



FINAL DECISION
TransGrid transmission
determination
2015–16 to 2017–18

Attachment 6 – Capital
expenditure

April 2015

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Note

This Attachment forms part of the AER's final decision on TransGrid's revenue proposal 2015–18. It should be read with other parts of the final decision.

The final decision includes the following documents:

Overview

Attachment 1 – maximum allowed revenue

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 – pricing methodology

Attachment 13 – pass through events

Attachment 14 – negotiated services

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Shortened forms

Shortened form	Extended form
AARR	aggregate annual revenue requirement
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ASRR	annual service revenue requirement
augex	augmentation expenditure
capex	capital expenditure
CCP	Consumer Challenge Panel
CESS	capital expenditure sharing scheme
CPI	consumer price index
DRP	debt risk premium
EBSS	efficiency benefit sharing scheme
ERP	equity risk premium
MAR	maximum allowed revenue
MRP	market risk premium
NEL	national electricity law
NEM	national electricity market
NEO	national electricity objective
NER	national electricity rules
NSP	network service provider

Shortened form	Extended form
NTSC	negotiated transmission service criteria
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
SLCAPM	Sharpe-Lintner capital asset pricing model
STPIS	service target performance incentive scheme
TNSP	transmission network service provider
TUoS	transmission use of system
WACC	weighted average cost of capital

6 Capital expenditure

Capital expenditure (capex) refers to the capital expenses incurred in the provision of prescribed transmission services. The return on and of forecast capex are two of the building blocks that form part of TransGrid's total revenue requirement.¹

This Attachment sets out our final decision on TransGrid'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 - Contingent Projects
- Appendix E - Statistical analysis of risk scores

6.1 Final decision

We are not satisfied that TransGrid's proposed total forecast capex of \$1348.1 million (\$2013–14) reasonably reflects the capex criteria. We have substituted it with our estimate of TransGrid's total forecast capex for the 2014–18 period. We are satisfied that our substitute estimate of \$1015.0 million (\$2013-14) reasonably reflects the capex criteria. Table 6-1 outlines our final decision.

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

	2014–15	2015–16	2016–17	2017–18	Total
TransGrid's revised proposal	342.5	387.8	310.3	307.5	1,348.1
AER final decision	255.3	304.6	235.3	219.8	1,015.0
Difference	-87.2	-83.2	-75.0	-87.7	-333.1
Percentage difference (%)	-25%	-21%	-24%	-29%	-25%

Source: TransGrid Revised Regulatory Proposal; AER analysis

Note: Numbers may not total due to rounding.

A summary of our reasons and findings that we present in this Attachment and Appendix B are set out in Table 6 2. These reasons include our responses to TransGrid's and other stakeholders' submissions on our draft decision. In the table we present our reasons largely by 'capex driver' such as augex and repex. This reflects

¹ NER, cl. 6A.6.4(a).

the way in which we tested TransGrid’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 TransGrid’s proposal such as non-network capex, were consistent with the NER requirements in that they reasonably reflect the efficient costs of a prudent operator as well as a realistic expectation of the demand forecasts and cost inputs required to achieve the capex objectives. However, we found that other aspects of TransGrid’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 TransGrid’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 TransGrid’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 the 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 TransGrid’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 TransGrid’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 TransGrid’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 TransGrid’s key assumptions about demand and customer forecast and forecast materials escalation rates and labour escalation rates.</p>
Augmentation capex (augex)	<p>We accept TransGrid’s revised forecast augex of \$65.2 million (\$2013-14). TransGrid decreased its augex forecast by \$0.9 million (2013-14) from its initial proposal based on the release of AEMO’s connection point demand forecasts in July 2014.</p>
Customer connections capex	<p>We accept TransGrid’s revised forecast connections capex of \$9.3 million (\$2013-14). TransGrid increased its connections forecast by \$2.3 million (\$2013-14) from its initial proposal. This is based on the delay of a connections project with Essential Energy from the final year of the 2009-14 period. We are satisfied with the reasons submitted by TransGrid’s for the small increase in connections capex.</p>
Replacement capex (including security and	<p>We do not accept TransGrid’s revised proposed repex forecast of \$898 million (\$2013-14) and its proposed forecast of security and compliance capex of \$130.3 million</p>

Issue	Reasons and findings
compliance capex)	<p>(\$2013-14). We have instead included in our alternative estimate an amount of \$733.8 million (\$2013 14) for repex, including security and compliance capex. Our estimate is 29 per cent lower than TransGrid's revised proposal. This reduction reflects:</p> <ul style="list-style-type: none"> • our broad concerns with TransGrid's forecasting methodology which relies on a bottom-up forecast and was not subject to an adequate top down assessment • our acceptance of the repex-specific analysis provided by our consultants, Energy Market Consulting associates, as to TransGrid's excessively risk averse bottom-up assessment and the implications of this at the portfolio level; and • our further analysis of TransGrid's proposed transmission low span capex which indicates that this expenditure is overstated. <p>We are satisfied that our alternative estimate reasonably reflects the capex criteria.</p>
Strategic property acquisitions capex	<p>We have not accepted TransGrid's revised forecast capex of \$99.2 million (\$2013–14) for strategic property acquisitions. This amount is overstated and exceeds the amount required to achieve the capex objectives. We have found that TransGrid has not accurately forecast the costs or, on the basis of the information before us, demonstrated the need for all of the proposed property acquisitions.</p> <p>We have instead included an amount of \$61.3 million (\$2013–14) of forecast strategic property acquisitions capex in our alternative estimate that we are satisfied reasonably reflects the capex criteria. This amount:</p> <ul style="list-style-type: none"> • excludes forecast capex for the Powering Sydney's Future, Maraylya and Richmond Vale strategic property acquisitions as TransGrid has not demonstrated the need for the acquisitions in the 2014-18 period • allows for the proposed strategic acquisition of land in Surry Hills, but at a reduced cost of \$50.4 million as TransGrid's revised proposal overstated the cost of this acquisition • allows for the acquisition of easements for existing lines in the ACT and a site for a future substation near Beryl, consistent with our draft decision.
Non-network capex	<p>We have accepted TransGrid's forecast non-network capex of \$145.6 million (\$2013–14), and included it in our alternative estimate of total capex. TransGrid's revised proposal for this category is consistent with its initial proposal and our draft decision.</p> <p>On average, TransGrid's forecast non-network capex is 23 per cent lower per year than actual non-network capex it spent during the 2009–14 regulatory control period. The longer term trends in non-network capex suggest that TransGrid has forecast capex returning to levels consistent with historical expenditure in this category.</p>
Real cost escalators	<p>In its revised proposal TransGrid accepted our draft decision not to apply commodity escalation, noting that the impact was not material.</p> <p>We have used an average of TransGrid's consultant BIS Shrapnel and our consultant Deloitte Access Economics (DAE's) labour forecasts of the utilities sector as detailed in Attachment 7. This approach is consistent with TransGrid's revised proposal for opex labour price.</p>

Source: AER analysis

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

² NEL, s. 7A

- providing direct control network services
- complying with its regulatory obligations and requirements.

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

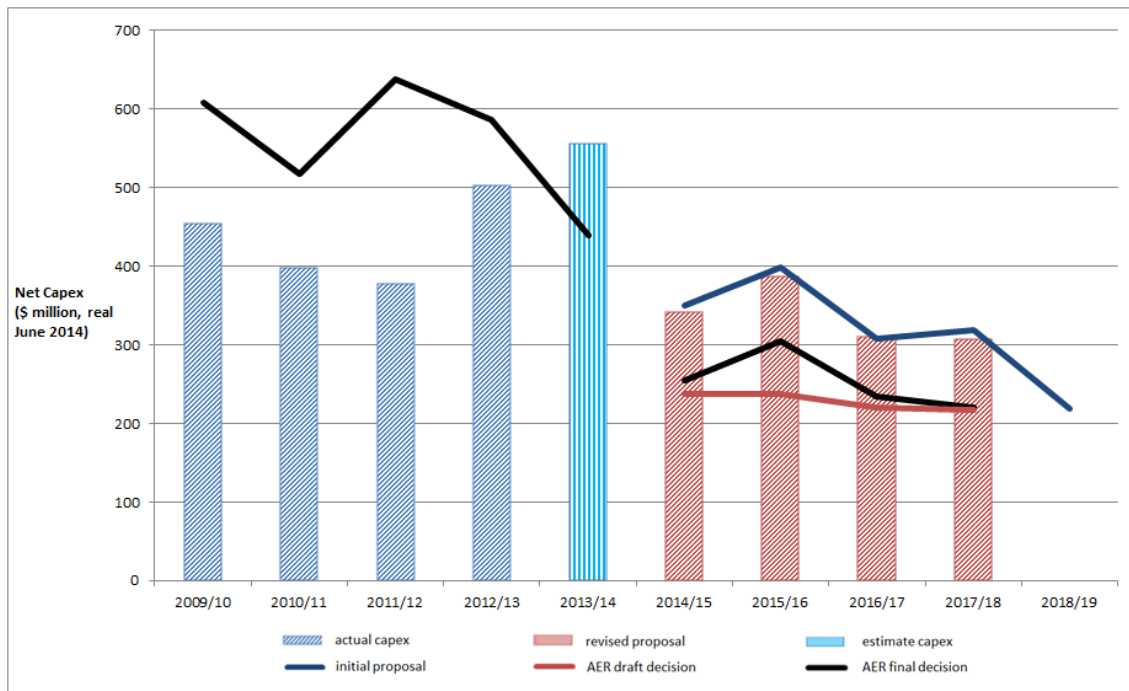
6.2 TransGrid's revised proposal

In its revised proposal, TransGrid proposal total forecast capex of \$1,348.1 million (\$2013–14) for the 2014–18 period. This is 48 per cent higher than our draft decision, and 2 per cent lower than TransGrid's initial regulatory proposal. Figure 6-1 shows the difference between TransGrid's initial proposal, its revised proposal and our draft decision for the 2014–18 period, as well as the actual capex that TransGrid spent during the 2009–14 regulatory control period. TransGrid accepted some aspects of the AER's draft decision and this is reflected in the reduction in its revised proposal compared to its initial proposal. TransGrid states these differences are due to:³

- Updating forecast capex for 2014 demand forecasts with the timing of one connection project changed based on the new forecasts
- Accepting the AER's labour escalation methodology and updating escalators to incorporate the most recent forecasts from BIS Shrapnel
- Accepting the AER's rejection of the Powering Sydney's Future project and amending the trigger for reinforcement of capacity in Southern New South Wales

³ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.42

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



Source: AER analysis

6.3 Assessment approach

This section outlines our approach to capex assessments. It sets out the relevant legislative and rule requirements, outlines our assessment techniques, and explains how we build an alternative estimate of total forecast capex against which we compare that proposed by the service provider. Key to our assessment is the information provided by TransGrid in its revised proposal. At the same time as TransGrid submitted its proposal, it also submitted its response to our RIN. We have also sought further clarification from TransGrid 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 TransGrid's revised proposal.⁴ We apply our various assessment techniques, both qualitative and quantitative, to assess the different elements of TransGrid'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 TransGrid's proposal reasonably reflects the capex criteria set out in the NER⁵ but it also provides us with an

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

⁵ NER, cl. 6A.6.7(c).

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 rules 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 prescribed transmission services over the period
- comply with all regulatory obligations or requirements associated with the provision of prescribed transmission services
- to the extent that there are no such obligations or requirements, maintain service quality, reliability and security of supply of prescribed transmission services and maintain the reliability and security of the transmission system
- maintain the safety of the transmission system through the supply of prescribed transmission 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

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

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. 6A.6.7(a).

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

In deciding whether we are satisfied that TransGrid'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 benchmarking capex that would be incurred by an efficient service provider over the relevant regulatory control period
- the actual and expected capex of the service provider 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 service provider 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 service provider
- the extent to which the capex forecast is referable to arrangements with a person other than the service provider 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 most recent National Transmission Network Development Plan (NTNDP) and any submissions made by AEMO on the forecast of the service provider's required capex
- the extent to which the service provider has considered, and made provision for, efficient and prudent non-network alternatives.
- any relevant project assessment conclusions report under clause 5.6.6 of the NER.
- In addition, we may notify the service provider in writing, prior to the submission of its revised revenue proposal, of any other factor we consider relevant.¹⁰ We have not had regard to any additional factors in this final decision for TransGrid.

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.

⁹ NER, cl. 6A.6.7(e).

¹⁰ NER, cl. 6A.6.7(e)(14).

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

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

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

Expenditure Assessment Guidelines

The rule changes the AEMC made in November 2012 require us to make and publish an Expenditure Forecast Assessment Guideline for Electricity Transmission, released in November 2013 (Expenditure Guideline).¹³ We undertook extensive consultation with stakeholders in the preparation of the Expenditure Guideline. The Expenditure Guideline sets out the AER's proposed general approach to assessing capex (and opex) forecasts. The rule changes also require us to set out our approach to assessing capex in the relevant framework and approach paper. For TransGrid, our framework and approach paper (published in January 2014) stated that we would apply the Expenditure 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 the RIN data forms part of a service provider's regulatory proposal.¹⁵ 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.¹⁶ Accordingly, we consider that our intention to materially rely upon the RIN data was made clear as part of the Expenditure Guideline.

6.3.1 Building an alternative estimate of total forecast capex

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

We then applied our specific assessment techniques, to develop and estimate and assess the economic justifications that TransGrid put forward. We have maintained the use of the techniques that we used in our draft decision. Many of our techniques

¹² NEL, ss. 7A and 16(2).

¹³ AER Expenditure Forecast Electricity Transmission Guideline,

¹⁴ AER, TransGrid 2014–19 – Framework and approach (January 2014), p. 27

¹⁵ NEL, cl. 6.8.2(c2) and (d).

¹⁶ AER, Expenditure Forecast Electricity Transmission Guideline, p. 25.

¹⁷ AER, Expenditure Forecast Electricity Transmission Guideline, November 2013, p. 9; see also AEMC, Economic Regulation Final Rule Determination, pp. 111 and 112.

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 forecast¹⁸. Once we approve total revenue, which will be determined by reference to our analysis of the proposed capex, the service provider will have to prioritise its capex program given the prevailing circumstances at the time (such as demand and economic conditions that impact during the regulatory period). Most likely, some projects or programs of work that were not anticipated will be required. Equally likely, some of the projects or programs of work that the service provider has proposed for the regulatory control period will not be required. 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 its individual circumstances.

As explained in the Expenditure 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 techniques when determining total capex ... forecasts. We typically would not infer the findings of an assessment technique in isolation from other techniques.¹⁹

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 a service provider's proposed capex. We have clarified to what extent we rely on each technique when assessing expenditure under the different capex drivers.

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

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

¹⁹ AER Expenditure Forecast Electricity Transmission Guideline, p. 12.

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 light of the outcomes from our other techniques and our examination of TransGrid's proposal.

We also need to take into account the various interrelationships between the total forecast capex and other components of a service provider's transmission determination. The other components that directly affect the total forecast capex are forecast demand, real cost escalation and contingent projects. We discuss how these components impact the total forecast demand in the Appendices to this Attachment and 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.²⁰
- Past expenditure was sufficient for TransGrid to manage and operate its network in that previous period, in a manner that achieved the capex objectives.²¹

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

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

Having established our alternative estimate of the total forecast capex, we can test the service provider's proposed total forecast capex. This includes comparing our alternative estimate with TransGrid's proposal. TransGrid'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:²²

The AER could be expected to approach the assessment of a NSP's expenditure (capex or opex) forecast by determining its own forecast of

²⁰ AER Expenditure Forecast Electricity Transmission 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) Transmission Pty Ltd [2012] ACompT 6.

²¹ AER Expenditure Forecast Electricity Transmission Guideline, p. 9.

²² AEMC, Economic Regulation Final Rule Determination, p. 112.

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

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

This does not mean that we have set our alternative estimate below the level where TransGrid has a reasonable opportunity to recover at least its efficient costs. Rather, we note that TransGrid is able to respond to any unanticipated issues that arise during the 2014-18 period and in the event that the approved total revenue underestimates the total capex required, TransGrid 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 service provider spending only what is efficient, with the benefits of the underspend being shared between service provider and consumers.

6.4 Reasons for final decision

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

Table 6-3 sets out the capex amounts by capex driver that we have included in our alternative estimate of TransGrid's total forecast capex for the 2014–18 period.

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

Capex driver	2014–15	2015–16	2016–17	2017–18	Total
Augex	17.1	4.8	22.6	20.6	65.2
Connections capex	5.5	2.5	1.1	0.2	9.3
Repex (including security and compliance expenditure)	192.3	205	170	166.5	733.8
Strategic land acquisitions	0.9	52.5	7.9	0	61.3
Non-network capex	39.5	39.8	33.7	32.6	145.6
Total annual capex	255.3	304.6	235.3	219.8	1015

Source: AER analysis

Note: Numbers may not total due to rounding.

Our assessment of TransGrid's forecasting methodology, key assumptions and past capex performance is discussed below. Our assessment of capex drivers is in Appendix B. Appendix B discusses 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 TransGrid to include in its revenue proposal the key assumptions that underlie its proposed forecast capex and a certification by its directors that those key assumptions are reasonable.²³

TransGrid's key assumptions are its reliance on various standards, forecasts, models and inputs. To the extent that TransGrid has relied on its key assumptions to justify its capex proposal, we have addressed these in:

²³ NER, cl. S6A.1.1(2), (4) and (5). TransGrid, Revenue Proposal, May 2014, p. 110 and Appendix B.

- Appendix C (Demand)
- Appendix D (Contingent Projects)
- Attachment 7, Appendix C (opex rate of change)

We have identified concerns with some of the key assumptions relied upon by TransGrid either in how they were formulated or applied. These concerns contribute to our decision that we are not satisfied that TransGrid's forecast capex reasonably reflects the capex criteria.

6.4.2 Forecasting Methodology

TransGrid is required to inform us about the methodology it proposes to use to prepare its total forecast capex before it submits its revenue proposal.²⁴ It is also required to include this information in its revenue proposal.²⁵

In our draft decision we identified two aspects of TransGrid's forecasting methodology which indicate 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:

- TransGrid's forecasting methodology applies a bottom-up build (or bottom-up assessment) to estimate the forecast expenditure for all its capital programs and projects. It does not involve applying a top-down assessment.
- TransGrid's cost-benefit evaluation of each of its capital projects or programs reveals that its underlying risk assessment is overly conservative.

We maintain our position from our draft decision that TransGrid's approach to risk assessment is overly conservative. Further, whilst TransGrid has now formulated a top-down assessment approach, we do not consider it has done so in a sufficiently robust manner to satisfy us that its proposed capex reasonably meets the capex requirements.

Insufficient top-down restraint

As noted in our draft decision, applying a top-down assessment indicates that some level of overall restraint has been brought to bear. Bottom up approaches have a tendency to overstate required allowances as they do not adequately account for inter-relationships and synergies between projects or areas of work. Simply aggregating such estimates is unlikely to result in a total forecast capex allowance that we are satisfied reasonably reflects the capex criteria. We note the findings of our consultant, EMCa, that this top-down assessment is largely absent in TransGrid's approach:²⁶

²⁴ NER, cll. 6A.10.1B and 11.58.4(n); TransGrid, Approach to Forecasting, November 2013.

²⁵ NER, cll. S6A.1.1(2); TransGrid, Revenue proposal, May 2014, pp. 87–91.

²⁶ EMCa, Review of Proposed Replacement Capital Expenditure in TransGrid's Revised Regulatory Proposal p.9

It is our view that a top-down assessment process is standard in a well-governed and well-managed regulated network business. We consider that the absence of such an assessment indicates that TransGrid has not adequately demonstrated that its proposal meets the expenditure criteria.

We consider that this position is supported by TransGrid's consultant AMCL. In auditing TransGrid's ISO 55001 certification, AMCL found:²⁷

Capital prioritisation criteria do not consider risk of deferral and are not aligned to the Asset Management Objectives, and there is no prioritisation of potential projects before they are committed.

TransGrid developed a top down assessment approach as part of its revised proposal. It considers this assessment justifies its capex proposal. TransGrid considers that its forecast repex addresses a similar threshold of risk to its historical repex, thereby satisfying the capex objectives to maintain quality, reliability, security and safety.²⁸

We have examined whether TransGrid's proposed alternative top down assessment reasonably reflects the capex criteria and have reached the conclusion that TransGrid's approach does not do so. We consider that our findings in the draft decision that TransGrid takes an overly conservative approach to risk remain valid. We do not accept that TransGrid's top down assessment demonstrates its proposal reflects the prudent and efficient costs of achieving the capex objectives. Our conclusion is based on the following:

1. TransGrid did not undertake a consistent approach to risk assessment in 2009 and 2014 and its risk assessment for the 2014-19 period is overly conservative. This conservatism is observable at both an absolute level and in comparison to the previous regulatory period.
2. Our review of a sample of projects indicates the risks of individual projects are likely overstated.
3. Our consultant EMCa found that:²⁹

We consider a bias for over-estimation of the forecast is still present, due primarily to TransGrid's conservative approach to risk assessment and weaknesses in the application of its risk assessment methodology.

In its revised proposal, TransGrid presented a comparison of the risk profile of projects it intends to undertake in the 2014-18 period against those in the 2009-14 regulatory control period. TransGrid indicates that because the assessments for both periods were produced on a consistent basis, that the question of bias in the absolute levels of

²⁷ TransGrid, ISO 55001 Certification - Audit report, p.14

²⁸ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 55

²⁹ EMCa, Review of Proposed Replacement Capital Expenditure in TransGrid's Revised Regulatory Proposal , p. ii

risk is not relevant.³⁰ TransGrid considers that its comparison of the risk profiles shows that:³¹

...the level of risk addressed by the forecast replacement expenditure in TransGrid's revenue proposal is consistent with that addressed by the forecast replacement expenditure in the 2009/10 to 2013/14 revenue proposal, and so addresses the requirement in the capital expenditure objectives to maintain quality, reliability, security and safety.

Figure 6-2 shows a histogram of the risk scores presented in TransGrid's revised proposal. TransGrid's data shows that the average and maximum risk scores have both increased between 2009 and 2014. A visual inspection of these risk scores indicates there is a different distribution of risk scores between 2009 and 2014. This is supported by a statistical analysis (a T-test for statistical significance) which indicates that the two sets of risk scores are not drawn from the same population (see appendix E). This indicates that a consistent process was not used to generate the risk scores in the two periods.

We also analysed nine programs that were risk scored in both 2009 and 2014. Each of these programs commenced in either the previous or preceding regulatory control period. TransGrid's documentation for these programs in 2009 stated that work would be staged to undertake the highest priority replacements first. Most replacements were completed in the 2009-14 period. Despite this, the risk scores for the same programs markedly increased in 2014 for seven of the nine programs. For example, the average score for safety, for example, increased from 9 to 40 and for environment, from 9 to 29. Only two programs resulted in a reduction in risk score (and in both cases the reduction was small). This suggests TransGrid's risk scoring process has resulted in a substantial elevation of risk over that period, contrary to the stated intent of the programs.³² We also consider that a prudent and efficient service provider would prioritise the replacement of higher risk assets first.

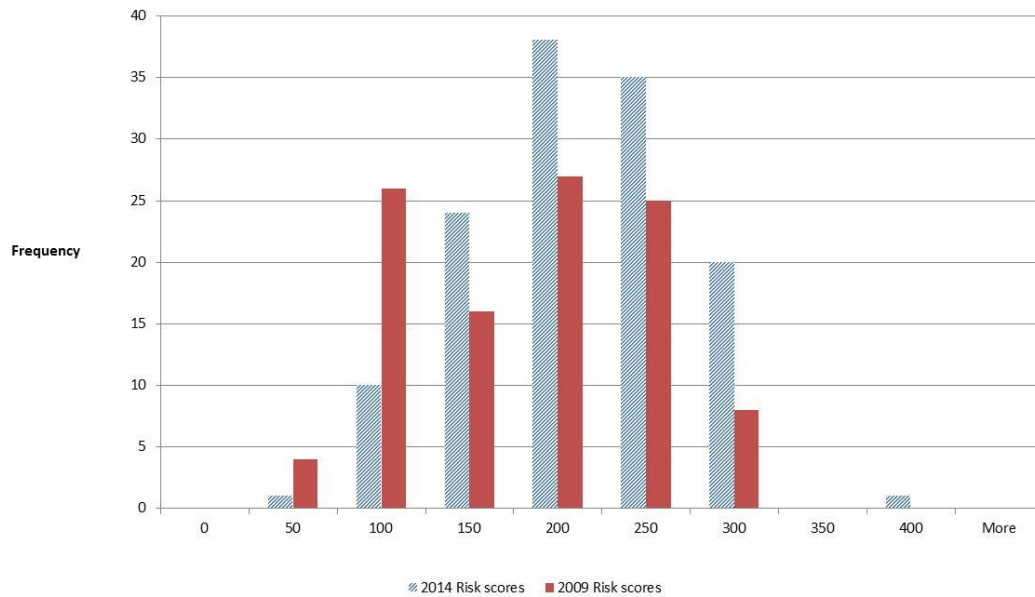
On the basis of the observed disparity between TransGrid's programs and its elevated risk scores in 2014, we conclude that TransGrid's risk assessment is being undertaken on a more conservative basis in 2014 compared to 2009.

³⁰ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 47

³¹ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.47

³² Indeed the 2009 risk assessment indicates that TransGrid used a risk based approach to prioritising these relays. See the 2009 risk assessment (4956 TH1A Relays ARPE, p11)

Figure 6-2 Histogram of risk scores



Source: AER analysis

Additionally, we undertook a detailed risk assessment of 43 out of 129 projects or programs to determine whether TransGrid's approach to calculating risk scores was appropriate. We undertook this assessment by applying TransGrid's "risk management framework" and "assessment methodology" in order to independently derive a risk score for comparison with TransGrid's risk score. We found that TransGrid's risk scores are too high. We calculated an average risk score of 79 compared to the average risk score of 192 generated by TransGrid. We consider this is driven by the following issues in TransGrid's approach to risk assessment:

- The frequency scale and particularly the consequence scale of the corporate risk assessment matrix are inappropriately scaled and have insufficient granularity to accommodate the range of frequencies and consequences appropriate to assessing electricity asset risks.
- The corporate risk matrix itself also shows apparent inconsistencies in the consequence ratings. For example, it seems unlikely that a fatality or a permanent total disability consequence would result in costs of between \$50 to \$500 million being incurred. This range appears higher than would reasonably be incurred.
- TransGrid's risk assessment methodology also fails to account for covariance between consequences arising from a common hazard. This results in partial double counting as not all consequences are fully realised when a specific hazard is realised.
- TransGrid's risk assessment and the associated allocation of resources to manage the risk do not account for the portfolio effects. For example, TransGrid has assessed the environmental risk from low spans (predominantly bushfire) as being possible (1 in 3 year event) and catastrophic (a consequence of \$500m in total economic and financial costs). This same assessment has been applied to each

low span project/program and the results added into the total portfolio risk score and risk dollars. No adjustment has been made at the portfolio level to account for the use of a population frequency and consequence for each individual project.

- The score dictates the characterisation of the level of risk - extreme, high, medium or low - and the required approach to manage the risk.³³ Additionally, we consider that TransGrid's risk quantification in dollar terms is likely to be too high, which results in an overstatement of benefits compared to the cost of the program.

Our consultant EMCa also reached similar conclusions. It found that TransGrid's alternative top-down assessment has not demonstrated an effective review or challenge of the portfolio to determine that the optimum level of risk has been reflected in the expenditure forecast.³⁴ EMCa stated that:³⁵

Our initial concerns regarding inadequate top-down assessment and focus at the individual project and program level have not been addressed. Accordingly, the new information provided does not support a different conclusion.

We note that TransGrid stated in its revised proposal that:³⁶

TransGrid recalculated the values of risk for each project using a conservative application of the method proposed as good practice by EMCa.... Using the revised values, the full portfolio is still required.

In clarifying this statement, TransGrid stated that in fact five projects are not justified under its own risk quantification approach.³⁷ TransGrid provided additional, brief justifications of the projects based on factors other than the risk score. This indicates that TransGrid has a preference to address any identified issues through capital expenditure, even when a project is not justified by its risk assessment.

Finally, we note that TransGrid provided an audit report of its ISO55001 Certification performed by its consultant AMCL. This audit report identified a number of Minor Non-conformances. Importantly, the audit report identified that there is a general overestimation of risk:³⁸

Use of the corporate risk management framework for asset level risk assessments is not effective. It does not provide a sufficiently granular resolution for these assessments, resulting in a general over-estimation of risk and ad-hoc modifications to the risk assessment process to compensate.

³³ For example TransGrid's corporate Risk Management Framework requires consideration of additional controls for medium risks but a cost benefit assessment should be undertaken. High risks require a cost effective plan and extreme risks must be addressed immediately. Low risks are generally considered to be at a level that TransGrid

³⁴ EMCa, Review of Proposed Replacement Capital Expenditure in TransGrid's Revised Regulatory Proposal ,p.10

³⁵ EMCa, Review of Proposed Replacement Capital Expenditure in TransGrid's Revised Regulatory Proposal ,p.10

³⁶ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 56.

³⁷ TransGrid, Response to info request R6.

³⁸ TransGrid, AMCL ISO 55001 Certification - Audit report

TransGrid's own audit report confirms that TransGrid has an overly conservative approach to risk. This finding is consistent with our own assessment and EMCA's analysis. Accordingly, we are not satisfied that its capex forecast reasonably reflects the capex criteria.

TransGrid average replacement age approach

TransGrid also presented a top down assessment that tested the proposed capex against the average asset replacement age implied by that level of capex.³⁹ TransGrid concluded that our approved capex program implied that the implied average replacement is in the order of 63.5 years.⁴⁰ TransGrid considers that this is longer than achieved in practice and contended that this implies that our forecast capex is below a long term sustainable rate.⁴¹ TransGrid considered that its historical repex over the last 10 years has also been below a sustainable long term average rate and stated that:⁴²

While this was appropriate, as investment above this level was not required at the time, it does not follow that the historical level of expenditure is necessarily suitable to continue in future periods.

The measure used by TransGrid is high level, but we do acknowledge that a service provider will eventually need to replace its network assets and that TransGrid's measure is broadly reflective of the average expenditure needed over the life of the network. However, due to the lumpiness of the initial build, the actual repex need will not be reflective of this average amount. For example, a brand new network would have very little repex for an extended period of time. The expenditure would then increase when the network reaches replacement age. This would result in expenditure either above or below the average level, but rarely, if ever at the average level. Indeed, TransGrid adopts this same argument to question our application of trend analysis and to support its position that historical expenditure is not a reasonable predictor of future expenditure levels. While we acknowledge that an ageing network would put upwards pressure on expenditure, we consider that historical expenditure can be used as a predictor of future expenditure if there is no reason to expect the future level to be different from the immediate past. That is, TransGrid needs to demonstrate those cost pressures will arise in the next period but were not present in the current period.

TransGrid does not agree with our conclusion that the observed stable or improving trends in performance indicators demonstrate that replacement expenditure is not required. TransGrid stated that:⁴³

the performance indicators to which the AER refers are lagging performance indicators and the information to which the AER had regard shows them over only a short period of time.

³⁹ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.48

⁴⁰ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.49

⁴¹ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.49

⁴² TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.49

⁴³ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.52

TransGrid considered:⁴⁴

The appropriate indicators to use for forecasting expenditure are the leading indicators of condition that are referred to in the condition assessments that establish the need for each replacement project. These condition assessments have been provided to the AER as part of the supporting documentation to TransGrid's revenue proposal.

We have examined the condition assessments provided by TransGrid. However, we do not consider that a "bottom-up" approach which aggregates these assessments is appropriate. This is because such an approach treats projects separately. It does not adequately account for inter-relationships and synergies between projects or areas of work. Accordingly, such an approach will overstate required allowances. Further, we note the finding of our consultant EMCa that:⁴⁵

the condition information in most cases was more representative of an aggregate health and condition for the asset group, rather than at an individual asset level. The resulting condition improvement, and corresponding improvement to business outcomes was not evident at a project or portfolio level.

EMCa's analysis does not support TransGrid's proposed "bottom up" forecast.

6.4.3 Safety and reliability outcomes

In making our final decision, we have specifically considered the impact our decision will have on the safety and reliability of TransGrid's network. TransGrid submitted that our repex estimate in our draft decision would increase TransGrid's level of asset risk, and would not provide a sufficient expenditure allowance for TransGrid to maintain quality, reliability, security and safety.⁴⁶ We therefore reviewed our assessment under the various capex drivers to ensure that we had not underestimated the forecast capex that TransGrid would require. In particular, as discussed in Appendix B, after reviewing TransGrid's top down analysis in conjunction with EMCa's updated findings we remain of the view that TransGrid's proposed capex is higher than necessary to meet its obligations. Further, we consider that system wide performance indicators do not support TransGrid's forecast capex at the portfolio level. In our assessment we found no evidence of an increase in TransGrid's level of asset risk or that our estimate of repex, based as it is on TransGrid's own replacement practices, would increase that risk. We therefore consider our alternative estimate is sufficient for a prudent and efficient service provider in TransGrid's circumstances to maintain the service quality, reliability, security and safety of its network consistent with its obligations.

⁴⁴ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.52

⁴⁵ EMCa, *Review of Proposed Replacement Capital Expenditure in TransGrid's Regulatory Proposal* p.18

⁴⁶ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p.47

We further note, as set out above in section 6.3, that TransGrid has some flexibility in prioritising particular projects and moreover, the regulatory framework includes mechanisms to deal with unanticipated expenditure needs.

6.4.4 TransGrid's capex performance

We have looked at a number of historical metrics of TransGrid's capex performance to help inform our assessment of TransGrid's proposed capex forecast. This includes TransGrid's relative multilateral total factor productivity (MTFP) performance from our annual benchmarking report, and its proposed forecast capex allowance against historical trends.

We note that the NER sets out that we must have regard to our annual benchmarking report. 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 TransGrid'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. We have not used this analysis deterministically in our capex assessment. We note that TransGrid has submitted that:⁴⁷

the benchmarking is not fit for purpose to draw conclusions on either the relative efficiency of service providers or the trend over time.

We acknowledge that our capex benchmarking is not suitable for drawing conclusions regarding the relative efficiency of TNSPs at this time. However, as set out in Attachment 7, we consider that we can make conclusions based on changes in TransGrid's efficiency over time.

Figure 6-3 shows TransGrid's MTFP performance over time and relative to the other service providers. 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). These results show that TransGrid's efficiency has declined steadily over time.

⁴⁷ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 45

Figure 6-3 Relative MTFP performance of transmission networks

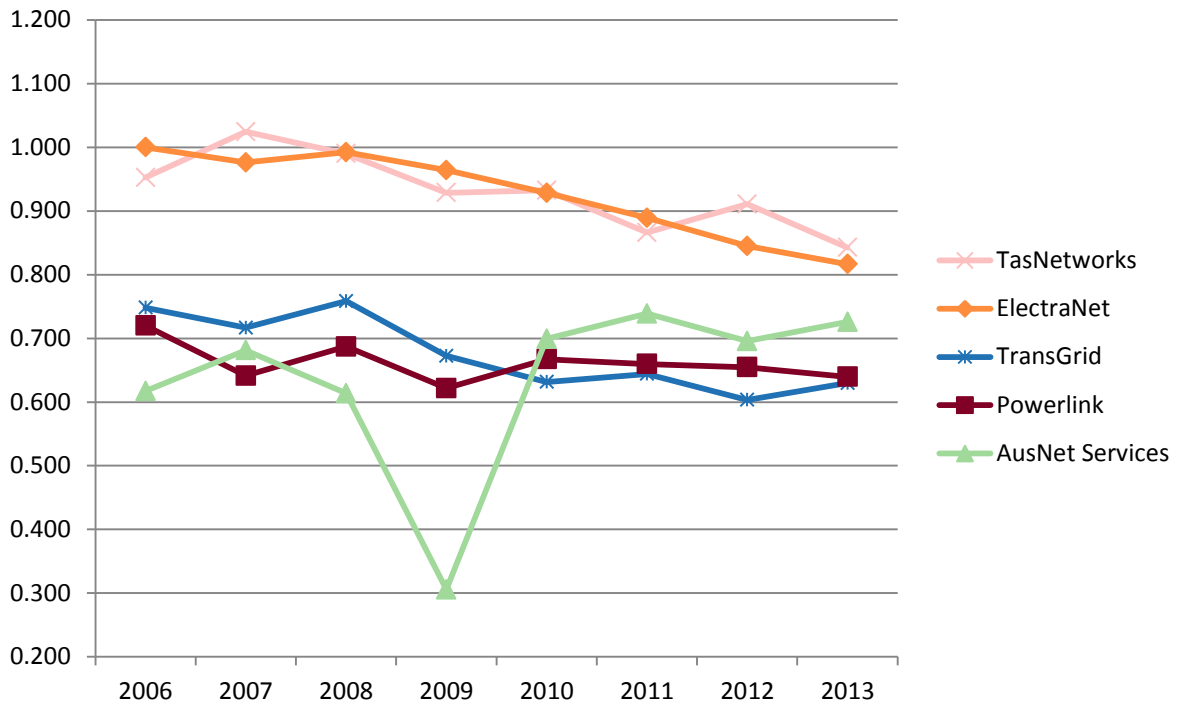
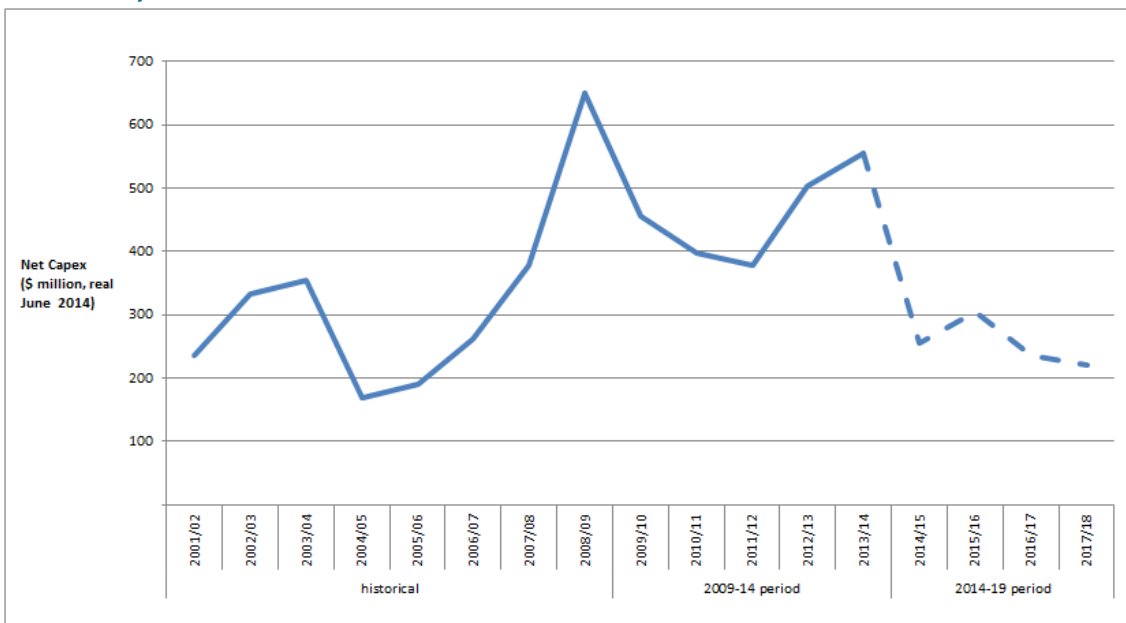


Figure 6-4 shows TransGrid's proposed forecast capex against historical trends (\$2013–14). This indicates that capex is declining when compared to the recent trends. The average annual capex allowance for the 2014–18 period is marginally lower than the average of the capex TransGrid spent between the years 2004–05 and 2013–14.

Figure 6-4 Historic capex and forecast capex for TransGrid (million \$2013/14)



Source: AER analysis

6.4.5 Interrelationships

There are a number of interrelationships between TransGrid's total forecast capex for the 2014–18 period and other components of its transmission determination that we have taken into account in coming to our final decision. Table 6-4 summarises these other components and their interrelationships with TransGrid's total forecast capex.

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

Other component	Interrelationships with total forecast capex
Total forecast opex	<p>There are elements of TransGrid's total forecast opex that are related to 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 TransGrid's opex base year that we approved in Attachment 7 <p>The labour cost escalators are related to capex because TransGrid'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 TransGrid's total forecast opex, it is related. This is because the amount of maintenance opex that is reflected in TransGrid's opex base in part determines the extent to which TransGrid needs to spend repex during the 2014–18 period.</p>
Forecast demand	<p>Forecast demand is related to TransGrid's total forecast capex. Growth driven capex, which includes augex and customer connections capex, is typically triggered by a need to build or upgrade a network to address changes in demand or to comply with quality, reliability and security of supply requirements. Hence, the main driver of growth-related capex is maximum demand and its effect on network utilisation and reliability.</p>
Capital Expenditure Sharing Scheme (CESS)	<p>The CESS is related to TransGrid's total forecast capex. In particular, the effective application of the CESS is contingent on the approved total forecast capex being efficient, or that it reasonably reflects the capex criteria. As noted in Table 6-5, this is because any efficiency gains or losses are measured against the approved total forecast capex. In addition, in future transmission 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 TransGrid's regulatory asset base. In particular, the CESS will ensure that TransGrid bears at least 30 per cent of any overspend against the capex allowance. Similarly, if TransGrid can fulfil their objectives without spending the full capex allowance, it will be able to retain 30 per cent of the benefit of this.</p>
Service Standards Performance Incentive Scheme (STPIS)	<p>The STPIS is related to TransGrid 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 2014–18 period.</p>
Contingent project	<p>A contingent project is related to TransGrid'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 TransGrid's total forecast capex for the 2014–18 period.</p> <p>We did not identify any part of TransGrid's forecast ex-ante capex forecast that we consider should be included as a contingent project. However, in our draft decision we did not accept TransGrid's proposed contingent project related to the inner Sydney and CBD area. As a consequence, in this final decision we have not accepted some proposed capex for the acquisition of land in the ex-ante allowance associated with this project.</p>

Source: AER analysis

6.4.6 Consideration of the capex factors

In deciding whether or not we are satisfied TransGrid'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 capex factors

Capex factor	AER consideration
The most recent annual benchmarking report and benchmarking capex that would be incurred by an efficient service provider over the relevant regulatory control period	We have had regard to our most recent benchmarking report in assessing TransGrid's proposed total forecast capex and in determining our alternative estimate for the 2014–18 period. This can be seen in the metrics we used in our assessment of TransGrid's capex performance.
The actual and expected capex of TransGrid during any preceding regulatory control periods	We have had regard to TransGrid's actual and expected capex during the 2009–14 regulatory control period and preceding regulatory control periods in assessing its proposed total forecast capex. This can be seen in our assessment of TransGrid's capex performance. It can also be seen in our assessment of the forecast capex associated with the capex drivers that underlie TransGrid's total forecast capex.
The extent to which the capex forecast includes expenditure to address concerns of electricity consumers as identified by TransGrid in the course of its engagement with electricity consumers	We have had regard to the extent to which TransGrid's proposed total forecast capex includes expenditure to address consumer concerns that have been identified by TransGrid. Consumers raised concerns that TransGrid had not applied a top-down forecasting approach, and therefore not demonstrated overall restraint. TransGrid provided a top-down forecasting approach in its revised proposal. We assessed TransGrid's top-down forecasting approach in our final decision.
The relative prices of operating and capital inputs	We have had regard to the relative prices of operating and capital inputs in assessing TransGrid's proposed real cost escalation factors for materials.
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 TransGrid'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 TransGrid	We have had regard to whether TransGrid's proposed total forecast capex is consistent with the CESS and the STPIS. See our discussion about the interrelationships between TransGrid'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 service provider that do not reflect arm's length terms	We have had regard to whether any part of TransGrid's proposed total forecast capex or our alternative estimate that is referable to arrangements with a person other than TransGrid that do not reflect arm's length terms. We did not identify any parts of TransGrid's proposed total forecast capex or our alternative estimate that is referable in this way.
Whether the capex forecast includes an amount	We have had regard to whether any amount of TransGrid's

Capex factor	AER consideration
relating to a project that should more appropriately be included as a contingent project	proposed total forecast capex or our alternative estimate relates to a project that should more appropriately be included as a contingent project. We have not identified any expenditure that would more appropriately be included as contingent project. We have accepted TransGrid's proposed contingent project as discussed in Appendix D.
The most recent National Transmission Network Development Plan (NTNDP), and any submissions made by AEMO, in accordance with the Rules, on the forecast of TransGrid's required capex	We have taken into account the most recent NTNDP and submissions made by AEMO in assessing TransGrid's forecast capex. See Appendix B.
The extent to which TransGrid has considered and made provision for efficient and prudent non-network alternatives	We have had regard to the extent to which TransGrid made provision for efficient and prudent non-network alternatives. TransGrid did not make provision for such non-network alternatives. We also did not identify any such non-network alternatives for inclusion in our alternative estimate.
Any relevant project assessment conclusions report required under clause 5.6.6 of the NER	There are no relevant project assessment conclusions reports relevant to TransGrid to which we have had regard.
Any other factor the AER considers relevant and which the AER has notified TransGrid in writing, prior to the submission of its revised Revenue Proposal, is a capex factor	We did not identify any other capex factor that we consider relevant.

Source: AER analysis

A Assessment techniques

This Appendix describes the assessment approaches we have applied in assessing TransGrid'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 Guideline, where we stated:⁴⁸

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 DNSPs) 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 TransGrid'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.⁴⁹ Economic benchmarking applies economic theory to measure the efficiency of a service provider's use of inputs to produce outputs, having regard to operating environment factors.⁵⁰ It allows us to compare the performance of a service provider against its own past performance, and the performance of other service providers. Economic benchmarking helps us to assess whether a service provider's capex forecast represents efficient costs.⁵¹ As stated by the AEMC, 'benchmarking is a critical exercise in assessing the efficiency of a NSP'.⁵²

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 service provider's

⁴⁸ AER Expenditure Forecast Electricity Transmission Guideline, p.8

⁴⁹ NER, cl. 6A.6.7(e)(4).

⁵⁰ AER, *Explanatory Statement: Expenditure Forecasting Assessment Guidelines*, November 2013.

⁵¹ NER, cl. 6A.6.7(c)

⁵² AEMC, *National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, November 2012, p. 25.

efficiency with consideration given to its inputs, outputs and its operating environment. We have considered each service provider's operating environment insofar as there are factors that are outside of a NSP's control but which affect a NSP's ability to convert inputs into outputs.⁵³ Once such exogenous factors are taken into account, we expect service providers 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.⁵⁴

For the TNSPs we consider this economic benchmarking can give an indication of how the efficiency of each service provider has changed over time. We accept that it is not currently robust enough to draw conclusions about the relative efficiency of these service providers.

A.2 Trend analysis

We have considered past trends in actual and forecast capex. This is one of the capex factors that we are required to have regard to.⁵⁵

Trend analysis involves comparing service providers 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 service providers in their proposals, as well as changes in the circumstances of the service provider.

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.⁵⁶ 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 service provider.

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 revised forecasts differ from the initial demand forecast, a service provider should incorporate this updated information in a timely manner and should reassess the need for the projects. Growth in a service provider's network will also drive augmentation and connections related capex. For these reasons it is important to

⁵³ See AEMC, *National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, November 2012, p.113. Exogenous factors could include geographic factors, customer factors, network factors and jurisdictional factors.

⁵⁴ AER, *Annual Benchmarking Report*, 2014.

⁵⁵ NER, cl. 6A.6.7(e)(5).

⁵⁶ NER, cl. 6A.6.7(a)(3).

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 Engineering review

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

In particular, in respect of augex and repex, we have engaged engineers to consider whether TransGrid's:

- forecast is reasonable and unbiased, by assessing whether the service provider'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.
- costs and work practices are prudent and efficient, by assessing whether the service provider uses the minimum resources reasonably practical to achieve the capex objectives and maintain the required or efficient service levels.

We have considered these factors as they relate directly to our assessment of whether TransGrid's proposal reflects the efficient costs that a prudent operator would require to achieve the capex objectives:⁵⁷

- 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.

⁵⁷ NER, s. 6.5.7(c) (version 58).

- If TransGrid's risk management is prudent and efficient, TransGrid'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.⁵⁸
- If TransGrid's costs and work practices are prudent and efficient, TransGrid will have the appropriate governance and asset management practices to ensure that TransGrid has determined an efficient and prudent capex forecast that is based on a realistic expectation of the demand forecast and cost inputs required to achieve the capex objectives.

Accordingly, the engineering review was tasked with assessing whether there were any systemic issues arising from TransGrid's governance and risk assessment framework and whether there is evidence that indicates that the forecasts are biased. The engineering reviews focused on TransGrid's major replacement programs and adopted a sampling approach in considering the above factors. Where this revealed concerns about systemic issues, we asked the engineers to quantify the likely impact of these biases. This review covered an assessment of:

- the options the NSP investigated to address the economic requirement (for example, for repex projects the review included an assessment of the extent to which the NSP considered sub options for replacements, non-network alternatives or demand management)
- whether the timing of the project is efficient and prudent (including replacement strategies at a portfolio level)
- unit costs and volumes, including comparisons with past trends in expenditure
- longer term asset replacement strategies (including replacement strategies at a portfolio level rather than at a project level)
- the relative prices of operating and capital inputs and the substitution possibilities between operating and capital expenditure
- the extent to which the capex forecast includes expenditure to address the concerns of electricity consumers as identified by the service provider in the course of its engagement with electricity consumers. This is most relevant to core network expenditure (augex and repex) and may include the NSP's consideration of the value of customer reliability (VCR) standard or a similar appropriate standard.

In some cases we have also reviewed specific capex projects or programs of work to determine whether these meet the capex criteria. We undertook these reviews have in respect of particular capex categories related to proposed asset replacement expenditure.

⁵⁸ This approach is supported by NERA Economic Consulting, see NERA, Economic Interpretation of Clauses 6.5.6 and 6.5.7 of the National Electricity Rules, Supplementary Report

B Assessment of forecast capex drivers

We present our detailed analysis of the sub-categories of TransGrid's revised forecast capex for the 2014–18 period in this Appendix. These sub-categories reflect the drivers of forecast capex over the 2014–18 period. These drivers are augmentation capex (augex), replacement capex (repex) and non-network capex.

As we discuss earlier in this Attachment, we are not satisfied that TransGrid'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 TransGrid'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 our overall alternative estimate which forms the basis of our substitute estimate, as well as our analysis of each sub-category of capex. The structure of this appendix is:

- Section B.1: alternative estimate
- Section B.2: forecast augex
- Section B.3: forecast repex (including security and compliance expenditure)
- Section B.4: non-network capex
- Section B.5: strategic property

In sections B.1 - B.5 we examine five 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 (alternative estimate)

B.1 Alternative estimate

Having examined TransGrid'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 TransGrid's submissions on the weighting should be given to particular techniques, is set out under the capex drivers in this Appendix B.

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

B.2 AER findings and estimates for augex and connections

Our alternative estimate includes \$74.5 million (\$2013–14) for growth-related capex for the 2014–18 period. This consists of \$65.2 million (\$2013–14) for augex and \$9.3

million (\$2013–14) for connections capex.⁵⁹ This is consistent with the forecasts proposed by TransGrid.

In our draft decision, we accepted \$72.1 million (\$2013–14) for growth-related capex for the 2014–18 period. Our draft decision sets out the full reasons for our acceptance of the forecast proposed by TransGrid.⁶⁰

We received several stakeholder submissions on the proposed augex:

- The Energy Markets Reform Forum (EMRF) considered that there is little rationale for any augex for the 2014–18 period due to the lower forecast demand.⁶¹
- The Total Environment Centre submitted that the significantly reduced augex TransGrid proposed is due to flat peak demand rather than the employment of demand management activities as alternatives to augex.⁶²
- AusNet Services submitted that where the need for augmentation declines due to lower demand growth, there is often still a need to undertake replacement as lower demand growth does not reverse deterioration of poor-condition or unsafe assets.

As set out in our draft decision, our assessment of the forecast was based on a review of AEMO's TransGrid Project Assessment Report⁶³, which found that the major projects proposed by TransGrid were justified. We accept AEMO's findings. AEMO's assessment is independent and we are required to take its report into account.⁶⁴ Furthermore, TransGrid's augex forecast is significantly less than what it spent in the 2009–14 period, which reflects the lowering of demand forecasts.

In the revised proposal, TransGrid accepted the outcome of our analysis of augex and connections capex, but slightly revised its annual augex and connections capex forecasts following the release of the 2014 connection point demand forecasts. As we noted in our draft decision, we intended to assess the impact of updated demand forecasts on our analysis.⁶⁵

TransGrid's revisions decrease the forecast of augex by \$0.09 million and increase the connections forecast by \$2.3 million (\$2013–14).⁶⁶ TransGrid submitted that the increase in forecast connections capex is driven by the related distributor—Essential

⁵⁹ TransGrid, Capex Model, January 2015.

⁶⁰ AER, Draft Decision for TransGrid transmission determination 2015–16 to 2017–18, Attachment 6: Capital expenditure, pp. 24, 34–38.

⁶¹ EMRF, submission to the Australian Energy Regulator on the AER's Draft Decision and TransGrid's revised proposal, January 2015, p.15.

⁶² Total Environment Centre, Submission to the Australian Energy Regulator on TransGrid's Revised Revenue Proposal 2014–19, February 2015, p.5.

⁶³ AEMO, *Independent Planning Review, New South Wales and Tasmanian Transmission Networks*, August 2014, p. 13.

⁶⁴ NER, cl. 6A.6.7(e)(11).

⁶⁵ AER, Draft Decision for TransGrid transmission determination 2015–16 to 2017–18, Attachment 6: Capital expenditure, p.38

⁶⁶ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 43

Energy—delaying the need for a connections project from the previous period.⁶⁷ This had a flow-on effect on TransGrid which had to complete the switch bay works at the connection site. TransGrid submitted that it had not engaged a contractor to undertake this task at the time of being advised of the delay.⁶⁸ As a result, TransGrid transferred \$2.3 million (\$2013–14) planned for the connections project from the final year of the 2009–14 period into first year of the 2014–18 r period.⁶⁹

We are satisfied with the reasons submitted by TransGrid for the small increase in growth-related capex and have included this additional amount in our alternative estimate.

B.3 AER findings and estimates for asset replacement expenditure (including security and compliance related expenditure)

Asset replacement expenditure (repex) involves replacing an asset with its modern equivalent where the asset has reached the end of its economic life. Economic life takes into account the age, condition, technology or operating environment of an existing asset. In general, we classify capex as repex where the expenditure decision is primarily based on an existing asset's inability to efficiently maintain its service performance requirement.

Expenditure on assets for security and compliance involves modifying an asset for reasons other than an increase in demand. This includes for safety reasons. The majority of this expenditure is to address low span transmission lines.

Position

TransGrid in its revised proposal has proposed \$898.6 million (\$2013–14) for repex and \$130.3 million for security and compliance related expenditure. We have instead included an amount of \$733.8 million (\$2013–14) in our alternative estimate.⁷⁰ This includes \$663.6 million (\$2013–14) of forecast repex and \$70.2 million (\$2013–14) of forecast security and compliance related repex expenditure. This represents an average annual increase of 11.5 per cent compared with actual expenditure in the 2009–14 period.

This reflects a reduction of 29 per cent compared to TransGrid's revised proposal. We determined that this reduction was warranted in light of:

⁶⁷ TransGrid, response to AER TransGrid Capex R10, p. 1

⁶⁸ TransGrid, response to AER TransGrid Capex R10, p. 1

⁶⁹ TransGrid, response to AER TransGrid Capex R10, p. 1

⁷⁰ TransGrid proposed additional expenditure of \$13.6 million in relation to substation renewal, secondary systems renewal, communications upgrades and other repex in its revised proposal. We have not included this expenditure in our alternative estimates as these increases were not explained by TransGrid in its revised proposal.

- the broad concerns we have with TransGrid's forecasting methodology as outlined in this Attachment 6
- our acceptance of the supporting repex-specific analysis provided by EMCa as to TransGrid's excessively risk averse bottom-up assessment and the implications of this at the portfolio level.

We also had regard to submissions from stakeholders.⁷¹

The reduction incorporates an adjustment which is consistent with the higher end of the adjustment recommended by EMCa. We determined that it was necessary to make an adjustment at the higher end of the range for two key reasons. First, the analysis from our different assessments was consistent. That is, each assessment reinforced the outcomes of each of the other assessment. Secondly, TransGrid's revised proposal did not provide any additional evidence to support its position. On the basis of the evidence before us, we are satisfied that these total adjustments result in an estimate of repex that reasonably reflects the capex criteria. This estimate has been tested by us at a systemic level and a project level.

Our findings, consistent with our draft decision, are:

- compared to the 2009–14 period, TransGrid's proposed total repex is a significant step increase of 52 per cent on an average annual basis
- the associated unit costs are reasonable
- TransGrid's proposed forecast is overstated in the order of 29 per cent. We have come to this view on the basis of our acceptance of the systemic issues that EMCa has identified in TransGrid's initial and revised proposals. We maintain our view that it appears that TransGrid has systemically overstated the risks associated with its assets and as a result its proposal is unjustifiably biased upwards. In doing so, we note EMCa also observed that TransGrid has not provided evidence further to its initial proposal that would support its forecast expenditure. In particular, we have reviewed and accept the following initial and further findings that EMCa made in relation to each of TransGrid's four key repex programs:
 - TransGrid has not identified opportunities to defer and/or reduce the scope of projects
 - There is evidence that the quantification of the project risk costs is likely to be overstated
 - TransGrid has not demonstrated that it considers lower cost options to address risks

⁷¹ Energy Markets Reform Forum, *Australian Energy Regulator, NSW electricity transmission revenue reset, AER draft decision and TransGrid revised proposal, A response by the Energy Markets Reform Forum*, January 2015, p. 56; Energy Users Association of Australia, *Submission to TransGrid response to draft determination (2014 to 2019)*, February 2015, p. 9; Origin, *Submission to AER TransGrid draft determination*, February 2015, p. 3.

- There are examples where some relatively new assets are replaced as part of a broader asset replacement project
- There is likely to be the potential to extend the life of some assets by using existing assets as spares
- There is no evidence of performance issues for specific assets that would support a substantial increase in replacement needs; and
- It appears that some assets are targeted for replacement based on replacement technology strategies rather than on asset condition grounds.

Revised proposal

TransGrid's revised proposal is \$1,028.9 million (\$2013–14), or \$26 million (3 per cent) lower than its initial proposal of \$1,054.9 billion (\$2013–14). This reduction in proposed expenditure is largely the result of a reduction in TransGrid's transmission line renewal expenditure. TransGrid has accepted, in part, EMCa's findings in relation to wood pole replacement expenditure. As such, TransGrid's revised proposal included a forecast which reflects the use of wood pole reinforcement in some circumstances.⁷²

AER approach

In this final decision, we applied the following assessment techniques to assess TransGrid's forecast of repex against the capex criteria:

- trend analysis, comparing past trends in total and actual and forecast repex and key programs⁷³
- an engineering/technical review by EMCa.

This assessment approach is consistent with the approach we adopted in our draft decision.⁷⁴

AER assessment

Trends in historical and forecast repex

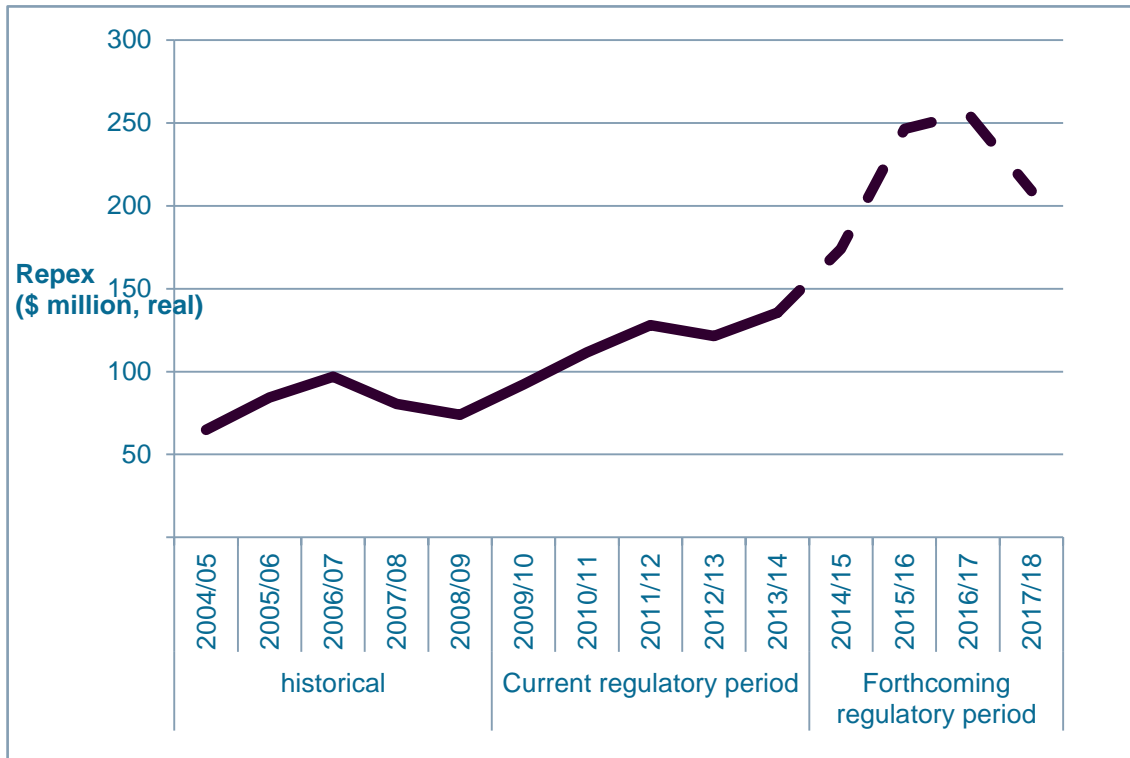
TransGrid's revised forecast average annual repex over the 2014–18 period is \$224.6 million (\$2013–14) per year. This compares to average annual actual repex of \$148 million (\$2013–14) over the 2009–14 period, an increase of 51.8 per cent. In our draft decision we observed that this was a substantial increase compared to the actual capex that TransGrid spent during the 2009–14 period (refer to Figure B-1).

⁷² TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 59.

⁷³ NER, cl.6A.6.7(e)(5).

⁷⁴ AER, *Draft decision, TransGrid transmission determination, 2015–16 to 2017–18, Attachment 6: Capital expenditure*, November 2014, pp. 6–27.

Figure B-1 Repex actual and forecast trend from 2004–2018 (inflation adjusted)



Source: AER analysis

TransGrid, in its revised proposal, considered past expenditure levels are not indicative of its future needs. TransGrid submitted that much of its network was constructed at the same time and is due for retirement in the 2015–18 regulatory control period.

TransGrid also noted that our draft decision cited stable or improving trends in performance indicators to conclude that an increase in repex is not required. TransGrid submitted that the performance indicators referred to are lagging indicators and the information to which we had regard shows them over only a short period of time. TransGrid considered that these indicators are not suitable for forecasting expenditure.⁷⁵

The ENA also expressed concerns with the AER's trend analysis. The ENA submitted that assuming that past repex is indicative of future repex ignores factors such as investment cycle or one-off major projects. The ENA considered that this type of analysis is unlikely to provide a reasonable indication of future capex that reflects the circumstances of network service providers in the next regulatory control period.⁷⁶

⁷⁵ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 45–53.

⁷⁶ Energy Networks Association, *ENA response – AER draft decision for TransGrid*, February 2015, p. 3

The EMRF disagreed with TransGrid's proposal that lagging indicators cannot be used to provide a trend on what is needed in terms of repex. The EMRF submitted that this approach to trend analysis is widely used and is consistent with how firms in the competitive environment address their needs.⁷⁷

We recognise that expenditure trends may have some limitations especially in circumstances where replacement needs may change over time. For example, a service provider may have a lumpy asset age profile or legislative obligations may change over time). In recognising these limitations we have used our trend analysis as a starting point from which we have drawn general observations from the historic trend analysis in relation to repex. Beyond this, we have relied on our further analysis of TransGrid's revised proposal along with the findings from EMCa's engineering/technical review.

TransGrid also referred to concerns in our draft decision about an increase in repex in the 2009–14 regulatory control period corresponding with a decrease in augex as a result of moderating peak demand. TransGrid disagreed that repex and augex are not substitutable. TransGrid submitted that it is not unusual to have some projects that satisfy both augex and repex needs. Where there are both augmentation and replacement drivers TransGrid typically categorises the projects as augmentation. However, if the augmentation driver disappears, TransGrid submitted that the replacement still needs to be undertaken.⁷⁸

TransGrid's comments are supported in AusNet Services' submission to the AER. AusNet Services submitted that a likely explanation for the apparent shift in costs from augex and repex is the relationship between replacement and augmentation. AusNet Services also submitted that service providers will normally seek to incorporate replacement work into a larger augmentation project where possible.⁷⁹

As noted in our draft decision, the drivers of repex and augex are not so similar that we would expect TransGrid's investment planning and asset management practices to take this into account in operating the network. We accept that some projects may have both augex and repex elements. However, we would expect that the primary driver for the project need would determine the nature of the investment driver. Further, at an aggregated level of capex, we consider that where augmentation is no longer required it does not follow that there would be a corresponding increase in repex.

Engineering/ technical assessment

Consistent with our draft decision, we have used EMCa's technical assessment to test whether there is evidence of systemic issues leading to forecasting bias and

⁷⁷ Energy Markets Reform Forum, *Australian Energy Regulator, NSW electricity transmission revenue reset, AER draft decision and TransGrid revised proposal, A response by the Energy Markets Reform Forum*, January 2015, p. 53.

⁷⁸ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 45–53.

⁷⁹ AusNet Services, *TransGrid transmission revenue draft decision 2015–18*, February 2015, p. 2.

overestimation of risk by TransGrid in developing its forecast. We have also used EMCa's review in our assessment of the materiality of any systemic issues identified through a review of specific programs/projects.⁸⁰

As part of our draft decision assessment we engaged EMCa to undertake a review of TransGrid's proposed repex. In particular, we engaged EMCa to undertake an engineering/technical review of TransGrid's forecast repex in order to:⁸¹

- identify any systemic issues in areas of governance and risk management, and forecasting methodology
- if relevant, assess the implications of systemic issues for proposed expenditure taking into account a review of specific projects/programs nominated by us.

Systemic issues may mean that the forecast is materially higher than would be incurred by a prudent and efficient service provider.

Specifically, EMCa assessed whether:⁸²

- TransGrid's proposed forecast repex is a reasonable forecast of the unbiased efficient cost of maintaining performance at the required or efficient service levels
- TransGrid manages risk prudently 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
- TransGrid uses the minimum resources reasonably practical to achieve the capex objectives and maintain the required or efficient service levels such that its costs and work practices are prudent and efficient.

Overall EMCa concluded that the systemic issues identified in its initial report were reflected in a range of biases that led to an overestimation of forecast expenditure.

Taking into account the issues identified in TransGrid's governance framework and forecasting methodology, EMCa further assessed a sample of projects related to the following key programs:

- substation renewal
- secondary systems renewal (i.e. metering, protection and control systems)
- transmission line life extensions; and
- communications upgrades and replacement.

⁸⁰ AER, *Draft decision, TransGrid transmission determination, 2015–16 to 2017–18, Attachment 6: Capital expenditure*, November 2014, pp. 6–31.

⁸¹ AER, *Draft decision, TransGrid transmission determination, 2015–16 to 2017–18, Attachment 6: Capital expenditure*, November 2014, pp. 6–31.

⁸² EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, October 2014.

These key programs accounted for approximately 67 per cent (or \$620.1 million (\$2013–14) of TransGrid's total proposed repex for the 2014-18 period.

EMCa in relation to each of TransGrid's four key repex programs concluded that:⁸³

- opportunities have not been identified to defer and/or reduce the scope of projects
- there is evidence that the quantification of the project risk costs is likely to be overstated
- a consideration of lower cost options to address risks has not been demonstrated
- there are examples where there is the replacement of relatively new assets as part of a broader asset replacement project for some assets
- there is likely to be the potential to extend the life of some assets by using existing assets as spares
- there is no evidence of performance issues for specific assets that would support a substantial increase in replacement needs
- it appears that some assets are targeted for replacement based on replacement technology strategies rather than on asset condition grounds.

We accepted these findings in our draft decision, noting that some of these findings were also consistent with our own analysis of TransGrid's proposed low transmission spans repex.

In its revised proposal TransGrid submitted that while some of EMCa's observations are fair, others reflect errors of fact and insufficient regard to information TransGrid provided to the AER as part of its revenue proposal.⁸⁴ In particular, TransGrid submitted that:

- in relation to its governance and risk management framework, TransGrid has achieved full certification to ISO 55001, which is an internationally recognised standard on asset management. Further, EMCa's observations appear to be based on specific experience of its personnel in asset management rather than addressing whether TransGrid's asset management systems are fit for purpose⁸⁵
- its network investment process does account for interrelationships and synergies through optimisation at all stages of the process which is evidenced in the supporting documentation provided in its revenue proposal⁸⁶
- EMCa's concern that the methodology for quantifying risk is resulting in a strong overestimation of risk does not affect TransGrid's forecast capex

⁸³ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, October 2014.

⁸⁴ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 53.

⁸⁵ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 54.

⁸⁶ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 55.

- it does not consider that EMCa's concerns regarding options analysis are well founded.⁸⁷

TransGrid's specific comments, and EMCa's response, are detailed below. We have reviewed both the submissions made by TransGrid and the analysis by EMCa and have accepted EMCa's findings for the reasons discussed below.

Governance and management framework review

In its revised proposal, TransGrid submitted that EMCa's initial report made a number of observations about its governance and management framework which appear to be based on specific previous experience of EMCa personnel. In particular, TransGrid relies on a report by its consultant, AMCL.⁸⁸ AMCL suggests that that some aspects of EMCa's report are more relevant to distribution assets and are therefore inappropriately justified. In its submission, the Energy Networks Association (ENA) also suggested that EMCa's report applied distribution focused management strategies and was, therefore, inadequate.⁸⁹

EMCa noted in its updated report that it had included examples of management strategies that it considered a prudent and efficient service provider would consider in its options analysis. While some of these may be more prevalent in DNSPs, EMCa considered they can also be applied to TNSPs. For example:⁹⁰

- *Use of system wide performance indicators:* EMCa considered that indicators that provide a summary of the non-financial impact of expenditure are essential to both understanding and determining an optimal expenditure forecast. Such indicators, it submitted, are necessary to independently support the need for expenditure. TransGrid stated that many renewals have been delayed due to the high number of growth related projects over the last 10 years. However EMCa did not observe performance trends that supported TransGrid's submission. Nor did it observe any evidence of any corresponding influence of such decisions on the repex forecast, such as an increase in safety risk or reduction in security of the network. In the absence of any further information from TransGrid, EMCa noted that it could only report this absence of outcome performance indicators in terms of cost and risk. EMCa further submitted that the performance information is essential to ensure an appropriate optimal outcome is achieved from a top-down review.
- *Use of spares:* AMCL contended that holding spare transformers to replace failed transformers is not an appropriate strategy for transmission assets. EMCa agreed that holding spare transformers is not appropriate in all situations. However it considered that there are cases where the holding of strategic spares is logical. EMCa stated that it did not see sufficient consideration of the hierarchy of controls

⁸⁷ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 57.

⁸⁸ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, Appendix E.

⁸⁹ ENA, *ENA response – AER draft decision for TransGrid*, February 2015, p. 3

⁹⁰ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, pp. 34–37.

to mitigate the identified risks. EMCa suggested that if TransGrid did not consider the use of a spare transformer acceptable, it should consider the replacement of critical assets and evaluation in the context of its ability to defer a much larger replacement project.

- *Wood pole nailing*: in its initial report, EMCa included reference to wood pole reinforcing (or nailing) as an example of risk mitigation options that could be considered in TransGrid's options analysis. EMCa noted that it would expect that a prudent and efficient service provider would consider targeted management options including consideration of practices used by other Australian service providers. This is now evidenced in TransGrid's revised proposal where TransGrid has subsequently proposed to adopt targeted options for two of the transmission lines proposed for wood pole replacement.
- *Use of condition data*: TransGrid stated that the condition based management approach using health indices and failure curves outlined in EMCa's initial report is typically used in distribution networks. However, EMCa noted that TransGrid had considered and trialled the use of health indicators and failure curves in 2008 and found that the results were similar to those obtained using its own approach and thresholds. EMCa also submitted that, in recent reviews in other Australian transmission businesses, the AER has observed that the use of condition based maintenance and replacement programs prioritised by risk assessments is a standard approach. EMCa has also observed its use in overseas jurisdictions.

In its submission to the AER, the CCP also agreed with the methods under which EMCa undertook its review. The CCP stated that the EMCa review tested TransGrid's repex proposals against the discipline that prudent asset intensive entities (such as service providers) apply to their capital investment decisions.⁹¹

TransGrid also submitted that it has achieved full certification to ISO 55001 for its asset management systems and process. That certification found TransGrid's asset management systems and processes were "fit for purpose".⁹² However, EMCa noted that this certification indicates that TransGrid complies with the requirements of ISO 55001, which involves neither an assessment against industry practice or consideration of the objectives of the NER and the NEL. Further, as detailed earlier in this Attachment, EMCa also noted that the ISO 55001 audit conducted by AMCL confirmed EMCa's own observations regarding TransGrid's risk management processes.⁹³

⁹¹ Consumer Challenge Panel, *CCP submission, AER draft TransGrid determination, TransGrid revised revenue proposal*, February 2015, p. 23.

⁹² TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 54.

⁹³ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 16.

Top-down assessment

Our draft decision outlined concerns regarding the absence of a top-down assessment by TransGrid as part of developing the capex forecast. Our further considerations of this issue are also discussed in earlier in this Attachment.

In its revised proposal, TransGrid did not accept that the absence of a top-down assessment indicated that its forecasts are overstated. It submitted that its network investment process accounts for interrelationships and synergies through optimisation practices at all stages of the process.⁹⁴

In its updated report, EMCa considered that TransGrid's revised proposal had not addressed its concerns regarding an inadequate top-down assessment and focus at the individual project and program level. In particular, EMCa noted that TransGrid had not reviewed its underlying determination of risk scores. EMCa therefore considered that its concerns regarding TransGrid's overestimation of risk have not been addressed.

EMCa also noted that when the dominant risk is used (rather than an aggregation of all risks) to produce the same top-down assessment,⁹⁵ a different distribution of projects is generated than proposed. Some projects classified as being below the draft decision repex amount by TransGrid were of a higher risk than those above the repex amount. That is, TransGrid was proposing to replace assets that were less risky when assessed using risk aggregation, rather than replacing other, riskier assets. EMCa reiterated its initial concern that TransGrid's approach means that the highest risk projects may not be appropriately prioritised.

EMCa also noted that it did not see evidence of any constraints being applied to assess the risk tolerance of the proposed expenditure, or reference to an alternate outcome measure, as a part of TransGrid's top-down review.⁹⁶

The Energy Users Association of Australia (EUAA) also outlined concerns regarding TransGrid's lack of top down analysis. Amongst its concerns were that TransGrid's approach will tend to give a higher replacement answer than should be applicable.⁹⁷ The EMRF considered that the top-down work done by EMCa provided a sound basis to assess TransGrid's cost forecast.⁹⁸

⁹⁴ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 55.

⁹⁵ This is referred to by TransGrid as the 'conservative risk assessment'.

⁹⁶ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 10.

⁹⁷ Energy Users Association of Australia, *Submission to TransGrid response to draft determination (2014 to 2019)*, February 2015, p. 7.

⁹⁸ Energy Markets Reform Forum, *Australian Energy Regulator, NSW electricity transmission revenue reset, AER draft decision and TransGrid revised proposal, A response by the Energy Markets Reform Forum*, January 2015, p. 53.

Methodology for quantifying risk

In response to concerns set out in EMCa's initial report, TransGrid submitted that it has recalculated the values of each project using the method proposed by EMCa in order to check the sensitivity of its proposed portfolio to the values of risk. That is, TransGrid submitted that it used the single value of the maximum of the safety, reliability, or environmental risk. TransGrid submitted that, using the revised values, the full portfolio is still required.⁹⁹

TransGrid also did not consider that its risk assessment was undertaken at too high a level to identify meaningful risk management actions. This is because the risks were based on detailed condition assessments of the relevant assets relating to each need. TransGrid also noted that the effectiveness of current risk mitigation controls was considered in its risk assessments.¹⁰⁰

EMCa tested TransGrid's claims that when changes are made to the risk assessment method to address concerns highlighted in its initial report there are no changes to the capital program requirements. EMCa observed that:¹⁰¹

- the projects appear to have been assessed against the corporate risk framework
- there are 81 projects comprising 58 per cent of the expenditure forecast (\$617 million) identified as 'medium' risks
- there is a difference in the classification of risks between the corporate risk management framework and the Network Investment Risk Assessment Methodology (NIRAM), in relation to 'low', 'medium', and 'high' risks.

EMCa noted that the NIRAM has been used in the development of supporting project information. EMCa submitted that when the same information (currently mapped to the corporate risk framework) is mapped to the NIRAM framework, it observed that 46 projects comprising 17 per cent of the expenditure forecast (\$178 million) are reclassified from 'medium' to 'low' risk based on maximum risk value. This is consistent with the outcome reached in EMCa's initial report. EMCa therefore considered that a proportion of projects may be subject to overestimation of risk and could be considered for deferral.¹⁰²

EMCa did not consider TransGrid's assessment of corporate risk and NIRAM using different risk frameworks a fundamental issue. Rather, EMCa noted that the underlying issues relate to the consistent use/application of different risk frameworks, the extent to which the different frameworks produce different results and how these results are

⁹⁹ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 56.

¹⁰⁰ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 56.

¹⁰¹ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 11.

¹⁰² EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 11.

subsequently interpreted and incorporated into the repex forecast as a component of TransGrid's revised proposal.¹⁰³

EMCa noted that there appeared to be a material difference in risk scores arising from the application of the different risk frameworks. EMCa was concerned that the application of the corporate risk matrix can result in a higher risk score, with an associated upward bias on forecast expenditure. EMCa separately observed that many of the projects did not contain a robust cost-benefit analysis to justify the timing and scope of work. In the absence of better information, EMCa considered that this led to over-forecasting expenditure needs for the regulatory control period.¹⁰⁴

EMCa also noted TransGrid's statement that EMCa has placed too much emphasis on the dollar value of risk in the decision making process. EMCa noted that TransGrid has used the risk score (\$ value of risk) to support its claims of a top-down review process and therefore these statements are in conflict.¹⁰⁵ The CCP also noted what it described as TransGrid's attempt to downplay the importance of its risk cost assessment. The CCP submitted that this contradicts TransGrid's previous claims regarding the robustness of its risk cost approach and demonstrates a major disconnect between TransGrid's governance processes and what happens in practice.¹⁰⁶

While acknowledging that the risk assessment is not the determining factor in proceeding with a project, EMCa concluded that it remains of the view that there is sufficient evidence to conclude that a bias exists in the application of risk assessment and the development of the expenditure forecast.¹⁰⁷

Need identification and option evaluation

TransGrid in its revised proposal responded to EMCa's initial conclusion that options analysis was limited to large discrete options. TransGrid submitted that, in most cases, the large discrete options to which EMCa was referring were developed by consolidating a range of replacement plans that apply to specific families of equipment, for example, of the same make, model and type. TransGrid suggested that EMCa has not had regard to the documentation submitted to the AER as part of its initial revenue proposal.¹⁰⁸

TransGrid also submitted in its revised proposal that, in considering the most economically efficient option to meet each need, it considers 'piecemeal replacement'

¹⁰³ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 12.

¹⁰⁴ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 12.

¹⁰⁵ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 13.

¹⁰⁶ Consumer Challenge Panel, *CCP submission, AER draft TransGrid determination, TransGrid revised revenue proposal*, February 2015, p. 24.

¹⁰⁷ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 15.

¹⁰⁸ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 56.

or 'selected plant replacement' options that comprise the minimum replacement of equipment needed to address the specific risks that have been identified. Where TransGrid has selected an option other than a 'piecemeal replacement' option, it is because that option has been demonstrated to be more economically efficient.¹⁰⁹

EMCa has subsequently clarified in response to TransGrid's revised proposal that it considers that options to address or mitigate identified risks were not fully explored or included in the options analysis. For example EMCa submitted that:

- whilst the piecemeal option for substation renewal was described as comprising 'the minimum replacement of equipment needed to address the specific risks that have been identified,' the analysis of the identified risks or changes in condition did not form part of the justification to confirm the selected option. If the identified equipment was not tested against changes in the identified risks, it is unknown whether it is prudent and efficient; and
- the Optical Power Ground Wire (OPGW) strategy (\$112 million), the largest component of the communications replex category, reflected a combination of multiple projects. Whilst some staging and interdependencies were included in the supplied documentation, the options analysis was limited to a single recommended option, when compared with the 'do nothing' option. EMCa did not consider this example demonstrates robust options analysis and assessment.

In its submission, the EMRF also raised concerns about TransGrid's use of large discrete options. The EMRF noted that TransGrid considered EMCa's observation flawed as green-field options provide more efficient outcomes than brownfield options. The EMRF submitted that its members tend to implement brownfield options as a matter of course as the overall costs are more efficient and might use green-field options when a new production line is to be implemented.¹¹⁰

EMCa previously commented in its initial assessment that TransGrid's expenditure forecast is dominated by what appeared to be a technology driven strategy, and that the strategy would deliver increased benefits without sufficient justification and inclusion of the associated benefits.¹¹¹ AMCL stated that in some cases substantial technology upgrades are required to:

- enable more efficient management of the network
- prevent technological obsolescence and associated costs and risks.

¹⁰⁹ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 56.

¹¹⁰ ERMF, *Australian Energy Regulator, NSW electricity transmission revenue reset, AER draft decision and TransGrid revised proposal, A response by the Energy Markets Reform Forum*, January 2015, p. 54.

¹¹¹ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 15.

AMCL submitted that such upgrades can be expected to realise value in a more sustainable and reliable manner over a longer period.¹¹² However EMCa considered that it has not been provided with additional information to justify these submissions.

Review of proposed replacement expenditure programs

TransGrid also raised concerns with EMCa's findings related to its review of the four key replex programs (substation renewals, transmission line renewals, secondary system renewals and communications projects).

Substation renewals

TransGrid in its revised proposal has proposed \$273.0 million of replex to renew a number of substations and to commence work on a number of substations in the 2014–18 period. This is an average annual increase of 29.9 per cent compared to the 2009–14 period. TransGrid submitted that the scope of renewal comprises the most economically efficient works required to restore the condition of these substations. Depending on the particular condition issues at each substation, the required works may consist of selected plant replacements, in-situ rebuilds or rebuilds on different sites.¹¹³

TransGrid included a revised expenditure forecast of \$273 million in its revised proposal which compares with \$268.6 million in its initial proposal. TransGrid has not explained the difference between the forecasts.¹¹⁴

TransGrid in its revised proposal disagreed with the reductions in scope and deferrals set out in EMCa's initial report. In its revised proposal, TransGrid provided new information regarding substation renewal projects that were reviewed in EMCa's initial report. TransGrid considered that EMCa's findings for the substation renewals expenditure forecast was unfounded and unreasonable.¹¹⁵

EMCa reviewed the new information provided by TransGrid and updated its assessment of the sample projects assessed in its initial report. Namely:

- for the Canberra substation project, the secondary works SSB solution would be a preferred solution due to the condition of control cables; and
- some additional environmental, fencing, auxiliary services and other civil works in projects are likely to be prudent.

¹¹² AMCL, A report for TransGrid from AMCL, Review of proposed replacement capex in TransGrid revenue proposal 2014 – 2019, AMCL review of EMCa's report to the Australian Energy Regulator, December 2014, p. 4.

¹¹³ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 72–73.

¹¹⁴ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 59–60; TransGrid, *Revised revenue proposal 2014/15 – 2017/18, Appendix F: Response to EMCa report*, January 2015.

¹¹⁵ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 57–58; TransGrid, *Revised revenue proposal 2014/15 – 2017/18, Appendix F: Response to EMCa report*, January 2015.

EMCa considered that its initial assessment and observations of the remaining sample of projects should remain unchanged.

EMCa considered that the systemic issues for substation renewals identified in its initial report have not been adequately addressed by TransGrid in its revised proposal. EMCa concluded that TransGrid has not provided evidence of sufficient options analysis and consideration of alternate solutions that it had explored, including opportunities for deferrals. EMCa has relied on its own experience in undertaking its assessment.¹¹⁶

EMCa concluded that its assessment of the impact of systemic issues on substation renewal expenditure remains unchanged from its initial report. EMCa submitted that TransGrid's overestimation of expenditure is in the range of 10 to 20 per cent. EMCa considers that TransGrid's repex estimate for substation renewal should be reduced by this amount so that it reflects that of a prudent and efficient service provider.

Transmission line renewals

TransGrid in its revised proposal has proposed \$68.5 million of repex for transmission line life extension works in the 2014–18 period. This is an average annual increase of 123.2 per cent compared to the 2009–14 period. TransGrid has assessed the condition of a number of coastal steel tower transmission lines as requiring renewal. TransGrid has also assessed a number of wood pole transmission lines as requiring renewal.¹¹⁷

The revised forecast is \$68.5 million in TransGrid's revised proposal compared with \$105.3 million in its initial proposal.¹¹⁸ TransGrid submitted in its revised proposal that the basis for reductions in scope and deferrals set out in EMCa's initial findings were not supported. Nonetheless, in its revised proposal, TransGrid provided new information regarding transmission line renewal projects reviewed in EMCa's initial assessment. In particular, TransGrid has reconsidered its wood pole replacement forecast, and considers that a targeted option may be more suitable for two of the four lines.¹¹⁹ TransGrid has updated its repex forecast reducing it by \$36.8 million over the four year forecast period. The remainder of TransGrid's forecast is materially unchanged from its initial proposal.

EMCa in its updated assessment considered that TransGrid has taken steps to address the systemic issues that were identified in its initial proposed wood pole replacement expenditure. However, EMCa also considered that the impact of systemic issues is likely to have resulted in an overestimation of the remaining expenditure. When applied to the total transmission line renewal forecast, EMCa concluded that the

¹¹⁶ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, pp. 19–20.

¹¹⁷ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 74–75.

¹¹⁸ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 58–59; TransGrid, *Revised revenue proposal 2014/15 – 2017/18, Appendix F: Response to EMCa report*, January 2015.

¹¹⁹ Lines 99F and 99J.

impact of the systemic issues is likely to have resulted in an overestimation of this expenditure category in total of between 5 and 15 per cent.¹²⁰

Secondary system renewals

TransGrid in its revised proposal has proposed \$149 million of repex relating to its control, metering and protection systems (secondary systems) in the 2014–18 period. This is an average annual increase of 157.5 per cent compared to the 2009–14 period. The secondary system renewal work includes:

- protection – to have the majority of electromechanical relays replaced by 2030 and the discrete component and early microprocessor protection by 2025
- control systems – to replace all discrete component control assemblies as a matter of urgency and all early microprocessor type control systems by 2024
- meters – to replace remaining electromechanical, solid state and early microprocessor meters by the end of the 2014–18 period.¹²¹

TransGrid included an expenditure forecast of \$149.0 million in its revised proposal which compares with \$148.6 million in its initial proposal. TransGrid has not explained the small difference between the forecasts.¹²²

TransGrid submitted in its revised proposal that the basis for reductions in scope and deferrals set out in EMCa's initial assessment were not supported. TransGrid provided new information regarding secondary systems renewal projects reviewed in EMCa's initial assessment. TransGrid submitted that EMCa's initial assessment included incomplete, inaccurate or misleading assertions, having regard to the information provided to the AER.¹²³

EMCa in its updated assessment noted that the information supplied by TransGrid included assessments for condition, supportability and compliance. However, EMCa remains concerned that the objective to change technologies by a target end date is likely to drive an aggressive program and less likely to consider how condition and risk is changing over time. EMCa considered that there is insufficient information available to justify the level of work proposed in the 2014–18 period, including consideration of reasonable deferrals.¹²⁴

¹²⁰ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, pp. 23–24.

¹²¹ TransGrid, *Management system document, Network renewal, maintenance and disposal strategy and objectives – substation automation systems*, 20 May 2014, pp. 74–75.

¹²² TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 59–60; TransGrid, *Revised revenue proposal 2014/15 – 2017/18, Appendix F: Response to EMCa report*, January 2015.

¹²³ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 59–60; TransGrid, *Revised revenue proposal 2014/15 – 2017/18, Appendix F: Response to EMCa report*, January 2015.

¹²⁴ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 21.

EMCa updated its assessment of the sample projects to take account of the additional information provided by TransGrid. Namely:

- ANM substation: EMCa found that the new information regarding the assessment of an immediate risk with critical clearance times improves the justification for this work; and
- Sydney West substation: EMCa found that TransGrid's clarification of the condition of the secondary cables improves the justification of this work.

Based on its assessment of the new information provided by TransGrid, EMCa considered that a reduced assessment to that observed in its initial assessment was appropriate. This is because the additional information led to a reassessment of the associated risk and opportunity for further optimisation within this program. EMCa concluded that the impact of the systemic issues identified is likely to result in an overestimation of secondary system renewal expenditure of between 15 and 25 per cent.

Communications projects

TransGrid has proposed \$100.7 million of repex for communications upgrade and replacement projects in the 2014–18 period. This is an average annual increase of 147.9 per cent compared to the 2009–14 period. TransGrid submitted that its communications network needs to support the communication requirements of the technologies being introduced within the substation environment. Further, many of TransGrid's corporate systems require access from the field.¹²⁵ TransGrid's expenditure forecast of \$100.7 million in its revised proposal compares with \$97.6 million in its initial proposal. TransGrid has not explained the small difference between the forecasts.

TransGrid submitted in its revised proposal that the basis for reductions in scope and deferrals set out in EMCa's initial assessment were not supported. In its revised proposal, TransGrid did not provide any new information regarding communications upgrade and replacement expenditure. TransGrid noted that one of the key outcomes of the OPGW strategy is to establish fault tolerant communications rings which cannot be established by individual projects. The OPGW project is the largest component of the forecast communications expenditure.¹²⁶

In response EMCa noted that the 'project need' referred to the establishment of protected rings. EMCa further noted that that a large component of the proposal was dedicated to developing new capacity, described as establishing high capacity

¹²⁵ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 76–77.

¹²⁶ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, pp. 59–60; TransGrid, *Revised revenue proposal 2014/15 – 2017/18, Appendix F: Response to EMCa report*, January 2015.

telecommunications rings, so as to gain the full benefit of new technologies, rather than mitigate any identified risks.¹²⁷

EMCa also noted that the OPGW strategy was one of five projects where TransGrid state that the annualised project/program cost of risk mitigation is higher than the annualised risk value for projects/programs with a medium annualised risk value.¹²⁸ TransGrid stated that the risk score alone does not fully reflect the benefits associated with this particular project. However, EMCa submitted that it has not seen evidence of the justification of the benefits that it would expect for a project of this size.

EMCa also found evidence that, whilst these projects were considered as part of a broader strategy, there was some reference to staging of projects beyond the 2014–18 period. EMCa considered that this evidence undermines TransGrid's argument that these projects need to be included in its the forecast for the 2014-18 period.¹²⁹

EMCa reiterated the position reached in its initial assessment that the benefits and timing of benefits associated with this strategy have not been adequately demonstrated or included in the justification of the expenditure forecast and noted that the expenditure forecast is not proven.

EMCa considered that TransGrid had not provided additional information in which to revise the findings set out in its initial report. EMCa concluded that the impact of systemic issues on communications projects expenditure is likely to have resulted in an overestimation of the expenditure forecast of between 50 and 60 per cent.

Other repex

In our draft decision we reduced TransGrid's proposed repex that was not covered by the four key programs. We did so on the basis that EMCa had identified systemic issues that it considered lead to an overestimation of risk and therefore proposed repex.

TransGrid in its revised proposal submitted that other categories of proposed repex are different in nature to the categories reviewed by EMCa. TransGrid submitted that EMCa's assertion that options analysis was limited to large, discrete options is not relevant to these types of projects. TransGrid considers that EMCa's findings on its four main categories of review are not applicable to other categories of repex.¹³⁰

EMCa considered that a reasonable estimate of the level of underlying impact of the systemic issues in the other items of repex could be considered commensurate with

¹²⁷ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, pp. 24–25.

¹²⁸ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 25.

¹²⁹ EMCa, *Technical review of revenue proposal, Review of proposed replacement capex in TransGrid revenue proposal 2014–2019, Report to Australian Energy Regulator*, April 2015, p. 25.

¹³⁰ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 61.

the impact identified in its assessment of between 15 and 25 per cent. EMCa considered that the absence of an adequate top-down assessment and challenge process, overestimation of the identified risk and associated over-forecasting bias are equally applicable to other parts of the repex forecast.

Accordingly, EMCa considered that the impact of these systemic issues is likely to be at a similar level to the underlying impact observed across the four project groupings.

Security and compliance related capex

TransGrid has proposed \$130.3 million of capex for security and compliance capex in the 2014–18 period. This is an average annual increase of 96 per cent compared to the 2009–14 regulatory control period. TransGrid submitted that security and compliance expenditure is driven by external requirements such as legislation, jurisdictional requirements or particular standards.¹³¹

Around two thirds of TransGrid's proposed security and compliance expenditure is to remediate low spans on transmission lines. The other third is for various other types of projects.¹³² We have assessed these two components separately.

Security and compliance expenditure (excluding low span capex)

TransGrid has proposed \$48.8 million (\$2013–14) of capex for security and compliance capex (excluding low span expenditure) in the 2014–18 period.

In its revised proposal, TransGrid noted that the AER proposed to reduce security and compliance expenditure other than for low spans, by 30 per cent, commensurate with our position for repex. TransGrid submitted that security and compliance expenditure includes some replacement work and some works other than replacement. TransGrid submitted that this expenditure is predominately characterised by projects which are driven by a combination of augmentation and replacement needs.¹³³ To the extent that part of this expenditure is repex, it did not accept the reductions made by the AER on the basis of EMCa's report as it considered EMCa's recommendations are unsupported by evidence.¹³⁴ It further noted that, even if there were merit in the AER's reductions to repex, to the extent that this expenditure also includes auxex such reductions would not similarly apply to that part of the expenditure.¹³⁵

Apart from the above information, TransGrid provided no material to demonstrate that this security and compliance expenditure is other than repex. It outlined only the drivers of this expenditure.¹³⁶ We consider that security and compliance expenditure has the same drivers as repex. We also consider that TransGrid has provided no

¹³¹ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 61.

¹³² TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 61.

¹³³ TransGrid, response to information request (R3) Public, 12 February 2015.

¹³⁴ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 68.

¹³⁵ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 69.

¹³⁶ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015, p. 61.

evidence that any part of this expenditure is augex. This aspect of its submission was not substantiated in its revised proposal.

Given our acceptance of EMCa's findings regarding systemic overestimation of risk we have reduced this expenditure in line with our overall expenditure reductions for repex.

An overview of EMCa's findings and our reasons for accepting them are set out in section A.3 of the draft decision and this final decision.

Transmission line low spans

On review of TransGrid's revised proposal, we consider that transmission line low span expenditures is repex. It has the same driver as other elements of the network that need to be replaced to meet supply, safety and other regulatory obligations. Consistent with this, we have not separately forecast a transmission line low span amount.

However, we have considered a portion (\$44.8 million) of TransGrid's proposed low span expenditure together with TransGrid's other repex, in order to arrive at our forecast of overall repex that meets the capex criteria. We did not include a further \$36.7 million of TransGrid's proposed low span expenditure for consideration because:

- It was tied to the Network Capability Component (NCIPAP) expenditure which is a component of the STPIS.
- There were apparent errors in the calculation or timing of proposed expenditure.
- TransGrid proposed NCIPAP-related expenditure and/or augex which was not supported by a regulatory investment test for transmission (RIT-T).

We have identified similar flaws in the forecasting method for the expenditure proposed by TransGrid for low spans as for the other repex categories. Namely, the risk is overestimated and the options analysis is limited and results in an upwardly biased cost. These findings are discussed in more detail below.

In its initial proposal TransGrid forecast \$81.5 million of expenditure over the 2014-18 period to address transmission line spans that do not meet their original design clearances between the transmission line conductors and the ground and do not meet the minimum ground clearance required by AS7000.¹³⁷

In the draft decision, we noted that ground clearance is not an absolute and is impacted by a number of variables which will change over time (e.g. power flow, air temperature, land use).¹³⁸ We did not include TransGrid's proposed expenditure in our capex forecast. On the basis of sampling 23 per cent of TransGrid's proposed expenditure we found:¹³⁹

¹³⁷ TransGrid, *Revenue proposal*, May 2014: CAM V3.11_Inputs.xlsm.

¹³⁸ AER, *Draft decision TransGrid transmission determination 2015-18*, Attachment 6, November 2015, p.42.

¹³⁹ AER, *Draft decision TransGrid transmission determination 2015-18*, Attachment 6, November 2015, pp.42-45.

- Large variations in clearance deviations. We noted that it was not clear whether this was due to spans being built to previous standards. We also noted that we are unaware of any requirement to retrospectively meet new Australian standards.
- TransGrid has been able to address the highest priority low spans through the use of relatively low cost measures such as fencing, signage or landscaping.
- TransGrid provided limited information to support its assessments of non-compliance with specific obligations or the relevance of the standard applied. We therefore do not have clear evidence that any non-compliance exists or the extent of any non-compliance.
- In undertaking options analysis, TransGrid did not fully evaluate the various options. In particular, TransGrid appeared to choose higher cost solutions, without evaluating the relative efficiency of the various options. We assessed that the lack of consideration of lower cost options and TransGrid's objective to fully eliminate the low span hazard, led to a bias in the options selected and hence the estimated costs. We noted that this method of option selection for low spans was consistent with the method it applied for repex.
- TransGrid's risk assessment methodology did not accurately reflect a reasonable range of consequences along with their likelihoods of being realised. We found a tendency to overstate event frequency and consequence in the application of its methodology.

We considered the efficiency of the transmission line low spans expenditure, taking into account the residual risk associated with an option. Using Marsh's insurance report, we estimated a total present value of the expected cost of risk per span of about \$5,700. For the 890 low spans targeted for remediation in the sample under review, we assessed that an upper limit present value estimate of about \$5 million is efficient for the sample reviewed.¹⁴⁰

In the draft decision we therefore included \$12.2 million in our alternative estimate. This reflected a reduction of 85 per cent on the expenditure proposed by TransGrid.¹⁴¹

In its revised proposal, TransGrid did not accept our draft decision. TransGrid made various submissions on each of our reasons and we have reviewed each of these below. In particular, we considered TransGrid's submissions on the drivers for low spans expenditure and taking these into account, have modified the amount of TransGrid's proposed low spans expenditure we included in its proposed total repex. We then considered the adjusted total repex amount to make our alternative total repex estimate, consistent with the capex criteria.

TransGrid, in its revised proposal, included expenditure which related to projects it has proposed to undertake under the NCIPAP of the STPIS that will apply to it in the next

¹⁴⁰ AER, *Draft decision TransGrid transmission determination 2015-18*, Attachment 6, November 2015, pp.45-46.

regulatory period. We reviewed this proposed expenditure. The application of the STPIS to TransGrid is explained in Attachment 11 of this final decision. In the following section, we consider the inter-relationship between the STPIS and TransGrid's proposed forecast for line spans capex. We also reviewed expenditure where:

- There were apparent errors in the calculation or timing of TransGrid's proposed expenditure.
- TransGrid proposed expenditure for NCIPAP related and/or augmentation work on the 'Snowy to Yass/Canberra Low Span Remediation' project.

NCIPAP-related expenditure

In its revised proposal, TransGrid has distinguished spans on the basis of high priority, normal priority and NCIPAP driven spans. For those identified as NCIPAP driven spans, TransGrid justifies the low span capex on those projects on the basis that remediation is required in order to realise the market benefits identified by the NCIPAP. For various projects TransGrid submitted that:

All low spans are to be remediated to achieve the market benefits identified by the NCIPAP. ... Lines 01 and 2 are listed in the NCIPAP for Dynamic Line Rating installation, therefore all low spans must be remediated.¹⁴²

A dynamic line rating system is being planned for lines 83, 84, 85, 86 and 88. The requirement for these systems is based on getting additional power flows from the current line temperature limit that leads to the book rating, not to manage low spans to maintain the existing rating.¹⁴³

Line 993 has been identified as requiring the full line rating as there is a project in the Network Capability Incentive Project Action Plan (NCIPAP) for upgrading of terminal equipment to remove a constraint. All low spans need addressing to allow full benefits of the NCIPAP task.¹⁴⁴

Line 993 has been identified as requiring the full line rating as there is a project in the Network Capability Incentive Project Action Plan (NCIPAP) for upgrading of terminal equipment to remove a constraint. All low spans need addressing to allow full benefits of the NCIPAP task. Line 992 is on the same 132kV link between Wagga and Yass as 993, so if the full rating is required on 993 then it is also required on 992.¹⁴⁵ Lines 993 and 99P have been identified in the TransGrid Network Capability Incentive Project Action Plan (NCIPAP) to have line constraints removed. These two lines are on the same 132kV link between

¹⁴² TransGrid, Revenue Proposal, May 2014: 0533 Snowy-Yass Canberra Line Remediation_Public.pdf, p.8.

¹⁴³ TransGrid, Revenue Proposal, May 2014: 0593 Northern Tower Lines Low Spans_Public, p.41.

¹⁴⁴ TransGrid, Revenue Proposal, May 2014: 0131 Line 993 Gadara to Wagga Pole Replacement_Public.pdf, p.7.

¹⁴⁵ TransGrid, Revenue Proposal, May 2014: 0129 Line 992 Burrinjuck to Tumut Low Spans Remediation_Public.pdf, p.7.

Wagga and Yass as Line 992. Hence, all low spans on Line 922 are required to be remediated to ensure the aims of the NCIPAP are achieved.¹⁴⁶

This plan identifies that Dynamic Line Rating is required on the 9 line. This indicates that the full transfer capacity of the line is required.¹⁴⁷ A dynamic line rating system is being planned for line 9. The requirement for this system is based on getting additional power flows from the current line temperature limit that leads to the book rating, not to manage low spans to maintain the existing rating.¹⁴⁸

A dynamic line rating system is being planned for lines 966, 967, 969, 96R and 96T. The requirement for these systems is based on getting additional power flows from the current line temperature limit that leads to the book rating, not to manage low spans to maintain the existing rating.¹⁴⁹

Lines 4 and 5 are listed in the NCIPAP for Dynamic Line Rating installation, therefore all low spans must be remediated.¹⁵⁰ This plan notes that the 4 and 5 lines should have the installation of a Dynamic Line Rating system to achieve market benefits. These market benefits can only be achieved if all low spans are remediated.¹⁵¹

Lines 01 and 2 are listed in the NCIPAP for Dynamic Line Rating installation, therefore all low spans must be remediated.¹⁵²

We consider that if the NCIPAP market benefits depend on the remediation of the low spans then it should form part of TransGrid's NCIPAP proposal. As such, the low span expenditure should have been included in the cost benefit analysis for the proposed NCIPAP project expenditure under the STPIS if this was considered by TransGrid to be necessary to it realising the benefits of the NCIPAP projects. If TransGrid had adopted that course, the STPIS provides that cost of priority projects must not be included in proposed total forecast opex or capex, and we would not therefore consider such expenditure as part of our capex assessment.¹⁵³

As TransGrid has not adopted that course, we are required to consider this proposed capex but must have regard to whether the proposed capex forecast is consistent with incentive schemes that will apply to TransGrid, including the STPIS.¹⁵⁴ We do not consider that the NCIPAP expenditure proposed here as part of TransGrid's forecast capex is consistent with those NCIPAP projects proposed by TransGrid and accepted

¹⁴⁶ TransGrid, Revenue Proposal, May 2014: 0129 Line 992 Burrinjuck to Tumut Low Spans Remediation_Public.pdf, p.48.

¹⁴⁷ TransGrid, Revenue Proposal, May 2014: 0597 Southern Region Tower Lines Low Spans_Public.pdf, p.10.

¹⁴⁸ TransGrid, Revenue Proposal, May 2014: 0597 Southern Region Tower Lines Low Spans_Public.pdf, p.42.

¹⁴⁹ TransGrid, Revenue Proposal, May 2014: 0594 Northern Pole Lines Low Span_Public.pdf, p.43.

¹⁵⁰ TransGrid, Revenue Proposal, May 2014: 0532 4-5 Yass - Marulan 330kV Line Remediation_Public.pdf, p.42.

¹⁵¹ TransGrid, Revenue Proposal, May 2014: 0532 4-5 Yass - Marulan 330kV Line Remediation_Public.pdf, p.42.

¹⁵² TransGrid, Revenue Proposal, May 2014: 0533 Snowy - Yass - Canberra Line Remediation_Public.pdf, p.8.

¹⁵³ STPIS version 4.1, clause 5.2(q)

¹⁵⁴ NER, clause 6A.6.7(8).

by us. This is because if the expenditure was necessary for TransGrid to realise the market benefits identified by the NCIPAP then it would have been identified in the cost benefit analysis for those NCIPAP projects. Given this inconsistency, we have not included expenditure which TransGrid identified as NCIPAP expenditure in TransGrid's total repex amount for our assessment. The amount that TransGrid identified as NCIPAP expenditure was \$19.0 million.

Apparent errors in the calculation or timing of TransGrid's proposed expenditure

For the project entitled '0597 Southern Region Tower Lines' TransGrid included 16 spans on circuit 9 for remediation on the basis that greater than 50 per cent of the line had high priority or normal priority low spans to be remediated.¹⁵⁵ However, TransGrid only identified 7 normal priority low spans.¹⁵⁶ As this is less than 50 per cent of all low spans and there was no other evidence provided to support the inclusion of the additional spans in this regulatory period, we have excluded the expenditure for 9 spans. TransGrid identified this expenditure to be \$0.6 million.¹⁵⁷

For the project entitled '97G Line Murray to Guthega Low Spans Remediation' we asked TransGrid to identify the number of high, normal, greater than 50 per cent and NCIPAP spans. TransGrid did not identify any spans and indicated that '[t]his project is essentially complete anyway'.¹⁵⁸ On the basis of this response we have excluded the \$0.9 million of expenditure proposed by TransGrid for this project.

NCIPAP related or augmentation expenditure which was not supported by a regulatory investment test for transmission (RIT-T)

For the project entitled 'Snowy to Yass/Canberra Low Span Remediation' TransGrid proposed \$16.1 million for Terminal Palm installation on Line No. 1 & 2 and substation works.¹⁵⁹ TransGrid submitted that the lines are currently operated at 85°C or 915 MVA.¹⁶⁰ TransGrid further submitted that:¹⁶¹

"the transmission lines between Lower/Upper Tumut and Yass/Canberra (i.e., transmission lines O1, 2, 3, O7) are presently limited by the capacity of lines O1 and 2. This cut set is the critical constraint between Sydney and the Snowy hydro system and Vic-NSW interconnector. The NCIPAP proposes dynamic line rating on both lines O1 and 2 which will help mitigate networks constraints in this area. To allow dynamic line rating to be most effective and raise the line

¹⁵⁵ TransGrid, Revenue Proposal, May 2014: 0597 Southern Tower Lines Low Spans_Public.pdf, p.46.

¹⁵⁶ TransGrid, Revenue Proposal, May 2014: 0597 Southern Tower Lines Low Spans_Public.pdf, p.46.

¹⁵⁷ TransGrid, Response to AER information request - TransGrid Capex R11 - low spans, received 2 April 2015: 2015-04-02 - TransGrid AER Capex R11.xlsx

¹⁵⁸ TransGrid, Response to AER information request - TransGrid Capex R11 - low spans, received 2 April 2015: 2015-04-02 - TransGrid AER Capex R11.xlsx

¹⁵⁹ TransGrid, Revenue Proposal, May 2014: 0533 Snowy-Yass - Canberra Line Remediation_Public.pdf, p.35.

¹⁶⁰ TransGrid, Response to AER information request - TransGrid Capex R13 - low spans further questions, received 13 April 2015, p.1.

¹⁶¹ TransGrid, Response to AER information request - TransGrid Capex R13 - low spans further questions, received 13 April 2015, p.1.

capacity in appropriate conditions the terminal palms will be the limiting factor. Replacing the terminal palms as part of the low span project should limit constraints on Snowy Hydro and the import capacity from Victoria under certain conditions".

As there is no evidence before us that there is a need for the proposed expenditure at the current operating temperature we do not consider it is prudent to undertake the proposed remediation. We also consider that TransGrid appears to be proposing the expenditure to either realise the market benefits associated with its NCIPAP proposal or augment the line, that is, to reduce the current constraints on the lines. As discussed above, given that the NCIPAP benefits rely upon the proposed work being complete we consider that the proposed expenditure should have been included in the NCIPAP cost benefit analysis. On this basis it should therefore not be included as a capex proposal. Furthermore, as the expenditure also appears to be required to augment the line and as the proposed expenditure for the works is greater than \$5 million, TransGrid is obligated under the NER to apply a RIT-T.¹⁶² TransGrid did not provide a RIT-T in support of its proposed expenditure.

Therefore, we do not accept TransGrid's proposed expenditure and have excluded it from our estimate because:

- TransGrid has not provided evidence to us that there is a need for the proposed expenditure at the current operating temperature
- the expenditure appears to be tied to the NCIPAP benefits; and
- it appears to be an augmentation project, in which case TransGrid should have prepared a supporting RIT-T which it has not done.

We have therefore excluded a total of \$36.7 million for the NCIPAP related expenditure.

We have assessed the remaining \$44.8 million proposed by TransGrid for low span remediation as part of TransGrid's total repex amount, in order to arrive at a total repex forecast for inclusion in our alternative capex forecast.

We set out below our concerns with the remaining \$44.8 million of low span expenditure proposed by TransGrid. We have found similar flaws in the forecasting method for the expenditure proposed by TransGrid for low spans as for the other repex categories. We consider that the risk is overestimated and the options analysis is limited which results in an upwardly biased cost.

Risk assessment

TransGrid did not revise or submit updated risk assessments, option analyses or costings for the low span projects in response to the concerns raised in our draft

¹⁶² NER, cl. 5.16.3(a)

decision. Without evidence of adequate risk assessments or option analyses and costings, we remain of the view that:

- TransGrid's risk assessment is overstated, and
- TransGrid's incomplete option analysis is likely to result in inefficient remediation choices and so upwardly biased forecast expenditure requirements.

In our draft decision we noted that TransGrid's assessment of risk associated with the low spans is significantly overstated due to its assessment of:

- The frequency of loss events.
- The consequences associated with these events.

As discussed above, we provided evidence of the extent of overestimation by showing that Marsh's estimates of loss provided in its insurance and self-insurance estimates were considerably lower.¹⁶³

In relation to our assessment of risk, which relied on Marsh's insurance and self-insurance estimates, TransGrid submitted that we had only considered the direct financial impacts. TransGrid stated that it had taken a broader perspective, including direct and indirect losses associated with cost, operational, reliability, environment and safety risks.¹⁶⁴ It did not provide further detail regarding these expected losses or an estimated build-up of these various losses in order to support its \$81.5 million forecast other than to make reference to "the value of risk" based on a recent court settlement for a Victorian bushfire.

We have considered TransGrid's submission on the Marsh estimates and without direct evidence to support its submission, remain of the view that the Marsh estimates are likely to be comprehensive and importantly, provide an objective assessment of expected loss considerations. We also made adjustments to the Marsh estimates to account for the economic cost of reliability. Furthermore, Marsh provided for any exposure to losses not covered through direct insurance to be covered through self-insurance. For these reasons, we consider that the Marsh insurance and self-insurance estimates, together with our adjustments, provide the best indication of the expected losses associated with low spans.

Not all options considered or sufficiently scoped

In relation to its options analysis, we have found that:

- not all options have been considered
- the options are not sufficiently scoped to arrive at an efficient solution

¹⁶³ AER, Draft decision TransGrid transmission determination 2015-18, Attachment 6, November 2015, pp 45-46.

¹⁶⁴ TransGrid, Revised Revenue Proposal, Attachment G Approach to Low Span Remediation, January 2015, pp. 12-13.

In our draft decision we considered that a lack of consideration of all available options in forecasting the low spans expenditure is likely to result in an upward bias of costs.

In response to our draft decision, TransGrid submitted that it had evaluated landscaping, insulated cross arms, conductor re-tensioning, dynamic rating, de-rating, fencing and signage options in its detailed scoping phase for low span works.¹⁶⁵

However, TransGrid only provided the detailed scoping for one of its projects - Line 97K (Cooma to Mungah).¹⁶⁶ The options feasibility study for the Snowy Yass Canberra Line project was the only other report to consider landscaping, re-tensioning and the installation of insulated cross arms as options at a high level.¹⁶⁷ Other project reports only considered:

- for tower lines - Inverted Vee strings, D Strings and suspension tower replacement¹⁶⁸
- for pole lines - structure replacement.¹⁶⁹

For the projects which were not scoped in detail, in the various option evaluation reports TransGrid specifically states the limits which it has imposed on the range of options it has considered in arriving at the proposed low spans expenditure. Examples of this include:

Landscaping below low spans, insulated cross arms and conductor retensioning have not been considered at this stage of the investigation but may be considered as alternative remediation methods during detailed investigations at the PSS phase of this project.¹⁷⁰

At this stage it has been assumed that the structures will need to be raised by replacing the entire structure. Further design work may show that the use of body extensions is possible and should be considered. One possibility for further consideration to avoid the need to raise structures would be replacement of the existing conductors with high temperature, low sag conductors.¹⁷¹

¹⁶⁵ TransGrid, Revised Revenue Proposal, Attachment G Approach to Low Span Remediation, January 2015, pp. 8-10.

¹⁶⁶ TransGrid Revenue Proposal, May 2014: Attachment PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, pp.20-28, 60-82.

¹⁶⁷ TransGrid Revenue Proposal, May 2014: Attachment 0533 Snowy-Yass-Canberra Line Remediation_Public.pdf, p.17.

¹⁶⁸ TransGrid, Revenue Proposal, May 2014: Attachment 0593 Northern Tower Lines Low Spans_Public.pdf, pp.17, 26; 0597 Southern Tower Lines Low Spans_Public.pdf, p.43;

¹⁶⁹ TransGrid, Revenue Proposal, May 2014: Attachment 0594 Northern Pole Lines Low Spans_Public.pdf, pp.27; 0596 Central Pole Lines Low Spans_Public.pdf, p.25; 0598 Southern Pole Lines Low Spans_Public.pdf, p. 26 .

¹⁷⁰ TransGrid, Revenue Proposal, May 2014: Attachment 0596 Central Pole Lines Low Spans_Public.pdf, p.25; 0595 Central Tower Lines Low Spans_public.pdf, p.27; 0598 Southern Pole Lines Low Spans_Public.pdf, p.26; 0597 Southern Tower Lines Low Spans_Public.pdf, p.43; 0594 Northern Pole Lines Low Spans_Public.pdf, pp.27, 44; 0532 4-5 Yass - Marulan 330kV Line Remediation_Public.pdf, p.42 (does consider retensioning).

¹⁷¹ TransGrid Revenue Proposal, May 2014: 0595 Central Tower Lines Low Spans_Public.pdf, p.28.

It is assumed for this OFS that the existing line capacity will be retained.¹⁷²

In this OFS, it is assumed the 8 metre line clearance should be used for summer clearances, whether it is trafficable or not trafficable. Trafficability of the low spans will be confirmed during the PSS stage. If the span is not traversable by vehicles over 3 metres in height due to steepness or swampiness then only 6.7 metres of clearance is required.¹⁷³

It is assumed the 6.7 metre line clearance should be used for summer clearances, whether it is trafficable or not trafficable. If the span is not traversable by vehicles over 3 metres in height due to steepness or swampiness then only 5.5 metres of clearance is required.¹⁷⁴

The only method of remediation considered is a structure replacement. The raising of cross-arms was not considered due to the average age of 132kV structures and the likelihood these timber structures would need replacing in the future. Insulator rearrangements such as D-strings and inverted V only obtain very small gains on 132kV lines.¹⁷⁵

We note that for Line 97K (Cooma to Munyang) which did consider all options, 30 per cent of spans were remediated through landscaping only.¹⁷⁶ There were also 16 spans where TransGrid chose to accept the violation and the low spans were not planned to be remediated at all.¹⁷⁷

We also consider that a lack of sufficient scoping is likely to result in an upward bias of costs.

From examining the one project that was scoped in detail, it is evident that TransGrid made a range of decisions regarding risk which are not evident in the other project's option considerations.

These decisions include:

- the temperature to which the spans are to be remediated or whether to de-rate a line. We note that for the project which had a detailed project scoping done, that is, for Line 97K (Cooma to Munyang), the TransGrid Board approved a reduction in the temperature to which the low spans were to be remediated. The lines were remediated to a maximum operating temperature (MOT) of 65°C rather than the current book rating/design MOT of 85°C.¹⁷⁸ TransGrid submitted in its project scoping report in 2011 that '[d]ue to large amount of low spans at MOT, remediation to MOT will be costly. For the options involving remediation ..., works

¹⁷² TransGrid Revenue Proposal, May 2014: 0595 Central Tower Lines Low Spans_Public.pdf, p.29.

¹⁷³ TransGrid, Revenue Proposal, May 2014: 0595 Central Tower Lines Low Spans_Public.pdf, p.26.

¹⁷⁴ TransGrid, Revenue Proposal, May 2014: 0598 Southern Pole Lines Low Spans_Public.pdf, p.25.

¹⁷⁵ TransGrid, Revenue Proposal, May 2014: 0598 Southern Pole Lines Low Spans_Public.pdf, p.26.

¹⁷⁶ TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, pp.20-28.

¹⁷⁷ TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, pp.60-82.

¹⁷⁸ TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, p.8.

shall be developed to two alternative operating temperatures (in addition to 85°C (MOT)): 75°C and 65°C'.¹⁷⁹ This led to a reduction in the number of spans identified for remediation from 240 in the request for project scoping to 96 spans in the detailed project scoping study.¹⁸⁰

- cost-risk trade-offs in managing violations, where the cost of remediation would be disproportionate to the risk avoided. We note that for Line 97K (Cooma to Mungah) TransGrid has made decisions which take into account the cost-risk trade-off, including:

For Span 12-13, the scope is to install dummy strain on Structure 12 and landscape/grade the access track to achieve 6.7m. The remaining violation of 4.4m is on a steep slope downward which is inaccessible to any vehicle and deemed as a non-trafficable span. Due to the steepness of the slope off the access track, NP&P/Asset Performance has accepted the risk as being ALARP (As Low As Reasonably Practical). The costs of implementing further controls would be disproportionate with the benefit gained.¹⁸¹

TransGrid accepted a violation for a span which was only able to be remediated to 5.3 metres rather than 5.5 metres due to rock and the span being non trafficable.¹⁸²

However while TransGrid has undertaken this risk assessment on detailed scoping, it clearly has not undertaken this risk assessment for the low spans identified for remediation in the 2015-18 period for other projects. In the options evaluation for other projects TransGrid states that for the low spans not identified for remediation in the 2015-18 period that it will undertake a study to determine the design requirements and level of risk that TransGrid is willing to accept. We consider that a prudent and efficient service provider would undertake this assessment for all low spans, including those spans proposed to be remediated in the 2015-18 period.

It is also evident that more information acquired for more detailed scoping alters the remediation outcomes significantly. For example, information about non-trafficable spans and landscape leads to significant scope revisions. For the projects for which detailed scoping has not been undertaken, there is no evidence of allowing for alternative solutions where a line is non-trafficable. TransGrid notes that:¹⁸³

The scope of work could be reduced if more land is identified as “non-trafficable” or suitable for landscaping.

TransGrid's analysis indicates that non-trafficable areas are remediated to a lower height and are more likely to be managed through lower cost remediation measures or

¹⁷⁹ TransGrid, Revenue Proposal, May 2014: Attachment 0129 Line 992 Burrinjuck to Tumut Low Spans Remediation_Public.pdf, p.56.

¹⁸⁰ TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, pp.8, 20-28.

¹⁸¹ TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, p.33.

¹⁸² TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, p.33.

¹⁸³ TransGrid, Revenue Proposal, 0533 Snowy-Yass Canberra Line Remediation_Public.pdf, p.19.

continuance of mitigation measures such as signage and fencing rather than remediation.

For Line 97K (Cooma to Mungah) the non-trafficable areas require ground clearance of 5.5 metres rather than 6.6 metres.¹⁸⁴ On detailed scoping 21 non-trafficable spans were identified as not requiring any remediation.

We also note that TransGrid has applied the blanket assumption that where more than 50 per cent of spans are low, it will remediate all lines.¹⁸⁵ TransGrid did not provide any evidence for why this is more efficient. It also seems inconsistent with its decision to replace poles on an as required basis.

Other repex and augex drivers of low span remediation

On review of TransGrid's revised proposal, we consider low spans are not the sole or primary driver of remediation. TransGrid has not considered other drivers of low span remediation. This is likely to result in inefficiencies as low spans are remediated without considering the impacts of the other drivers.

Many of the business cases appear to consider low span remediation in isolation, without consideration of the timing of other replacement or augmentation requirements. This may result in low span remediation being carried out when it could have been avoided if the other repex or augex requirements were addressed.

For example, in its contingent proposal expenditure TransGrid has proposed:¹⁸⁶

- \$5.4 million for the upgrade of line 01 Upper Tumut to Canberra to 100°C.
- \$7 million for the upgrade of line 39 Bannaby to Sydney West to 100°C.
- \$28.5 million for the upgrade of lines 4 and 5 Yass to Marulan to 100°C.
- However, the low spans proposal costs remediation to 85°C, 85°C and 68°C respectively.

In relation to line 01 Upper Tumut to Canberra, TransGrid states in its need statement that 'if the option for line upgrading is chosen then the need to address the low spans is also addressed'.¹⁸⁷ The latest document, the options evaluation report, recommends that remediation to both 85°C and 100°C be progressed.

As illustrated above, the temperature to which low spans are remediated makes a significant difference to the number of spans which are remediated. While there is uncertainty, TransGrid may re-scope these projects so that only high priority spans are remediated and the residual spans be deferred until TransGrid gains a better

¹⁸⁴ TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, p.9.

¹⁸⁵ TransGrid, Revenue Proposal, May 2014: 0533 Snowy-Yass Canberra Line Remediation_Public.pdf, p.8; 0593 Northern Tower Lines Low Spans_Public.pdf, p.8; 0594 Northern Pole Lines Low Spans_Public.pdf, p.8; 0595 Central Tower Lines Low Spans_Public.pdf, p.8.

¹⁸⁶ TransGrid, Revenue Proposal, May 2014: Attachment L: Contingent Project Southern NSW Network Upgrade, p.6.

¹⁸⁷ TransGrid, Revenue Proposal, 0533 Snowy-Yass Canberra Line Remediation_Public.pdf, pp.10,11.

understanding of the need for augmentation. As TransGrid has proposed the uprating as a contingent project for the 2015-18 period, we consider that TransGrid will understand the augmentation requirements during the 2015-18 regulatory period.

Another example is where pole replacement is required. Lines 993 and 992 have above average pole defect rates due to termites, at 4 per cent and 0.05 per cent, respectively.¹⁸⁸ TransGrid states that '[t]he low span remediation should consider the possible future need to replace the poles in approximately 10 years' time'.¹⁸⁹ Undertaking the pole replacement would address the low span. Consequently, we consider that the efficient costs that a prudent service operator would require to achieve the capex objectives would be more reasonably reflected if these projects were re-scoped so that only high priority spans are remediated and the residual spans are deferred until pole replacement is carried out.

TransGrid's assessment of grossly disproportionate

In relation to its requirement to remediate low spans to comply with AS7000, TransGrid's submitted that:¹⁹⁰

'[w]hilst compliance to AS7000 is not enshrined in legislation, it is generally considered that compliance with AS7000 affords reasonable protection from claims of negligence'.

In its revised proposal, TransGrid submitted that it also has an obligation under the Work Health and Safety Act 2011 (WHS Act) to minimise the risk associated with low spans to as low as reasonably practicable.¹⁹¹ TransGrid observes that 'reasonably practicable' is defined as 'doing what is effective and possible to ensure the health and safety of workers and others'.¹⁹² In discussing the hierarchy of options to minimise risk, TransGrid points to the requirement to consider whether the cost of minimising risk is grossly disproportionate to the risk and therefore not reasonably practicable.¹⁹³ That is, the WHS Act requires that in determining what is reasonably practicable that 'after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk' is taken into account

¹⁸⁸ TransGrid, Revenue Proposal, May 2014: Attachment 0131 Line 993 Gadara to Wagga Pole Replacement_Public.pdf, p.44; 0129 Line 992 Burrinjuck to Tumut Low Spans Remediation_Public.pdf, p.48.

¹⁸⁹ TransGrid, Revenue Proposal, May 2014: Attachment 0131 Line 993 Gadara to Wagga Pole Replacement_Public.pdf, p.10; 0129 Line 992 Burrinjuck to Tumut Low Spans Remediation_Public.pdf, p.48.

¹⁹⁰ TransGrid, Revenue Proposal, May 2014: Attachment 0597 Southern Tower Lines Low Spans_Public.pdf, p.6.

¹⁹¹ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015: Attachment G Approach to Low Span Remediation, p.1.

¹⁹² TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015: Attachment G Approach to Low Span Remediation, p.5.

¹⁹³ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015: Attachment G Approach to Low Span Remediation, p.6.

and weighed up.¹⁹⁴ TransGrid also refers to *Courts v Essential Energy*,¹⁹⁵ and interprets the judgement to mean that 'it is not acceptable ... to not remove the risk'.¹⁹⁶

We do not accept TransGrid's conclusion as to the need to remove all risk. We do not consider that TransGrid is subject to such an absolute regulatory obligation or requirement. We consider TransGrid's approach to remedying low line spans recognises this in the details of its revised proposal, as we explain below. We do not suggest that TransGrid implement no controls. We agree that TransGrid has a legitimate need to mitigate the risk of serious consequences occurring. To clarify, we do accept that AS7000 is fundamental to TransGrid's risk assessment. We also accept that the WHS Act is relevant in that its primary purpose is to protect persons from work-related harm. We also consider that apart from the WHS Act, there are a range of other laws, regulations and guidelines that TransGrid must necessarily consider when considering risk posed to public health and safety. The WHS Act enshrines such considerations through, for example, providing that a person may rely on compliance with an approved code of practice to demonstrate compliance with their duties under the WHS Act (in relation to the subject matter of the code).¹⁹⁷ The judgment in *Courts v Essential Energy* also informs TransGrid's evolving duty of care.

However, we consider that the obligations and requirements that apply to TransGrid do not, no matter the circumstances, require that all risk should be removed. It is a central part of the complex regulatory framework for managing risk that a service provider properly evaluate risks and make appropriate judgements about what can be done. Indeed, TransGrid's position appears to be internally inconsistent in that it has shown that it exercises judgement in the manner envisaged by the regulatory framework for managing risk. As indicated above, TransGrid has made judgements that remediation would pose disproportionate cost compared to the risk posed by the low span in relation to Line 97K (Cooma to Mungyang). TransGrid submitted:

For Span 12-13, the scope is to install dummy strain on Structure 12 and landscape/grade the access track to achieve 6.7m. The remaining violation of 4.4m is on a steep slope downward which is inaccessible to any vehicle and deemed as a non-trafficable span. Due to the steepness of the slope off the access track, NP&P/Asset Performance has accepted the risk as being ALARP (As Low As Reasonably Practical). The costs of implementing further controls would be disproportionate with the benefit gained.¹⁹⁸

Further, TransGrid intends to complete an 'indicative date to address need' study for remediation of low spans not identified for remediation in the 2015-18 period. The

¹⁹⁴ Work Health and Safety Act 2011 (NSW) s.18(e).

¹⁹⁵ *Courts v Essential Energy* [2014] NSWSC 1483

¹⁹⁶ TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015: Attachment G Approach to Low Span Remediation, p. 8.

¹⁹⁷ Work Health and Safety Act 2011 (NSW) s.275.

¹⁹⁸ TransGrid, Revenue Proposal, May 2014: PUBLIC PSS-DCN243 97K Low Span Remediation.pdf, p.33.

study will determine the design requirements and level of risk TransGrid is willing to accept. This is inconsistent with TransGrid's conclusion that it needs to avoid all risk.

Our alternative repex forecast

We have considered \$44.8 million of TransGrid's proposed low span remediation as part of our assessment of the efficient level of total replacement and compliance capex.

This figure reflects that we have first reduced TransGrid's proposed amount of \$81.5 million for low spans remediation by an amount of \$36.7 million. We made this adjustment on the basis that, as discussed above:

- This expenditure is to enable NCIPAP market benefits to be realised
- The prudence of the expenditure was not demonstrated
- The augmentation was not supported by a RIT-T

In relation to the residual \$44.8 million amount proposed by TransGrid, we consider that a prudent service provider, given a reasonable estimate of the expected risk, would assess the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk. Instead, the evidence before us reveals that:

- TransGrid's low spans risk assessments are grossly overstated and TransGrid has not submitted revised risk assessments
- TransGrid's low spans costs are upwardly biased and TransGrid has not submitted revised business cases.

On this basis, we are not satisfied that the proposed \$44.8 million in capex reasonably reflects the capex criteria. It does not reflect the costs that a prudent and efficient operator would require to achieve the capex objectives.

We consider that a prudent and efficient operator would allocate capital according to the expected benefits, including the benefits of mitigating the expected cost of risk. As risk diversifies within a capital portfolio, efficient allocation should be undertaken at the portfolio level.

At the portfolio level, low spans remediation falls within replacement and compliance driven expenditure as it essentially reflects the same safety, environmental, reliability and operational risks. Accordingly, the proposed low span remediation capex should be considered within the context of TransGrid's capital portfolio.

We have therefore aggregated the remaining \$44.8 million in low span remediation expenditure proposed by TransGrid with TransGrid's other proposed repex components. We have then considered TransGrid's total repex amount. Our decision in relation to the total repex amount is discussed above in this appendix.

B.4 AER findings and estimates for non-network capex

Non-network capex includes capex on information and communications technology (ICT), buildings and property, motor vehicles, and other plant and equipment.

TransGrid's revised proposal for non-network capex of \$145.7 million (\$2013-14) for the 2014–18 period is the same as in its initial proposal. In our draft decision we accepted this expenditure, without adjustment, for inclusion in our alternative estimate on the basis that:¹⁹⁹

- TransGrid has forecast capex for this category returning to levels which are consistent with longer term trends
- the forecast capex for each category of non-network expenditure reflects the high level drivers of expenditure in each category
- the forecast reduction in non-network capex does not simply reflect a reallocation of expenditure from capex to opex.

The CCP submitted that the AER had not sufficiently scrutinised TransGrid's non-network capex proposal, and recommended a reduction of 30 per cent to this category of capex. Specifically, the CCP submitted that TransGrid's ICT capex is not largely recurrent in nature as we noted in our draft decision, and that TransGrid's forecast ICT capex is around three to four times its long term historical average.²⁰⁰

Our view that TransGrid's forecast ICT capex is largely recurrent in nature is based on TransGrid's identified split between recurrent and non-recurrent ICT capex. TransGrid has classified 89 per cent of its forecast ICT capex as recurrent expenditure, which is in line with the historical split between recurrent and non-recurrent expenditure in the 2009–14 regulatory control period.²⁰¹

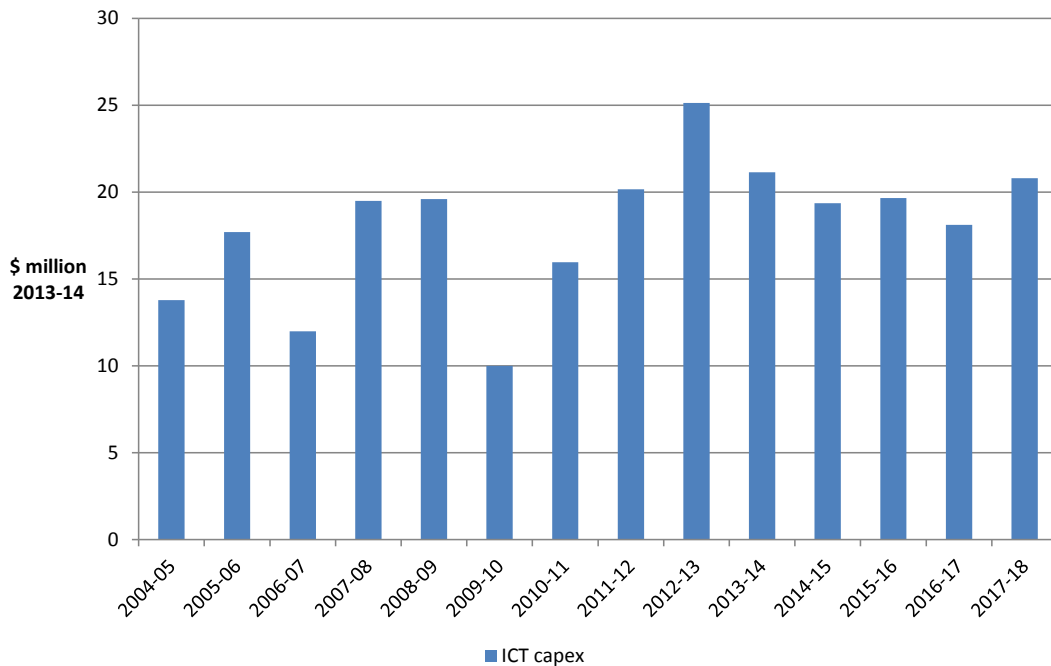
The CCP submitted that TransGrid's forecast ICT capex is around 300 to 400 per cent above its long term historical average. We set out TransGrid's historical and forecast non-network ICT capex from 2004-05 to 2017-18 in Figure B-2 below.

¹⁹⁹ AER, *Draft decision: TransGrid transmission determination 2015-18 - Attachment 6: Capital expenditure*, November 2014, pp. 6-54 to 6-57.

²⁰⁰ Consumer Challenge Panel, *Submission to the AER's draft transmission determination and TransGrid's revised revenue proposal*, 6 February 2015, pp. 28-30.

²⁰¹ TransGrid, *Regulatory information notice 2014-15 to 2018-19*, template 2.5, May 2014; AER analysis.

Figure B-2 TransGrid's actual and forecast non-network ICT capex from 2004-05 to 2017-18 (\$million, 2013-14)



Source: TransGrid, Regulatory proposal, 31 May 2014, pp. 70, 98, 101; AER analysis.

Our analysis suggests that TransGrid's forecast non-network ICT capex is, on average, approximately 18 per cent above the level of expenditure in the 2004–09 regulatory control period. We have been unable to replicate or substantiate the CCP's submission that TransGrid's forecast ICT capex is 300 to 400 per cent above its long term historical average.

As stated in our draft decision, while ICT capex is forecast to remain relatively steady in the 2014–18 period, the significant reductions in other categories of non-network capex have resulted in an overall reduction in non-network capex of 23 per cent per year.²⁰² This contributes to our conclusion that TransGrid's forecast of overall non-network capex requirements in the 2014–18 period is likely to be reasonable having regard to past expenditure.²⁰³ The CCP did not provide the basis for its recommended 30 per cent reduction to TransGrid's forecast non-network capex.

In summary, we do not consider that the CCP's submission provides persuasive evidence that would cause us to depart from our draft decision on TransGrid's forecast non-network capex. For the reasons set out above and in our draft decision,²⁰⁴ we

²⁰² AER, *Draft decision - TransGrid transmission determination - Attachment 6 - Capital expenditure*, November 2014, p. 6-54.

²⁰³ NER, cl. 6A.6.7(e)(5).

²⁰⁴ AER, *Draft decision - TransGrid transmission determination - Attachment 6 - Capital expenditure*, November 2014, pp. 6-55 to 6-57.

accept TransGrid's forecast of non-network capex is a reasonable estimate of the efficient costs required for this capex category. We have included this forecast in our alternative estimate of total capex for the 2014–18 period.

B.5 AER findings and estimates for strategic property capex

We are not satisfied that TransGrid has accurately forecast the costs of or demonstrated the need for all of its proposed property acquisitions in accordance with the capex criteria. We consider that forecast capex of \$61.3 million (\$2013–14) is a reasonable estimate of TransGrid's requirement for strategic property acquisitions. We have included this amount in our alternative estimate of total capex for the 2014–18 period.

TransGrid's revised proposal includes forecast strategic property capex of \$99.2 million (\$2013-14) for the 2014–18 period.²⁰⁵ This is \$13.6 million less than its initial proposal of \$112.8 million, but \$88.7 million more than our draft decision of \$10.5 million for strategic property capex. In its revised proposal, TransGrid:²⁰⁶

- adopted our draft decision to exclude capex of \$24.5 million associated with the Western Sydney Supply Project, which does not relate to the 2014–18 period
- did not adopt our draft decision to exclude capex for the Surry Hills, Powering Sydney's Future, Maraylya and Richmond Vale strategic property acquisitions
- increased the forecast capex for the Surry Hills and Powering Sydney's Future acquisitions by \$11.2 million as a result of changes to the scope of the projects.

Our consideration of TransGrid's revised forecast strategic property capex for each proposed acquisition is set out below.

B.5.1 Surry Hills

TransGrid's revised proposal includes forecast capex of \$53.0 million (\$2013-14) to acquire the Surry Hills site.²⁰⁷ This is an increase of \$6.0 million from its initial proposal.²⁰⁸ The increased cost reflects a change in the scope of the purchase as a result of Ausgrid's decision to dispose of the whole site rather than retain a portion as previously envisaged.

In our draft decision, we noted that the Surry Hills site has certain unique characteristics which support its strategic acquisition from Ausgrid and ongoing use for electricity network purposes, including:²⁰⁹

²⁰⁵ TransGrid, *Capex accumulation model*, February 2015.

²⁰⁶ TransGrid, *Revised revenue proposal*, 13 January 2015, pp. 68-72.

²⁰⁷ TransGrid, *Revised revenue proposal*, 13 January 2015, p. 71.

²⁰⁸ TransGrid, *Revenue proposal*, May 2014, p. 78.

²⁰⁹ AER, *Draft decision - TransGrid transmission determination - Attachment 6 - Capital expenditure*, November 2014, p. 6-50.

- immediate access to Ausgrid's inner city cable tunnel ring to provide straight forward connection to Ausgrid's current and future zone substations
- tunnel access to TransGrid's existing Haymarket and Beaconsfield 330 kV substations, suitable for direct connection of a 330 kV cable
- relatively short distance to TransGrid's existing Beaconsfield 330 kV substation
- physical size suitable for establishment of a major 330 kV substation and bulk supply point
- suitably located to provide a practical alternative as a replacement for TransGrid's Haymarket 330 kV substation
- suitably located to provide a viable option for relieving forecast constraints in the Ausgrid 132 kV supply network
- unlike many surrounding sites, use of the site is not restricted by heritage listing
- excavation works below street level have already been completed
- minimal acquisition costs compared to a developed site as the site would be purchased directly from Ausgrid undeveloped and with vacant possession.

However, in our draft decision we concluded that until such time as Ausgrid confirms its intention to dispose of the Surry Hills site and its anticipated sale proceeds, there is no basis for allowing TransGrid's forecast capex for this acquisition. In the absence of this confirmation, if we were to include this expenditure for TransGrid, it would result in the inclusion of the Surry Hills site as part of the regulated asset base for both Ausgrid and TransGrid, and therefore an over recovery of the cost of this asset from electricity consumers. We undertook to review this conclusion if Ausgrid confirmed its intention to dispose of the asset in the 2014–18 period.²¹⁰

Following receipt of TransGrid's revised proposal to acquire the Surry Hills site, we sought confirmation from Ausgrid that it had accounted for the disposal of the Surry Hills site in its revised regulatory proposal.²¹¹ Ausgrid confirmed that it had agreed to sell the Surry Hills property to TransGrid for an agreed value of \$50 million (nominal) in 2015–16.²¹² This compares to TransGrid's forecast capex of \$53.0 million (\$2013–14). Ausgrid's modelling for its revised regulatory proposal accounts for the disposal of this property.²¹³

We sought clarification from TransGrid that its forecast capex for the Surry Hills site aligned with Ausgrid's anticipated sale proceeds for the site.²¹⁴ TransGrid confirmed Ausgrid's advice, noting that its forecast amount for this acquisition referred to an

²¹⁰ AER, *Draft decision - TransGrid transmission determination - Attachment 6 - Capital expenditure*, November 2014, p. 6-51.

²¹¹ AER, *Information request AER AUSGRID 050*, 2 February 2015.

²¹² Ausgrid, *Response to information request AER AUSGRID 050*, 10 February 2015.

²¹³ Ausgrid, *4.09 - Revised PTRM - Transmission*, January 23015.

²¹⁴ AER, *Information request AER TransGrid Capex R8*, 24 February 2015.

incorrect base date in TransGrid's capital accumulation model. TransGrid confirmed the value of the proposed acquisition, including stamp duty and legal fees, is \$53.0 million (\$2015–16) or \$50.0 million (\$2013–14).²¹⁵

The EMRF submitted that the AER should not permit the Surry Hills acquisition even if Ausgrid decides to dispose of the land because the costs and risks to consumers are too great to make the acquisition efficient. The EMRF submitted that TransGrid has failed to demonstrate that the benefit of the acquisition outweighs the costs over the period in which the land is unutilised.²¹⁶

In relation to the costs and risks of this acquisition to consumers, we note that the need for the Surry Hills site is not primarily driven by forecast growth in maximum demand. The site may allow for a number of uses, but is primarily intended to provide for the replacement of TransGrid's existing 330/132 kV substation at Haymarket, expected to be required by 2041.²¹⁷ Also, given this transaction will result in the transfer of the asset from one network service provider to another, the net costs of the acquisition to consumers will be low.

We sought further information from TransGrid to confirm that the Surry Hills acquisition remained the most economic option across a range of possible scenarios. TransGrid provided an updated cost benefit analysis which indicated that, across a range of scenarios, the Surry Hills acquisition remains the preferred (highest NPV) economic option to address the need.²¹⁸ This is due to the significantly lower acquisition and demolition costs for undeveloped land in the inner city area, and the higher cabling and tunnel construction costs of an alternative site compared to the Surry Hills site.²¹⁹

For these reasons, and for the reasons previously set out in our draft decision,²²⁰ we are now satisfied that forecast capex for this project reasonably reflects the capex criteria in the NER. However, as discussed above, TransGrid's proposed capex for this acquisition should be reduced from \$53.0 million to \$50.0 million (\$2013-14) to reflect the agreed sale price. We will include this reduced forecast in our alternative estimate of total capex for the 2014–18 period.

B.5.2 Powering Sydney's Future

TransGrid's revised proposal includes forecast capex of \$23.5 million (\$2013-14) for a strategic property acquisition and related works to secure a cable route for the Powering Sydney's Future project.²²¹ This is an increase of \$4.1 million from its initial proposal. The increased cost reflects a change in the timing of the acquisition and

²¹⁵ TransGrid, *Response to information request AER TransGrid Capex R8*, 26 February 2015.

²¹⁶ EMRF, *Submission to the AER*, January 2015, pp. 48-49.

²¹⁷ TransGrid, *0677 Strategic Property Acquisition at Riley Street_Public*, 30 May 2014.

²¹⁸ TransGrid, *Response to information request AER TRANSGRID R1*, 16 February 2015, pp. 7-8.

²¹⁹ TransGrid, *0677 Strategic Property Acquisition at Riley Street_Public*, 30 May 2014, pp. 8-9.

²²⁰ AER, *Draft decision - TransGrid transmission determination - Attachment 6 - Capital expenditure*, November 2014, pp. 6-50 to 6-51.

²²¹ TransGrid, *Revised revenue proposal*, 13 January 2015, p. 71.

additional cable ducting works which TransGrid has proposed to undertake in conjunction with planned road works for the WestConnex project.

In our draft decision, we concluded that the forecast strategic property capex associated with the Powering Sydney's Future project should be deferred beyond the 2014–18 period, in line with the deferral of the Powering Sydney's Future project itself.²²² TransGrid nevertheless retained the Powering Sydney's Future property acquisition in its revised proposal on the basis that:²²³

- the date of the forecast network capacity shortfall for Powering Sydney's Future has been deferred from 2018-19 to 2023-24
- a network solution to the Powering Sydney's Future network constraints has a lead time of around six years
- planned road works for the WestConnex road infrastructure project due for completion in 2019 are likely to affect the preferred future cable route for the Powering Sydney's Future project
- it is prudent to secure a cable route for the future cable in conjunction with the WestConnex project.

TransGrid has deferred the need date for the Powering Sydney's Future strategic property acquisition to the end of calendar year 2018, which is six months beyond the end of the 2014–18 period.²²⁴ Nonetheless, TransGrid has proposed to include the majority (92 per cent) of the cost of this project within the 2014–18 period.²²⁵

We sought advice from TransGrid to explain why it had deferred the need date for the property acquisition by only one year from 2017 to 2018 while deferring the need date for Powering Sydney's Future by five years. TransGrid advised that the initial need date of 2017 had created risk for the project. In the event that a compulsory acquisition became necessary or the property was unable to be acquired, this may have delayed the Powering Sydney's Future project or necessitated a more costly route option.²²⁶ This is because, in TransGrid's experience, a compulsory acquisition would likely take 2-3 years, compared to six months for a negotiated settlement.²²⁷

In our view, TransGrid's response to the risk of a compulsory acquisition transfers the full cost of this risk to consumers, who are not well placed to manage this risk.²²⁸ This

²²² AER, *Draft decision - TransGrid transmission determination - Attachment 6 - Capital expenditure*, November 2014, pp. 6-50 to 6-51.

²²³ TransGrid, *Revised revenue proposal*, 13 January 2015, pp. 69-70.

²²⁴ TransGrid, *OFR-2002Y Property Acquisition for Powering Sydney's Future*, 12 January 2015, p. 3.

²²⁵ TransGrid, *Capex accumulation model*, February 2015; AER analysis.

²²⁶ TransGrid, *Response to information request AER TransGrid R1*, 16 February 2015, p. 1.

²²⁷ TransGrid, *Response to information request AER TransGrid 02*, 8 September 2014, pp. 3-4.

²²⁸ The AEMC notes that an appropriate uncertainty regime will contribute to efficiency of investment by allocating risks to the party best able to deal with them, including appropriately sharing the risks of external events: AEMC Economic Regulation Final Rule Determination, p. 183.

is despite TransGrid's assessment that this risk is unlikely to eventuate.²²⁹ This risk is best managed by TransGrid, through its approach to negotiations with existing landholders. In our view, deferring the commencement of the strategic property acquisition beyond the 2014–18 period is both prudent and a more efficient timing for this expenditure. For example, commencing the property acquisition process in, for example 2018–19 would:

- reduce the cost of the project to consumers by deferring the capex requirement
- still allow TransGrid sufficient time to acquire the property by either negotiated settlement (six months) or compulsory acquisition (2-3 years) well before the forecast 2023-24 need date for the Powering Sydney's Future project.

We also sought advice from TransGrid to confirm that there is a net benefit in bringing forward the cable ducting works to align with the timing of the WestConnex project. TransGrid provided a quantitative cost benefit analysis which indicated that the most economic (highest NPV) option is to defer the cable ducting works until when those works are required for the Powering Sydney's Future project.²³⁰ On this basis, we are not satisfied that TransGrid's proposal to schedule the cable ducting works in conjunction with the WestConnex road works is efficient.

TransGrid has advised that a network solution to the Powering Sydney's Future network constraints has a lead time of around six years. In its initial proposal, TransGrid identified one limb of the trigger for the Powering Sydney's Future project as:

demand forecasts ... resulting in the loading of the defined constraint cut-set exceeding its contingent MVA rating (based on the applicable reliability criteria at the time) within the next four years.

TransGrid now proposes to incur significant capex six or seven years in advance of the forecast constraint in 2023-24, for example \$5.6 million in 2016-17 and \$17.7 million in 2017-18. We are not satisfied that the timing of this forecast capex is either prudent or efficient. The forecast capex is not required in order to meet or manage the expected demand for prescribed transmission services over the 2014–18 period.

In summary, we consider that TransGrid's forecast capex for the Powering Sydney's Future strategic property acquisition and related cable ducting works should be excluded from our alternative estimate of total capex for the 2014–18 period. We are not satisfied that the forecast capex reasonably reflects the efficient costs that a prudent operator would require to achieve the capex objectives. We consider the property acquisition and cable ducting works related to the Powering Sydney's Future project should be deferred until closer to the need date for that project, for the following key reasons:

²²⁹ TransGrid, *Response to information request AER TransGrid 02*, 8 September 2014, p. 3.

²³⁰ TransGrid, *Response to information request AER TRANSGRID R1*, 16 February 2015, pp. 2-3.

- the timing of the Powering Sydney's Future project remains uncertain, and subject to several factors including future changes in forecast and actual demand, the timing of expected Ausgrid 132 kV cable retirements, and future developments in embedded generation, demand management and network support arrangements
- TransGrid's quantitative cost benefit analysis indicates the potential benefits of aligning cable ducting works with the WestConnex road project do not outweigh the costs of bringing forward these works
- the timing of the strategic property acquisition, which seeks to address the risk that an extended compulsory acquisition process is required, transfers the full cost of this risk to consumers even though TransGrid considers the risk is unlikely to occur and consumers are not best placed to manage this risk.

B.5.3 Maraylya and Richmond Vale

TransGrid's revised proposal includes \$10.5 million (\$2013-14) for strategic property acquisitions at Maraylya and Richmond Vale.²³¹

TransGrid submitted that the strategic property acquisitions at Maraylya and Richmond Vale provide an economic benefit and are in the long term interests of consumers.²³² TransGrid's economic analysis is set out in the business cases provided with its initial proposal. We considered these business cases in reaching our draft decision to reject the inclusion of the proposed capex.²³³ TransGrid has not submitted any new or additional information to justify the forecast capex for the Maraylya and Richmond Vale property acquisitions.

TransGrid considers a range of possible future scenarios of demand growth and generation developments in considering its long term network development strategy.²³⁴ However, as noted in our draft decision, TransGrid's economic analysis of network augmentation options in the Maraylya and Richmond Vale business cases relies on the highest load growth scenario to forecast the augmentation need date.²³⁵ On this basis, TransGrid's economic analysis assumes a network augmentation date of 2029 for Maraylya and 2040 for Richmond Vale to address forecast network constraints in these locations.²³⁶

In considering TransGrid's forecast of required capex for the 2014–18 period, we must be satisfied that forecast capex reasonably reflects a realistic expectation of the

²³¹ TransGrid, *Revised revenue proposal*, 13 January 2015, p. 72.

²³² TransGrid, *Revised revenue proposal*, 13 January 2015, pp. 71-72.

²³³ TransGrid, *Maraylya 500kV Site Acquisition*, 30 May 2014; and TransGrid, *Richmond Vale Property Extension*, 30 May 2014.

²³⁴ TransGrid, *Revised revenue proposal*, 13 January 2015, p. 72.

²³⁵ TransGrid, *Need Statement - Strategic Property Acquisition - Maraylya 500kV Site*, 30 May 2014, p. 8; and TransGrid, *Need Statement - Richmond Vale 500kV Substation Site Extension*, 30 May 2014, p. 18.

²³⁶ TransGrid, *Maraylya 500kV Site - Strategic Property Acquisition Report*, 30 May 2014, pp. 13-15; and TransGrid, *Richmond Vale 500kV Substation Site - Strategic Property Acquisition Report*, 30 May 2014, p. 11.

demand forecast required to achieve the capex objectives.²³⁷ As stated in our draft decision, we are not satisfied that TransGrid's forecast capex for the Maraylya and Richmond Vale strategic property acquisitions reflects a realistic expectation of the demand forecast. We note that this conclusion is consistent with the EMRF's submission on our draft decision and TransGrid's revised proposal.²³⁸

We consider that TransGrid has been overly risk averse. It has assumed the highest load growth forecast as the basis for the economic evaluation of augmentation requirements at Maraylya and Richmond Vale. When used as a basis for forecasting required capex, TransGrid's application of the highest growth load forecast is likely to unnecessarily bring forward and overstate augmentation requirements. We consider that a medium growth scenario is more likely to reflect a realistic expectation of the demand forecast and provide a justifiable basis for incurring augex, including property acquisitions.

Applying AEMO's 2013 medium growth forecast of demand defers the augmentation date for Maraylya by 11 years.²³⁹ The need for augmentation at Richmond Vale does not arise in the period covered by TransGrid's forecasts (up to 2053) under this scenario.²⁴⁰ Any augmentation requirement would be further deferred if TransGrid applied AEMO's updated 2014 forecasts, which forecast a slower rate of maximum demand growth.²⁴¹

In the absence of new or additional information to justify these acquisitions, we maintain our draft decision that:

- the forecast capex does not reasonably reflect a realistic expectation of the demand forecast²⁴²
- the need for the Maraylya and Richmond Vale property acquisitions is uncertain as it relies on long term forecasts of growth in network maximum demand
- it is not prudent to incur capex in the 2014–18 period, and impose costs on consumers, for projects which are dependent on future growth in demand and which may or may not be required more than 30 years into the future.

We are not satisfied that TransGrid's forecast capex for the Maraylya and Richmond Vale acquisitions reasonably reflects a realistic expectation of the demand forecast or the costs that a prudent operator would require to achieve the capex objectives.²⁴³ We have excluded the forecast capex for these projects from our alternative estimate of total capex for the 2014–18 period.

²³⁷ NER, cl. 6A.6.7(c)(3).

²³⁸ Energy Markets Reform Forum, *Submission to the AER*, January 2015.

²³⁹ TransGrid, *Need Statement - Strategic Property Acquisition - Maraylya 500kV Site*, 30 May 2014, p. 10.

²⁴⁰ TransGrid, *Need Statement - Richmond Vale 500kV Substation Site Extension*, 30 May 2014, p. 13.

²⁴¹ AEMO, *2014 National Electricity Forecasting Report*, 16 June 2014, section 4.2.

²⁴² NER, cl. 6A.6.7(c)(3).

²⁴³ NER, cl. 6A.6.7(c).

B.5.4 Beryl and ACT Easements

TransGrid's revised proposal for the Beryl and ACT Easements strategic property acquisitions is consistent with both its initial proposal and our draft decision.²⁴⁴ We therefore accept that TransGrid's forecast capex of \$10.5 million reflects the efficient costs required for these projects. We have included it in our alternative estimate of total capex for the 2014–18 period.

²⁴⁴ TransGrid, *Capex accumulation model*, February 2015; and AER, *Draft decision - TransGrid transmission determination - Attachment 6 - Capital expenditure*, November 2014, pp. 6-48 and 6-53 to 6-54.

C Demand

In our draft decision, we were satisfied the system demand forecasts in TransGrid's regulatory proposal for the 2014–18 period reasonably reflected a realistic expectation of demand.²⁴⁵ We noted that TransGrid had progressively downgraded its demand forecasts in its annual planning reports since its regulatory proposal for the 2009–14 regulatory control period.

Our draft decision also set out our analysis of the TransGrid demand forecasts compared to those prepared by AEMO. The analysis showed that the growth trend for TransGrid's system demand forecast was consistent with AEMO's connection point forecast for the 2014–18 period. This was despite having different datasets and forecasting approaches. We therefore concluded that we had a level of confidence that the trend in TransGrid's forecast was realistic.

However, while the trends between the AEMO and TransGrid forecasts were consistent, the TransGrid forecasts were consistently higher at both 10 and 50 per cent probability of exceedance levels.²⁴⁶ We sought further explanation from both TransGrid and AEMO on these differences.

In response, TransGrid noted several differences between its demand data and AEMO's connection point demand data. For example, AEMO's forecasts are for the NSW region of the NEM, whereas TransGrid's forecasts are for its network, which extends into the Victoria region. TransGrid also considered its demand figures differ from AEMO's in the way they treat interconnectors and pumping loads. AEMO acknowledged the factors TransGrid identified explain some of the differences between its dataset and those of TransGrid. AEMO also noted TransGrid did not raise the treatment of rooftop photovoltaics, energy efficiency and large industrial customer activity in its response. AEMO expected different handling of these issues would result in differences in the datasets and demand forecasts.

Our draft decision concluded that there was satisfactory explanation of the differences between the forecasts. However, we also noted in our draft decision that the NSW distributors were in the process of further updating their demand forecasts. Hence, we stated that we will consider updated demand forecasts and other information in the final decision.²⁴⁷

We received several stakeholder submissions on TransGrid's demand forecasts:

²⁴⁵ AER, *Draft Decision for TransGrid transmission determination 2015–16 to 2017–18, Attachment 6: Capital expenditure*, November 2014, p.89.

²⁴⁶ Exceedance Probability defines the probability of exceeding electricity demand forecasts. Demand is expressed as the probability the forecast would be met or exceeded.

²⁴⁷ AER, *Draft Decision for TransGrid transmission determination 2015–16 to 2017–18, Attachment 6: Capital expenditure*, November 2014, p.89.

- The EMRF considered that the AER's draft decision for TransGrid addressed the EMRF's previous comment that networks tend to overestimate the expected peak demand to maximise its capex allowance.²⁴⁸
- The Energy Users' Association of Australia suggested that TransGrid's total capex forecast should be reduced further in view of the flat demand for TransGrid's network services.²⁴⁹

Since our draft decision, Ausgrid, Endeavour Energy and Essential Energy have revised their demand forecasts downward. While TransGrid has not yet published a revised system demand forecast, it has taken into account changes in system demand within its augex and connections forecasts. In particular, it has considered the release of AEMO's 2014 connection point demand forecast, which was released subsequent to TransGrid's submission of its initial proposal. As discussed in section B.2, TransGrid has reduced its augex forecast by \$0.09 million based on the revised demand forecasts. We are satisfied that the TransGrid revised proposal adequately considers the changes in connection point forecasts since the draft decision.

Accordingly, we continue to be satisfied that the system demand forecast in TransGrid's regulatory proposal for the 2014–18 period reasonably reflects a realistic expectation of demand.

²⁴⁸ EMRF, submission to the Australian Energy Regulator on the AER's Draft Decision and TransGrid's revised proposal, January 2015, p.16.

²⁴⁹ Energy Users' Association of Australia, submission to TransGrid response to draft determination (2014 to 2019), January 2015, pp. 3, 10.

D Contingent projects

Generally, contingent projects are significant network augmentation projects that may be reasonably required to be undertaken in order to achieve the capex objectives. However, unlike other proposed capex projects, the need for the project and the associated costs are not sufficiently certain. Consequently, expenditure for such projects does not form a part of our assessment of the total forecast capex that we approve in this determination. Such projects are linked to unique investment drivers (rather than general investment drivers such as expectations of load growth in a region) and are triggered by a defined 'trigger event'. The occurrence of the trigger event must be probable during the relevant regulatory control period.²⁵⁰

If the service provider considers that the trigger event has occurred during the regulatory control period, it may make an application to the AER. At that time, we will assess whether the trigger event has occurred and whether the project meets the threshold. If we were satisfied that the trigger event has occurred and that the project meets the threshold, we would determine the efficient incremental revenue which is likely to be required in each remaining year of the regulatory control period as a result of the contingent project, and amend the revenue determination accordingly.²⁵¹

TransGrid's initial revenue proposal included two proposed contingent projects:

- A network solution to the Powering Sydney's Future project to supply the Sydney central business district and inner metropolitan area.
- A project for 'Reinforcement of Capacity in Southern NSW'.

In our draft decision we rejected both proposed contingent projects. For the latter project, we proposed some amendments to the trigger event that would be required to trigger this contingent project.

In its revised revenue proposal, TransGrid accepted the AER's draft decision to not approve the Powering Sydney's Future contingent project.²⁵² TransGrid maintains its proposal for the Reinforcement of Capacity in Southern NSW. However TransGrid has proposed project triggers for this project that differ from those set out in our draft decision.²⁵³

D.1 Position

We do not accept all aspects of TransGrid's revised trigger event for the Reinforcement of Capacity in Southern NSW contingent project.²⁵⁴

²⁵⁰ NER, cl. 6A.8.1(c)(5).

²⁵¹ NER, cl. 6A.8.2.

²⁵² TransGrid, Revised revenue proposal, p. 72.

²⁵³ TransGrid, Revised revenue proposal, p. 73.

²⁵⁴ NER, cl. 6A.8.1(b)(4).

We consider that all of the following triggers must have occurred:

- AEMO classification of generation developments as being at the 'committed' stage of development on their 'Generator Information' webpage:
 - Exceeding 350MW.
 - In Southern New South Wales around Yass/Canberra/Marulan area, or any additional connection points established in this vicinity.
- Successful completion of the regulatory investment test for transmission (RIT-T) demonstrating positive net market benefits.
- Determination by the AER under clause 5.16.6 of the NER that the proposed investment satisfies the regulatory test for transmission.
- TransGrid Board commitment to proceed with the project, subject to the AER amending the revenue determination pursuant to the National Electricity Rules.

D.2 Revised proposal

TransGrid's revised revenue proposal maintains its proposed Reinforcement of Capacity in Southern NSW contingent project.

TransGrid has previously submitted that the transmission network linking the Snowy Mountains and Sydney may become congested under high summer demand scenarios, with high import from Victoria and high levels of southern New South Wales generation.²⁵⁵ TransGrid stated that this congestion could be exacerbated by the commissioning of new generation in southern New South Wales around the Yass–Canberra–Marulan area. If this portion of the network becomes congested, TransGrid proposed the following works at a total estimated cost of \$308.9 million:²⁵⁶

- Increase the ratings of Upper Tumut – Canberra line 01 and 39 Bannaby – Sydney West line 39 by increasing the height of the conductor to allow a 100 degree Celsius operating temperature.
- Increase the ratings of Yass – Marulan lines 4 and 5 by increasing the height of the conductor to allow a 100 degree Celsius operating temperature.
- Install phase shifting transformers on Bannaby – Sydney West line 39, Gullen Range – Bannaby line 61 and Yass – Marulan line 5.
- Construct a new 330 kV single circuit line between Yass and Bannaby.
- Replace equipment at Sydney South, Dapto, Avon, and Macarthur substations.

TransGrid submitted that it proposes an amended trigger event for this project that incorporates key elements of our draft decision trigger event amendments and ensures

²⁵⁵ TransGrid Revenue proposal, Appendix L - contingent projects, p. 4.

²⁵⁶ TransGrid Revenue proposal, Appendix L - contingent projects, p. 4.

a compliant RIT-T, as determined by the AER. Table 6-6 outlines TransGrid's proposed amended trigger event.

Table 6-6 TransGrid proposed contingent project

Project	Trigger event	Total cost (\$million, 2013–14)
Reinforcement of Capacity in Southern New South Wales	<ol style="list-style-type: none"> 1. AEMO classification of generation developments as being at the 'committed' stage of development on their 'Generator Information' webpage: <ol style="list-style-type: none"> i. Exceeding 350MW; ii. In Southern New South Wales around Yass/Canberra/Marulan area, or any additional connection points established in this vicinity; and 2. Successful completion of the regulatory investment test for transmission demonstrating that a transmission investment is justified; and 3. Determination by the AER under Clause 5.16.6 of the National Electricity Rules that the proposed investment satisfies the regulatory investment test for transmission (compliance review); and 4. TransGrid Board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the National Electricity Rules. 	\$308.9 million

Source: TransGrid, Revised revenue proposal, p. 73; TransGrid, Revenue proposal 2014/15 – 2018/19, Appendix L: Contingent projects, May 2014.

D.3 Assessment approach

In our draft decision we considered that the 'Reinforcement of Capacity in Southern NSW' contingent project would satisfy the NER requirements subject to TransGrid implementing a modified trigger event. In our draft decision we accepted that.²⁵⁷

- The project is reasonably required to be undertaken in order to achieve the capex objectives.²⁵⁸
- The proposed contingent project is not otherwise provided for in the capex proposal.²⁵⁹

²⁵⁷ AER, Draft decision TransGrid transmission determination 2015-18 (November 2014) p. 6-91.

²⁵⁸ NER, cl. 6A.8.1(b)(1).

²⁵⁹ NER, cl. 6A.8.1(b)(2)(i).

- The proposed contingent project capital expenditure reasonably reflects the capex criteria, taking into account the capex factors in the context of the proposed contingent project as described in the revenue proposal.²⁶⁰
- The cost of the project exceeds the defined threshold (\$30 million or 5 per cent of the value of the maximum allowed revenue for the first year of the regulatory control period).
- The occurrence of the trigger event is probable during the 2014–18 period.²⁶¹

In our draft decision we set out indicative amendments to TransGrid's proposed trigger event which we considered would be required in order to be satisfied that the 'Reinforcement of Capacity in Southern NSW' should be included as a contingent project. This modified trigger event in our draft decision is as follows:

- Successful completion of the regulatory investment test for transmission demonstrating positive net market benefits.
- Determination by the AER under clause 5.16.6 of the NER that the proposed investment satisfies the regulatory investment test for transmission (compliance review).
- TransGrid Board commitment to proceed with the project prior to submitting an application to the AER seeking an amendment to the revenue determination pursuant to the NER.²⁶²

D.4 Reasons for final decision

TransGrid's revised revenue proposal proposed a similar but different trigger event to that provided in our draft decision. TransGrid did not provide any reasons outlining why it departed from the indicative trigger event that was outlined in our draft decision.

We accept that TransGrid's drafting of the requirement for TransGrid Board commitment to proceed is sufficient. As with all aspects of the trigger event, evidence of this commitment would need to be provided to us should TransGrid seek to have us amend the revenue determination. We have also amended our draft decision trigger event to include TransGrid's proposed AEMO classification of generation developments as being at the 'committed' stage of development.

Otherwise, we consider that all other aspects of the trigger event set out in our final decision are required for the reasons set out in the draft decision.²⁶³ As explained in our draft decision and summarised in the table below, this trigger event makes it clear that should the event occur, it makes the undertaking of the proposed contingent

²⁶⁰ NER, cl. 6A.8.1(b)(2)(ii).

²⁶¹ NER, cl. 6A.8.1(c)(5).

²⁶² AER, Draft decision TransGrid transmission determination 2015-18 (November 2014), p. 6-86 - 6-91

²⁶³ AER, Draft decision TransGrid transmission determination 2015-18 (November 2014), p. 6-90.

project reasonably necessary in order to achieve the capex objectives, specifically to meet or manage expected demand for prescribed transmission services.²⁶⁴

Our revised trigger event which we are satisfied meets the NER requirements is outlined in Table 6-7.

Table 6-7 AER assessment of trigger events for the Reinforcement of Capacity in Southern New South Wales contingent project

Proposed Trigger event	AER assessment
<p>AEMO classification of generation developments as being at the 'committed' stage of development on their 'Generator Information' webpage:</p> <ul style="list-style-type: none"> i. Exceeding 350MW; ii. In Southern New South Wales around Yass/Canberra/Marulan area, or any additional connection points established in this vicinity; and 	<p>We have accepted this element of the trigger event on the basis that this is consistent with AEMO's view that any proposed augmentation should be contingent on 350MW of committed projects in southern NSW around the Yass--Canberra-Marulan area or any additional connection pints in this vicinity.</p>
<p>Successful completion of the regulatory investment test for transmission demonstrating that a transmission investment is justified; and</p>	<p>We consider that completion of a RIT-T is not an appropriate trigger event and propose an alternative trigger event. We consider that the successful completion of the regulatory investment test for transmission demonstrating positive net market benefits be specified in the trigger event given this project is not a reliability corrective action²⁶⁵. The need to demonstrate positive market benefits for the investment was also recognised by AEMO. As we noted in our draft decision the first two stages of the proposed contingent project increase the ratings of lines by increasing the height of the conductor to allow a higher operating temperature. These same lines are also included in the NCIPAP dynamic ratings projects. TransGrid justified these projects on the basis that:</p> <ul style="list-style-type: none"> • The benefit is the avoidance of the market impact due to the present 4, 5, 9, 61 and 39 Line limits, under favourable conditions. • Renewable generation developments in Southern NSW, driven by the Renewable Energy Target are likely to increase the power transfer on 4.5,9,61 and 39 Lines. The benefits of this project are the avoidance of wind generation being constrained off and thermal generation dispatched in its place. <p>It is likely that specifying the need to demonstrate positive market benefits will result in increased costs that are specific to resolving congestion in southern NSW.</p>
<p>Determination by the AER under</p>	<p>Accept consistent with our draft decision</p>

²⁶⁴ NER, cl. 6A.8.1(c)(2).

²⁶⁵ NER, cl. 5.16(b)(1).

Proposed Trigger event	AER assessment
<p>Clause 5.16.6 of the National Electricity Rules that the proposed investment satisfies the regulatory investment test for transmission (compliance review); and</p>	
<p>TransGrid Board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the National Electricity Rules.</p>	<p>Accept; consistent with our draft decision.</p>

Source: Revised revenue proposal, p.73, TransGrid Revenue proposal - 2014/15 to 2018/19, Appendix L: Contingent projects, May 2014, AER analysis

We consider that the trigger event set out in this decision is such that if the trigger event occurs the project is reasonably required to achieve the capex objectives.²⁶⁶ In addition, the trigger event is likely to result in increased costs that are specific to generation congestion in southern NSW.²⁶⁷ The trigger event for our final decision is set out below.

- AEMO classification of generation developments as being at the 'committed' stage of development on the 'Generator Information' webpage:
 - (a) exceeding 350MW;
 - (b) in Southern new South Wales around Yass/Canberra/Marulan area, or any additional connection points established in the vicinity.
- Successful completion of the regulatory investment test for transmission demonstrating positive net market benefits.
- Determination by the AER under clause 5.16.6 of the NER that the proposed investment satisfies the regulatory investment test for transmission.
- TransGrid Board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the NER.

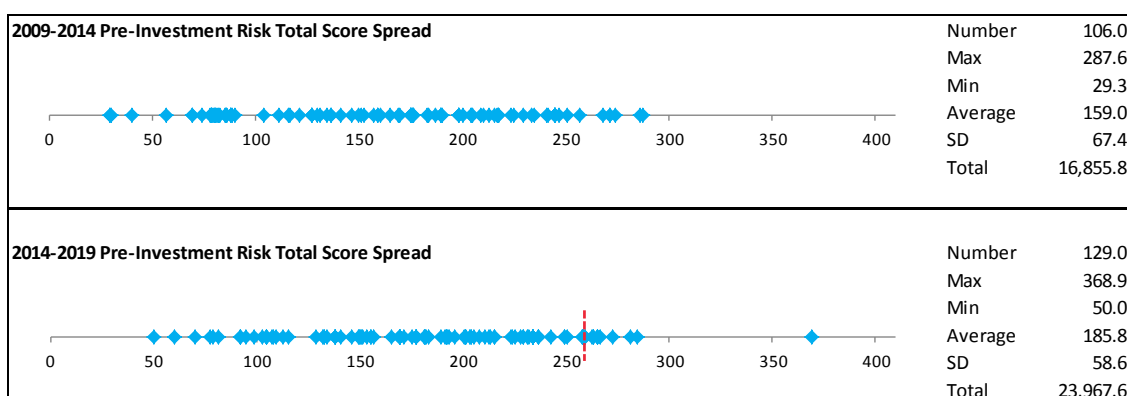
²⁶⁶ NER, cl.6A.8.1(b)(1).

²⁶⁷ NER, cl. 6A.8.1(c)(3).

E Statistical analysis of TransGrid's Risk profile

TransGrid presented Figure E-1 to demonstrate that it is undertaking projects with a similar risk profile to the previous regulatory control period. We have analysed the distribution of the risk scores in the 2009-14 and 2014-18 regulatory control periods and conclude that these two risk distributions are not generated by the same process and that TransGrid has inflated its risk scores in comparison to the previous regulatory period.

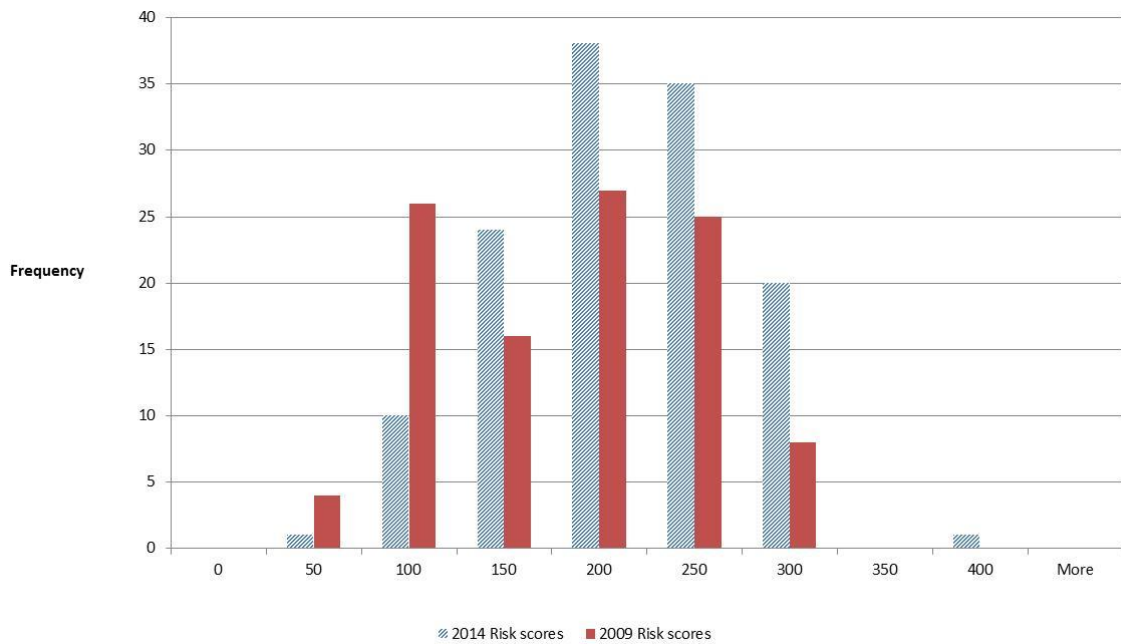
Figure E-1 TransGrid analysis of risk distribution



Source: TransGrid, *Revised revenue proposal 2014/15 – 2017/18*, January 2015

Figure E-2 provides a visual indication that the profile of risk scores in these two periods is different. In 2014 there appears to be a greater proportion of projects with higher risk scores.

Figure E-2 Histogram of risk scores



Source: AER analysis

Figure E-3 shows the output of a T-test, which can be used to determine if two sets of data are significantly different from each other. This test shows that the risk scores from 2009 and 2014 are significantly different from one another and this demonstrates that TransGrid is not addressing a group of projects with similar risk profiles as contended in its revised regulatory proposal.

Figure E-3 T-test

t-Test: Two-Sample Assuming Equal Variances		
	Variable 1	Variable 2
Mean	159.0174	185.7953
Variance	4544.902	3437.974
Observations	106	129
Pooled Variance	3936.804	
Hypothesized Mean Difference	0	
df	233	
t Stat	-3.25552	
P(T<=t) one-tail	0.00065	
t Critical one-tail	1.65142	
P(T<=t) two-tail	0.0013	
t Critical two-tail	1.970198	

Source: AER analysis