10)

²¹⁷ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, p. 136

²¹⁸ Essential Energy, *Revised Regulatory Proposal 1 July 2014 - 30 June 2019*, 20 January 2015, p. 136

²¹⁹ AEMC, *National Electricity Amendment (Demand Management Incentive Scheme) Rule 2015 Consultation Paper*, 19 February 2015

B.7.3 Draft decision position

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 Essential Energy'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.²²⁰

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.²²¹

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.²²² 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. Accordingly, we

²²⁰ AER, Draft Decision, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 79

²²¹ EnerNOC submission on 2015-19 draft decisions and revised proposals for NSW DNSPs p6

²²² EnerNOC submission on 2015-19 draft decisions and revised proposals for NSW DNSPs p5

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

C Demand

The level of expected demand is fundamental to a distributor's forecast capex and opex and to the AER's assessment of that forecast expenditure.²²³ This attachment sets out our decision on Essential Energy's forecast total system demand for the 2014-19 period.²²⁴

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.²²⁵ 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 Essential Energy's forecast while noting our expectation that updated forecasts would be included in the revised proposal.²²⁶ In this final decision we find that Essential Energy's system demand forecast reasonably reflects a realistic expectation of demand. We formed this view after considering the updated forecasts contained in Essential Energy'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 Essential Energy in its revised proposal (January 2015) reasonably reflect a realistic expectation of demand.²²⁷ Though we acknowledge that demand forecasting is not a precise science and will inevitably contain errors, the evidence before us supports our conclusion.

C.2 AER approach

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

- Essential Energy's revised proposal

²²³ NER, cl. 6.5.6(c)(3) and 6.5.7(c)(3).

²²⁴ In this attachment, 'demand' refers to summer maximum, or peak, demand (megawatts, MW) unless otherwise indicated.

²²⁵ Other factors, such as network utilisation, are also important high level indicators of growth capex requirements.

²²⁶ AER, Draft Decision, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p. 84

²²⁷ NER, cl. 6.5.6(c)(3) and 6.5.7(c)(3).

- forecasts from AEMO²²⁸
- stakeholder submissions in response to Essential Energy's revised proposal (as well as submissions made in relation to the NSW/ACT distribution determinations more generally).²²⁹

C.3 Essential Energy's revised proposal

Essential Energy's proposal described their demand forecasting methods, including approaches to:

- weather correction
- accounting for spot loads
- accounting for transfers
- accounting for embedded generation.

Essential Energy obtained its system demand forecast by aggregating spatial demand forecasts. It does not appear Essential Energy produced a separate demand forecast using a top down approach.

The demand forecasts provided by Essential Energy in its regulatory proposal incorporated the latest actual demand data (from summer 2013–14 and winter 2013). In the draft decision we accepted Essential Energy's forecast while noting our expectation that updated forecasts would be included in the revised proposal.

Essential Energy indicated a revised forecast would normally occur once the 2014–15 summer and 2015 winter actuals were available. To meet the AERs requirement for an interim forecast Essential Energy provided an interim peak demand forecast using a number of assumptions not normally required as part of the forecast process.

The main assumptions required to produce the interim peak demand forecast ahead of schedule include:

- That the network peak coincidence (that is, the diversity between bulk supply point demands and network wide demands) has remained stable
- That the roughly 50 per cent of bulk supply points used to align the forecast revision are not substantially different in their change in growth rate to those bulk supply point forecasts unavailable at this time.

Essential Energy's interim peak demand forecasts are lower than the forecasts provided in its initial regulatory proposal.²³⁰ We note Essential Energy did not provide weather corrected demand (historical or forecast).

²²⁸ AEMO, *National electricity forecasting report for the National Electricity Market*, June 2014, p. 4-4.

²²⁹ AER, <http://www.aer.gov.au/node/11485>

²³⁰ Essential Energy, *Attachment 4 Reset RIN Workbook Consolidated Information Formatted Public*, Table 5.3.1, May 2014

As part of our final decision on system demand forecasts, we compared Essential Energy's revised system demand forecast to the sum of AEMO's connection point (CP) forecasts for Essential Energy's network.²³¹ The AEMO forecasted similar trends of low system demand growth for Essential Energy's network and for the NSW region more generally. We note that AEMO had downgraded its demand forecast for the NSW region in its most recent report.²³²

Figure C-1 and Table C-1 provide an overall system level view of Essential Energy's revised demand forecasts, the changes made since its regulatory proposal and a comparison of the AEMO forecasts. We note that the network wide system demand forecasts do not directly relate to spatial forecasts.

Figure C-1 Maximum system demand

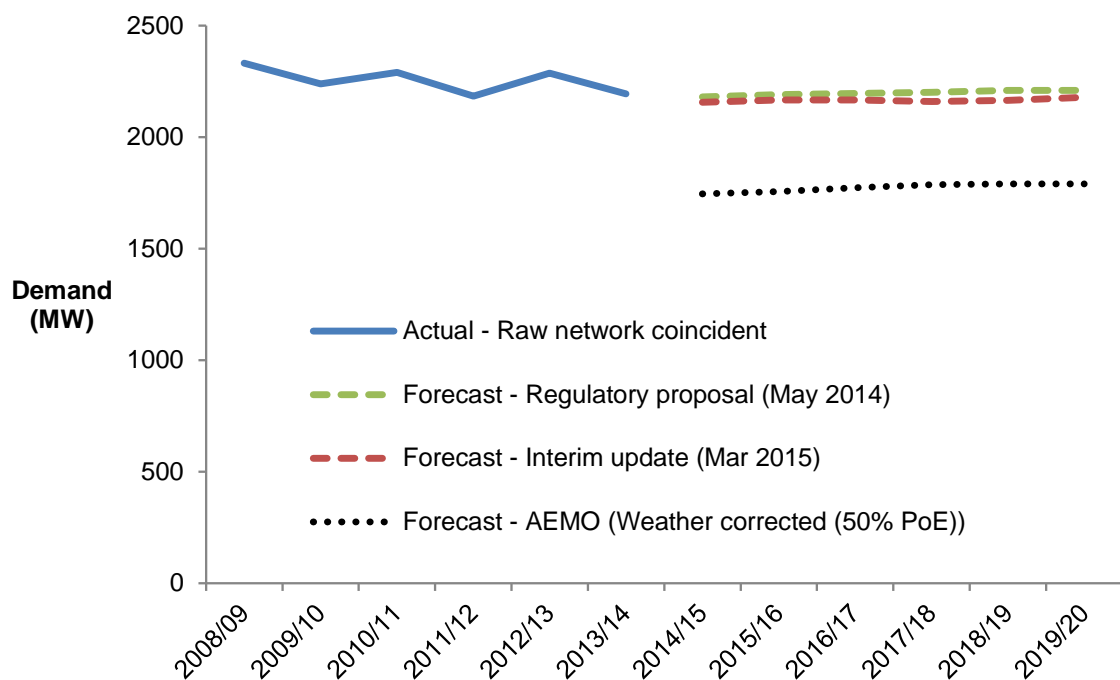


Table C-1 Maximum system demand - Raw network coincident (MW)

	2014-15	2015-16	2016-17	2017-18	2018-19	Average annual growth (2014-19)
Regulatory proposal (May 2014)	2 181	2 191	2 197	2 202	2 211	0.03%
Interim update (March 2015)	2 157	2 167	2 167	2 160	2 166	-0.05%

²³¹ AEMO, *Final Transmission Connection Point Forecasts*, October 2014.

²³² AEMO, *National electricity forecasting report for the National Electricity Market*, June 2014, p. 4-4.

C.4 AEMO forecasts

In July 2014, AEMO published the first edition of transmission CP forecasts for New South Wales and Tasmania.²³³ These forecasts are AEMO's independent electricity maximum demand forecasts at transmission connection point level, over a 10-year outlook period.²³⁴ The Standing Council on Energy Resources (SCER) intended these demand forecasts to inform our regulatory determinations.²³⁵ In addition, AEMO has published the National Electricity Forecasting Report (NEFR) since 2012, and published the latest edition in June 2014 (2014 NEFR).²³⁶ 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.²³⁷

Figure C-1 compares AEMO's demand forecasts and the forecasts proposed by Essential Energy in both its initial regulatory proposal²³⁸ and its interim forecast provided in March 2015. Essential Energy's initial growth trend was consistent with AEMO's CP forecasts over the 2014–19 period. This was despite having different datasets and forecasting approaches. Essential Energy's revised demand forecasts show a marginal decline in demand over the 2014-19 period.

As set out in our draft decision several stakeholders raised concerns that Essential Energy, 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.²³⁹

The Energy Retailers Association of Australia noted that the NSW distributors' revised demand forecasts should drive an observable reduction in the amount of required capex over the 2014-19 period²⁴⁰.

Essential Energy's marginal decline in forecast demand submitted in its revised proposal, to some extent addresses the views of stakeholders on levels of demand. Further, the changes made by Essential Energy result in a high degree of overlap with the independently determined forecasts of AEMO.

²³³ AEMO, *Transmission connection point forecasting report for New South Wales and Tasmania*, July 2014, p. 6.

²³⁴ AEMO, Website: <http://www.aemo.com.au/Electricity/Planning/Forecasting/Connection-Point-Forecasting/Transmission-Connection-Point-Forecasts>, accessed 3 September 2014.

²³⁵ AER, *Better regulation: Explanatory statement: Expenditure forecast assessment guideline*, November 2013, p. 182.

²³⁶ AEMO, *National electricity forecasting report for the National Electricity Market*, June 2014.

²³⁷ AER, Draft Decision, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p 6-86

²³⁸ We summed AEMO's coincident demand figures for each CP in Essential Energy's network for each year.

²³⁹ AER, Draft Decision, *Essential Energy distribution determination, 2015-16 to 2018-19, Attachment 6: Capital expenditure*, November 2014, p 6-87

²⁴⁰ ERAA, submission on NSW DNSPs draft decisions, p. 2

D 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. Essential Energy 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 (for example, poles, cables, transformers) used to provide network services. Consistent with its regulatory proposal submitted in June 2014, Essential Energy has also escalated construction costs in its forecast.

D.1 Position

We are not satisfied that Essential Energy'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 discussed above does not affect the proposed application of labour and construction cost escalators which apply to Essential Energy's forecast capex for standard control services.²⁴¹

D.2 Essential Energy's revised proposal

In its revised proposal, Essential Energy has applied the same material and labour cost escalators to various asset classes proposed in its regulatory proposal submitted in June 2014.²⁴² Table D-1 shows the revised material cost escalators calculated for Essential Energy by Competition Economics Group (CEG).

Table D-1 Essential Energy'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
Steel	-6.0	-0.4	2.0	0.7	1.0
Crude oil	- 12.1	-1.6	1.1	1.0	0.9

²⁴¹ AER, *Draft Decision Essential Energy distribution determination 2015–16 to 2018–19*, November 2014, p. 6-129.

²⁴² Essential Energy, *Revised regulatory proposal*, Attachment 6.14 RRP Cost Escalation Data.

Construction costs	0.5	1.1	1.7	1.5	1.4
Land	4.1	4.1	4.1	4.1	4.1

Source: Essential Energy, *Revised regulatory proposal*, Attachment 6.12 Updated Cost Escalation Factors, December 2014, pp. 6, 7, 9, 10 and 12 and Attachment 6.14 RRP Cost Escalation Data.

On the basis of these individual material (and labour) cost escalators, Essential Energy apportioned an escalation weighting based on the input cost escalators contribution to the total price of each asset.²⁴³

D.3 Reasons

We are not satisfied that Essential Energy's forecast is based on a sound and robust methodology for the reasons outlined below. We therefore consider that it does not reasonably reflect the capex criteria.²⁴⁴ This criteria includes that the total forecast capex reasonably reflects a realistic expectation of cost inputs required to achieve the capex objectives.²⁴⁵ Accordingly, we have not included it as part of our alternative estimate in our final decision on total forecast capex. We are satisfied that zero per cent real cost escalation is reasonably likely to reflect the capex criteria and this has been taken into account into our alternative estimate.

Our conclusion is based on the following:

- the degree of potential inaccuracy of commodities forecasts;
- there is little evidence to support how accurately Essential Energy's materials escalation model forecasts reasonably reflect changes in prices paid by Essential Energy for physical assets in the past and by which we can assess the reliability and accuracy of its materials model forecasts; and
- there is insufficient supporting evidence to show that Essential Energy has considered whether there may be some material exogenous factors that impact on the cost of physical inputs.

The weight of the information evidences that there is a real potential for inaccuracy in commodity forecasts. This possibility in conjunction with the lack of evidence in support of Essential Energy'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 Essential Energy's costs for its physical assets if we were to accept its material cost escalation.

²⁴³ Essential Energy, *Revised Regulatory proposal*, Attachment 6.14 RRP Cost Escalation Data.

²⁴⁴ NER, clause 6.5.7(c).

²⁴⁵ NER, clause 6.5.7(c)(3).

Our decision not to accept Essential Energy's material cost escalation means that Essential Energy'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 Essential Energy'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 Essential Energy'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 (that is, 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 Essential Energy and consumers that a measured and well understood basis for increasing Essential Energy'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 Essential Energy 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 Essential Energy 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 Essential Energy'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

Following are our reasons for not accepting Essential Energy's proposed real material cost escalation. We have also addressed issues raised by AusNet Services in its submission.²⁴⁶

Potential inaccuracy of commodities forecasts

Essential Energy did not provide any evidence that has altered our view of the potential inaccuracy of commodities forecasts. Our reasons relating to the degree of potential inaccuracy are set out in our draft decision.²⁴⁷ However, in order to further test our position on commodities forecasts, we compared the forecasts provided by CEG in its December 2013 report to Essential Energy as part of Essential Energy's June 2014 regulatory proposal with the updated December 2014 report from CEG which forms part of Essential Energy's revised regulatory proposal. Table D-2 compares CEG's real material cost escalation forecasts for December 2013 and December 2014.

²⁴⁶ AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

²⁴⁷ AER, *Draft Decision Essential Energy distribution determination 2015-16 to 2018-19*, November 2014, p. 6-94-102.

**Table D-2 Essential Energy's real materials cost escalation forecast
December 2013 and 2014—inputs (per cent)**

	2014–15	2015–16	2016–17	2017–18	2018–19
Aluminium					
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%
Copper					
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%
Steel					
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
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 D-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 between the December 2013 and December 2014 CEG reports.

Table D-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 in 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 Essential Energy'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 period. Also, the commodity cost escalation forecasts would apply for the duration of the regulatory period, further amplifying the risk of commodity forecast error and subsequent impact on the accuracy of estimating the prices of network assets.

In its submission, AusNet Services stated that potential inaccuracy generally is an insufficient reason to reject a forecast and that all forecasts inherently involve some level of uncertainty. AusNet Services also stated that the inherent uncertainty of a forecast does not mean that a substitute of zero represents a "more reliable" estimation. AusNet Services stated that the regulatory regime requires "a realistic expectation of costs" and therefore a reasonable estimate must be provided. AusNet Services contend that the AER has not shown how its forecast of zero is superior to the materials cost estimate provided by experts using a robust and sound methodology.²⁴⁸

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

We consider that on the basis of the degree of potential inaccuracy of commodities forecasts and the paucity of evidence to support how accurately Essential Energy's materials escalation model forecasts reasonably reflect changes in prices paid by Essential Energy for physical assets in the past, Essential Energy's proposed real material cost escalators do not satisfy the NER criteria. Instead we consider that zero per cent real cost escalation is reasonably likely to reflect the capex criteria and is likely to reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period.

²⁴⁸ AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

AusNet Services submission also 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 commodities prices, their views of average real price growth in relevant materials costs is generally consistent.²⁴⁹

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 D-3.

Table D-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 D-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 consultants' commodity price forecasts for the 2014-19 period were identical, the degree of the potential inaccuracy of commodities forecasts is significant.

Link between forecast prices of commodities and asset prices

In its submission, AusNet Services stated that evidence of historic materials cost increases would be useful for our assessment of future materials costs but 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.²⁵⁰

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 Essential Energy'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

²⁴⁹ AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

²⁵⁰ AusNet Services, *Draft Decisions NSW/ACT Electricity Distribution Determination 2015-19*, 12 February 2015.

materials cost.²⁵¹ 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 (for example, materials cost escalation). Most importantly, it also sets out a number of new assessment techniques.

As we concluded 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.²⁵² We considered 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. We consider that Essential Energy's revised regulatory proposal does not include supporting data or information which demonstrates movements or interlink-ages between changes in the input prices of commodities and the prices Essential Energy paid for physical inputs. Essential Energy'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 or that the weightings applied have produced unbiased forecasts of the costs of Essential Energy's assets. For these reasons, there is no basis on which we can conclude that the forecasts are reliable.

Other factors affecting input cost prices

Our draft decision highlighted a number of factors we consider impact on Essential Energy's input costs, namely:²⁵³

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

²⁵¹ AER, *Draft Decision Essential Energy distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-130-131.

²⁵² AER, *Draft Decision Essential Energy distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-130-131.

²⁵³ AER, *Draft Decision Essential Energy distribution determination 2015–16 to 2018–19*, November 2014, pp. 6-132-137.

- the substitution potential between opex and capex when the relative prices of operating and capital inputs change
 - including hedging strategies or price escalation provisions in their contracts with suppliers of inputs (for example, by including fixed prices in long term contracts)
 - 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 Essential Energy 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 contribute to our view that Essential Energy'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.