



Draft decision

TasNetworks transmission determination

2015-16 to 2018-19

Attachment 6: Capital expenditure

November 2014

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Note

This attachment forms part of the AER's draft decision on the transmission determination for TasNetworks' 2015–19 regulatory control period. It should be read in conjunction with other parts of the draft decision.

The draft 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
AASB	Australian Accounting Standards Board
ABS	Australian Bureau of Statistics
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARPC	Australian Reinsurance Pool Corporation
ASRR	aggregate service revenue requirement
ASX	Australian Stock Exchange
ATO	Australian Tax Office
augex	augmentation expenditure
Benchmarking report	AER, <i>Electricity transmission network service providers annual benchmarking report</i> , November 2014
capex	capital expenditure
capex incentive guideline	AER, <i>Capital Expenditure Incentive Guideline for Electricity Network Service Providers</i> , November 2013
CCP	Consumer Challenge Panel
CEG	Competition Economics Group
CESS	capital expenditure sharing scheme
CPI	consumer price index
DAE	Deloitte Access Economic
DRP	debt risk premium
EBA	enterprise bargaining agreement

Shortened form	Extended form
EBSS	efficiency benefit sharing scheme
EGWWS	electricity, gas, water and waste services
EMCa	Energy Market Consulting associates
ERA	Economic Regulation Authority of Western Australia
ERP	equity risk premium
EUA	Energy Users Association of Australia
Guideline	AER, <i>Expenditure forecast assessment guideline for electricity transmission</i> , November 2013
JGN	Jemena Gas Networks
MAR	maximum allowed revenue
MEU	Major Energy Users
MJA	Marsden Jacob Associates
MRP	market risk premium
MTFP	multilateral total factor productivity
MW	megawatts
NEL	national electricity law
NEM	national electricity market
NEO	national electricity objective
NER	national electricity rules
NERA	NERA Economic Consulting
NSP	network service provider
NTNDP	National Transmission Network Development Plan
NTSC	negotiated transmission service criteria

Shortened form	Extended form
NSW	New South Wales
opex	operating expenditure
PFP	partial factor productivity
PPI	partial performance indicators
PPI	producer price index
PTRM	post-tax revenue model
QCA	Queensland Competition Authority
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
SFG	SFG Consulting
SLCAPM	Sharpe-Lintner capital asset pricing model
STPIS	service target performance incentive scheme
TAB	tax asset base
TFP	total factor productivity
TNSP	transmission network service provider
TSBC	Tasmanian Small Business Council
TUoS	transmission use of system
version one of the EBSS	AER, <i>Electricity transmission network service providers: Efficiency benefit sharing scheme</i> , September 2007

Shortened form	Extended form
version two of the EBSS	AER, <i>Efficiency benefit sharing scheme for electricity network service providers</i> , November 2013
WACC	weighted average cost of capital
WPI	wage price index

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 TasNetworks' total revenue requirement.¹

We generally categorise capex as either network or non-network capex. Network capex includes growth-driven capex and non-load driven capex. Growth-driven capex includes augmentations and new connections. Non-load driven capex includes replacement and refurbishment of existing assets. Non-network capex covers expenditure in areas other than the network itself, and includes business information technology (IT) and buildings/facilities.

This attachment sets out our draft decision on TasNetworks' proposed total forecast capex. Further detailed analysis is in the following appendices:

Appendix A – Capex associated with each of the capex drivers that underlie TasNetworks' proposed total forecast capex

Appendix B – Overview of our assessment approaches

Appendix C – Demand

Appendix D – Real cost escalation

6.1 Draft decision

TasNetworks proposed total forecast capex of \$275.9 million (\$2013–14) in their revenue proposal. We are not satisfied that this reasonably reflects the capex criteria. Based on further information provided by TasNetworks during the determination process, and supporting information from AEMO, our alternative estimate of TasNetworks' total forecast capex for the 2014–19 period is \$246.4 million (\$2013–14). We are satisfied that this reasonably reflects the capex criteria.

Table 6-1 outlines our draft decision. Table 6-2 summarises our reasons and findings.

Table 6-1 Our draft decision on TasNetworks' total forecast capex (\$ million 2013–14)

	2014–15	2015–16	2016–17	2017–18	2018-19	Total
TasNetworks' proposal	51.0	66.1	59.9	53.7	45.3	275.9
AER draft decision	50.6	64.5	52.8	44.5	34.0	246.4
Difference	-0.4	-1.6	-7.1	-9.2	-11.3	-29.5
Percentage difference (%)	0.8	2.4	11.9	17.1	25.0	10.7

Source: TasNetworks, Revenue Proposal; AER analysis

Note: Numbers may not add due to rounding

¹ NER, clause 6A.6.4(a).

Table 6-2 Summary of AER reasons and findings

Issue	Reasons and findings
Forecasting methodology, key assumptions and past capex performance	<p>TasNetworks used a bottom up methodology to develop its proposed forecast capex. This methodology has the potential to overstate the amount of capex required to reflect the capex criteria. We therefore applied a combination of top down and bottom up assessments to test whether TasNetworks' capex proposal is reasonable. This includes considering TasNetworks' past capex performance and trend analysis. Based on this assessment, and subject to our findings on augex, below, we are satisfied that TasNetworks' proposal reasonably reflects the capex criteria.</p>
Augmentation capex	<p>The vast majority of TasNetworks' proposed forecast augex of \$36.8 million (\$2013–14) is driven by two individual augmentation projects. During the determination process, TasNetworks submitted that these projects could be prudently deferred until after the 2014-19 period and submitted updated forecasts of augex and repex to reflect the deferral of these projects. The deferral of these projects is supported by revised demand forecasts and information from AEMO.</p> <p>We have included an amount of \$1.6 million (\$2013–14) in our alternative estimate of capex for the 2014-19 period. Our alternative estimate reflects TasNetworks' revised augex forecast which we are satisfied reasonably reflects the capex criteria.</p>
Customer connections capex	<p>We have accepted and included TasNetworks' proposed forecast connections capex of \$19.03 million (\$2013–14) in our alternative estimate. We have found that TasNetworks' proposed forecast connections capex reflects the trend of reduced demand at a state level since the start of the 2009–14 regulatory control period.</p>
Repex (including security and compliance capex)	<p>While TasNetworks' proposed forecast repex of \$207.5 million (\$2013–14) makes up the largest proportion of its total capex, TasNetworks has proposed historically low amounts of repex, on average, over the entire 2014-19 period. Based on the deferral of TasNetworks' two key augmentation projects (as discussed above), TasNetworks submitted that an additional \$5.6 million (\$2013–14) in repex would be required to maintain network reliability.</p> <p>We accept TasNetworks' proposed forecast and the additional amount for asset replacements and have included an amount of \$213 million (\$2013–14) in our alternative estimate that we are satisfied reasonably reflects the capex criteria.</p> <p>TasNetworks' historically low repex follows a period of relatively high asset renewal and enhancement capex. TasNetworks stated that its asset replacement programs over 2009-14 period have resulted in maintenance intensive assets being replaced with modern equivalents which are less maintenance intensive. TasNetworks' capex for spare assets and operational support systems should be required maintain network reliability.</p>
Non-network capex	<p>We have accepted and included TasNetworks' proposed forecast non-network capex of \$12.7 million (\$2013-14) in our alternative estimate that we are satisfied reasonably reflects the capex criteria. This is based primarily on trend analysis which shows that TasNetworks' forecast non-network capex is 75 per cent lower per year than actual non-network capex it spent during the 2009–14 regulatory control period.</p>
Real cost escalators	<p>We have not accepted TasNetworks' proposed real material cost escalators (which suggest cost increases above CPI). This has not affected TasNetworks' proposed application of labour and construction cost escalators to its forecast capex and opex.</p> <p>We have also not accepted TasNetworks' proposed real escalation of labour prices on the basis of our reasoning in Attachment 7.</p>

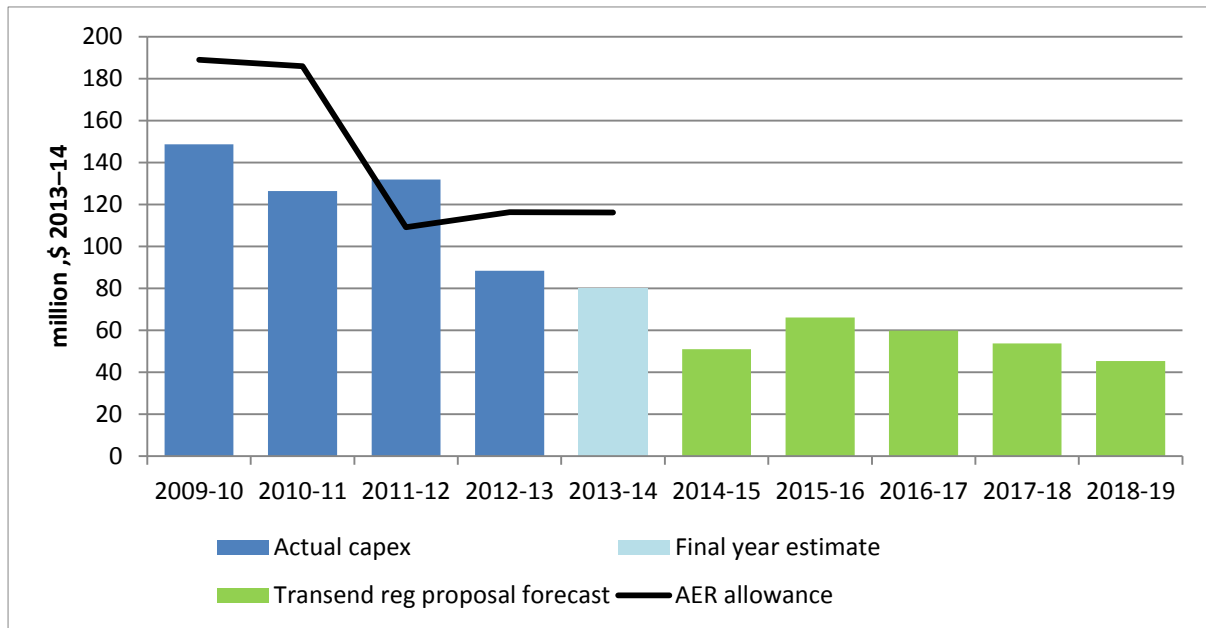
Source: AER analysis

6.2 TasNetworks' proposal

TasNetworks proposed total forecast capex of \$275.9 million (\$2013–14) for the 2014–19 period. This is 52 per cent lower than the actual capex that TasNetworks spent during the 2009–14 regulatory control period. This reflects reductions to all capex categories.

Error! Reference source not found. shows the reduction between TasNetworks' proposal for the 014–19 period and the actual capex that it spent during the 2009–14 regulatory control period. According to TasNetworks, this proposed reduction is attributable to a reduced need for augmentation expenditure due to weak demand growth, and the conclusion of a significant asset renewal phase in the previous period.²

Figure 6-1 TasNetworks' capital expenditure



Source: TasNetworks revenue proposal, AER analysis

After TasNetworks submitted its proposal, TasNetworks submitted updated information which supported further reductions to its forecast capex—specifically, through the removal of two key augmentation projects. Revised demand forecasts and AEMO's assessment report of TasNetworks' network investment needs also supported the removal of these projects. TasNetworks provided suggested adjustments to its proposed forecast capex, our assessment of which has informed our alternative estimate of forecast capex.

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.

² TasNetworks, Revenue Proposal, pp. 4-6.

We will accept TasNetworks' proposed total forecast capex if we are satisfied that it reasonably reflects the capex criteria.³ If we are not satisfied, we replace it with our estimate of a total forecast capex that we are satisfied reasonably reflects the capex criteria.⁴ 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 Australian Energy Market Commission (AEMC) noted that '[t]hese criteria broadly reflect the NEO [National Electricity Objective]'.⁵ The capital expenditure objectives (capex objectives) referred to in the capex criteria, are to:⁶

- 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 expressed our role in these terms:⁷

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

In deciding whether we are satisfied that TasNetworks' proposed total forecast capex reasonably reflects the capex criteria, we have regard to the capex factors.

The capex factors are:⁸

1. the AER's most recent annual benchmarking report and benchmarking capex that would be incurred by an efficient TNSP over the relevant regulatory control period
2. the actual and expected capex of the TNSP during the preceding regulatory control periods
3. the extent to which the capex forecast includes expenditure to address the concerns of electricity consumers as identified by the TNSP in the course of its engagement with electricity consumers
4. the relative prices of operating and capital inputs
5. the substitution possibilities between operating and capital expenditure

³ NER, clause 6A.6.7(c).

⁴ NER, clauses 6A.6.7(d) and 6A.14.1(2)(ii).

⁵ 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).

⁶ NER, clause 6A.6.7(a).

⁷ AEMC Economic Regulation Final Rule Determination, p. vii.

⁸ NER, clause 6A.6.7(e).

6. whether the capex forecast is consistent with any incentive scheme or schemes that apply to the TNSP
7. the extent to which the capex forecast is referable to arrangements with a person other than the TNSP that, in the opinion of the AER, do not reflect arm's length terms
8. whether the capex forecast includes an amount relating to a project that should more appropriately be included as a contingent project
9. the most recent National Transmission Network Development Plan (NTNDP) and any submissions made by AEMO on the forecast of the TNSP's required capex
10. the extent to which the TNSP has considered, and made provision for, efficient and prudent non-network alternatives.
11. any relevant project assessment conclusions report under clause 5.6.6 of the NER.

In addition, the AER may notify the TNSP in writing, prior to the submission of its revised revenue proposal, of any other factor it considers relevant.⁹

In taking these factors into account, the AEMC has noted that:¹⁰

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

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

More broadly, we also note that in exercising our discretion, we take into account the revenue and pricing principles which are set out in the National Electricity Law.¹¹

The Expenditure Forecast Assessment Guideline

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). The 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 TasNetworks, our framework and approach paper (published in January 2014) stated that we would apply the guideline, including the assessment techniques outlined in it. We may depart from our Guideline approach and if we do so, need to explain why. In this determination we have not departed from the approach set out in our Guideline.

Building an alternative estimate of total forecast capex

Our starting point is the service provider's proposal.¹² We then considered the service provider's performance in the previous regulatory control period to inform our alternative estimate. We also reviewed the proposed forecast methodology and the service provider's reliance on key assumptions that underlie its forecast.

⁹ NER, clause 6A.6.7(e)(14).

¹⁰ AEMC Economic Regulation Final Rule Determination, p. 115.

¹¹ NEL, sections 7A and 16(2).

¹² AER Expenditure Forecast Electricity Transmission Guideline, p. 9; see also AEMC Economic Regulation Final Rule Determination, pp. 111 and 112.

We then applied our specific assessment techniques, outlined below, to develop and estimate and assess the economic justifications that the service provider put forward. The specific techniques that we have used in this draft decision include:

- economic benchmarking—to assess a business’s overall efficiency (and trends in efficiency) compared with other businesses, drawing on our annual benchmarking report¹³
- trend analysis—forecasting future expenditure based on historical information, especially for recurrent and predictable categories of expenditure

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 projects. Once we approve total revenue, which will be determined by reference to the AER’s 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 acting prudently and efficiently, the service provider will consider the changing environment throughout the regulatory period and make sound decisions taking into account their individual circumstances.

Many of our techniques encompass the capex factors that we are required to take into account. These techniques are discussed in more detail in Appendix B.

As explained in our Guidelines:

Our assessment techniques may complement each other in terms of the information they provide. This holistic approach gives us the ability to use all of these techniques, and refine them over time. The extent to which we use each technique will vary depending on the expenditure proposal we are assessing, but we intend to consider the inter-connections between our assessment techniques when determining total capex ... forecasts. We typically would not infer the findings of an assessment technique in isolation from other techniques.¹⁴

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. 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. We identify these interrelationships in section 6.4.4 below. In particular, the other components that directly affect the total forecast capex are forecast demand and real cost escalation. We discuss how these components impact the total forecast demand in Appendices C and D.

Underlying our approach are two general assumptions:

¹³ As part of the 2012 rule changes, the AEMC emphasised the role of benchmarking in our assessment of capex. In particular, we are now required to produce annual benchmarking reports. This is also a capex factor that we are now required to consider in assessing a capex proposal. The AEMC removed the focus on a business’ ‘individual circumstances’ as it could be an impediment to the use of benchmarking by the AER: AER Expenditure Forecast Electricity Transmission Guideline, p. vii; AEMC, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, November 2012, p. 97; NER, clause 6A.6.7A(e)(4).

¹⁴ AER Expenditure Forecast Electricity Transmission Guideline, p. 15

- 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.¹⁵
- Past expenditure was sufficient for TasNetworks to manage and operate its network in that previous period, in a manner that achieved the capex objectives.¹⁶

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

Comparing the service provider's proposal with our estimate

Having established our estimate of the total forecast capex, we can test the service provider's proposed total forecast capex. This includes comparing our alternative estimate of forecast total capex with the service provider's forecast total. The service provider'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.¹⁷

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

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

Where we approve a service provider's proposed total forecast capex or where we substitute our estimate of total forecast capex, it is important to recognise that the service provider is not precluded from undertaking unexpected capex works, if the need arises, and despite the fact that such works did not form part of our assessment in this determination. As noted above, we anticipate that a service provider will prioritise their capex program of works. Where an unexpected event leads to an overspend of the capex amount approved in this determination as part of total revenue, a service provider will only be required to bear 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. For these reasons, in the event that the approved total revenue underestimates the total capex required, we do not consider that this should lead to undue safety or reliability issues. Conversely, if we overestimate the amount of capex required, the stronger incentives put in place by the AEMC in 2012 should lead to a business spending only what is efficient, with the benefits of the underspend being shared between businesses and consumers.

6.4 Reasons for draft decision

TasNetworks proposed total forecast capex of \$275.9 million (\$2013–14) in its revenue proposal, which is significantly lower than its actual expenditure in the current regulatory control period.

¹⁵ AER Expenditure Forecast Electricity Transmission Guideline, pp. 8-9.

¹⁶ AER Expenditure Forecast Electricity Transmission Guideline, p. 9.

¹⁷ AEMC Economic Regulation Final Rule Determination, p. 112.

Information provided during the determination process by AEMO and TasNetworks supported the removal of two large projects comprising the majority of TasNetworks' proposed augex. Based on this further information, our alternative estimate of TasNetworks' total forecast capex for the 2014–19 period is \$246.4 million (\$2013–14), which we are satisfied reasonably reflects the capex criteria.

Our assessment of TasNetworks' forecasting methodology, key assumptions and past capex performance is discussed in this section below. Our assessment of capex drivers is in Appendix A. This sets out the application of our assessment techniques to the capex drivers, and the weighting we gave to particular techniques. Our reasoning in the appendices forms the basis of our alternative estimate.

Table 6-3 specifies the capex drivers and our estimate of the associated capex for each capex driver for the 2014–19 period.

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

Category	2014–15	2015–16	2016–17	2017–18	2018-19	Total
Augmentation	0.0	0.4	1.3	0.0	0.0	1.6
Connections	2.9	11.3	3.8	1.1	0.0	19.0
Replacement	44.6	49.8	45.3	41.1	32.3	213.0
Non-network	3.2	3.0	2.4	2.4	1.7	12.7
Total capex	50.6	64.5	52.8	44.5	34.0	246.4

Source: AER analysis

Note: Numbers may not total due to rounding

6.4.1 Forecasting methodology

TasNetworks is required to inform us about the methodology it proposes to use to prepare its forecast capex allowance before it submits its revenue proposal.¹⁸ It is also required to include this information in its revenue proposal.¹⁹

TasNetworks used a bottom up forecasting methodology. As discussed below, we consider that this methodology has the potential to overstate the amount of capex required to reflect the capex criteria. To test whether TasNetworks' capex proposal is efficient, we therefore applied a combination of top down and bottom up assessments. As outlined in Table 6-2, based on this assessment, and subject to changes we have made to the augex component of its total forecast capex in response to new information, we are satisfied that TasNetworks' proposal reasonably reflects the capex criteria.

While our concern with TasNetworks' methodology is not sufficient for us to conclude that its proposed total forecast capex does not reasonably reflects the capex criteria, we expect TasNetworks to develop its capex proposals for future regulatory periods through a combination of top down and bottom up modelling.

¹⁸ NER, clauses 6A.10.1B and 11.58.4(n); Transend Networks Pty Ltd, 2014–19 Revenue Proposal Forecasting Methodology, November 2013.

¹⁹ NER, clauses S6A.1.1(2); TasNetworks, Revenue Proposal, Appendix 7.

The main points of TasNetworks' forecasting methodology are:²⁰

- There are three categories of investment plans: development (comprising augmentation, connection and land and easements), renewal/enhancement (comprising asset renewal/enhancement, physical security/compliance, inventory/spares and operational support systems) and non-network (comprising information technology and business support).
- TasNetworks has used a bottom up build to derive its forecast capex for all of its capital programs and projects. Its capital projects are scoped to meet specific needs, whereas its capital programs group similar minor projects.
- TasNetworks has applied its approved cost allocation method so that all forecast capex is allocated to prescribed transmission services.
- TasNetworks' proposed forecast capex does not include expenditure relating to a project that should be included as a contingent project.
- TasNetworks has reflected feedback from customers in its proposed forecast capex.

As noted, TasNetworks' 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 combine this with the application of a top down assessment to check or test whether these estimates are efficient. While a bottom up assessment may be reasonably in very limited circumstances, the drawback of deriving an estimate of capex solely by applying a bottom up assessment is that of itself it does not provide any evidence that the estimate is 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 certain very limited circumstances, a bottom up build may be a reasonable approach to justifying expenditure. However, this is not the case when looking at aggregated areas of expenditure or at the global level. In most cases, simply aggregating such estimates is unlikely to result in a total forecast capex allowance that we are satisfied reasonably reflects the capex criteria.

As we stated in our Expenditure Forecast Assessment Guidelines, we intend to assess forecast capex proposals through a combination of top down and bottom up modelling.²¹ Our top down assessment of TasNetworks' proposed forecast is a material consideration in determining whether we are satisfied if it reasonably reflects the capex criteria. For example, trend analysis is a top down assessment that can be applied in the context of a transmission network. This technique is able to test whether an estimate that results from a bottom up assessment might be efficient. We have used this technique in this determination.

A top down assessment should also clearly evidence a holistic and strategic consideration or assessment of the entire forecast capex program at a portfolio level. It should also demonstrate how the forecast capex proposal has been subject to governance and risk management arrangements. In turn, these arrangements should demonstrate how the timing and prioritisation of certain capital projects or programs has been determined over both the short and the long-term. It should also demonstrate that the capex drivers, such as asset health and risk levels, are well defined and justified. In particular, asset health and risk level metrics are key elements of capex drivers.

²⁰ TasNetworks, Revenue Proposal, pp. 87–91.

²¹ AER Expenditure Forecast Electricity Transmission Guideline, p. 12

We consider TasNetworks' forecast methodology does not demonstrate these points and a top down review of its forecast total capex is warranted.

6.4.2 Key assumptions

The NER require TasNetworks 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.²²

TasNetworks' key assumptions concern various standards, forecasts, models and inputs. To the extent that TasNetworks has relied on its key assumptions to justify its capex proposal, we have addressed these key assumptions in Appendix C (demand forecasts) and Appendix D (forecast materials escalation rates).

6.4.3 TasNetworks' capex performance

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

These results show that TasNetworks' its capex efficiency has been slowly, but steadily declining over time. However, TasNetworks overall expenditure efficiency is better than the comparable transmission networks. TasNetworks now proposes historical low levels of proposed capex for the 2014–19 period, as shown in Figure 6-3, which suggests that TasNetworks will seek to improve its capex performance in the 2014–19 period.

We have not placed much weight on the other results from our annual benchmarking report. As noted in the report, it is difficult to draw any firm conclusions regarding the relative efficiency of the transmission networks based upon the benchmarking results. This is because the relative efficiency of the networks change depending on the measure selected.

Figure 6-2 shows TasNetworks' MTFP performance relative to the other TNSPs. MTFP measures how efficient a business is in terms of its inputs (costs) and outputs (energy delivered, customer numbers, ratcheted maximum demand, reliability and circuit line length).

²² NER, clauses S6A.1.1(2), (4) and (5). TasNetworks, Revenue Proposal, Appendix 7, pp. 12 and 13.

Figure 6-2 Relative MTFP performance of transmission networks

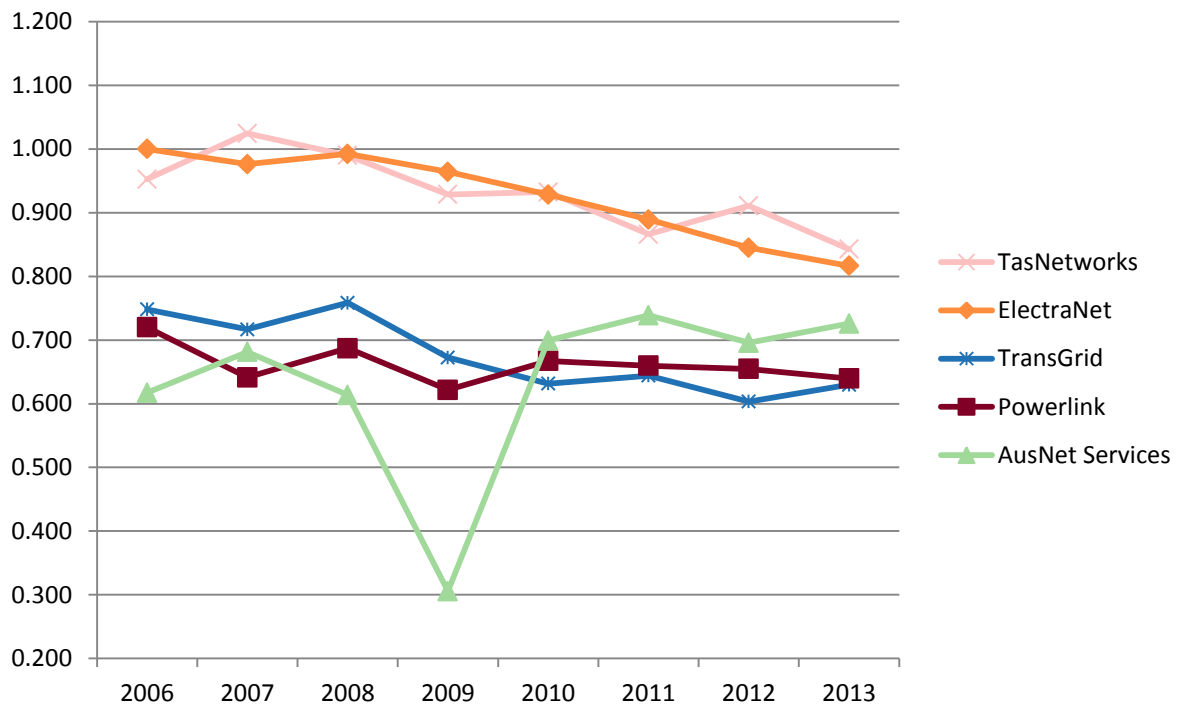
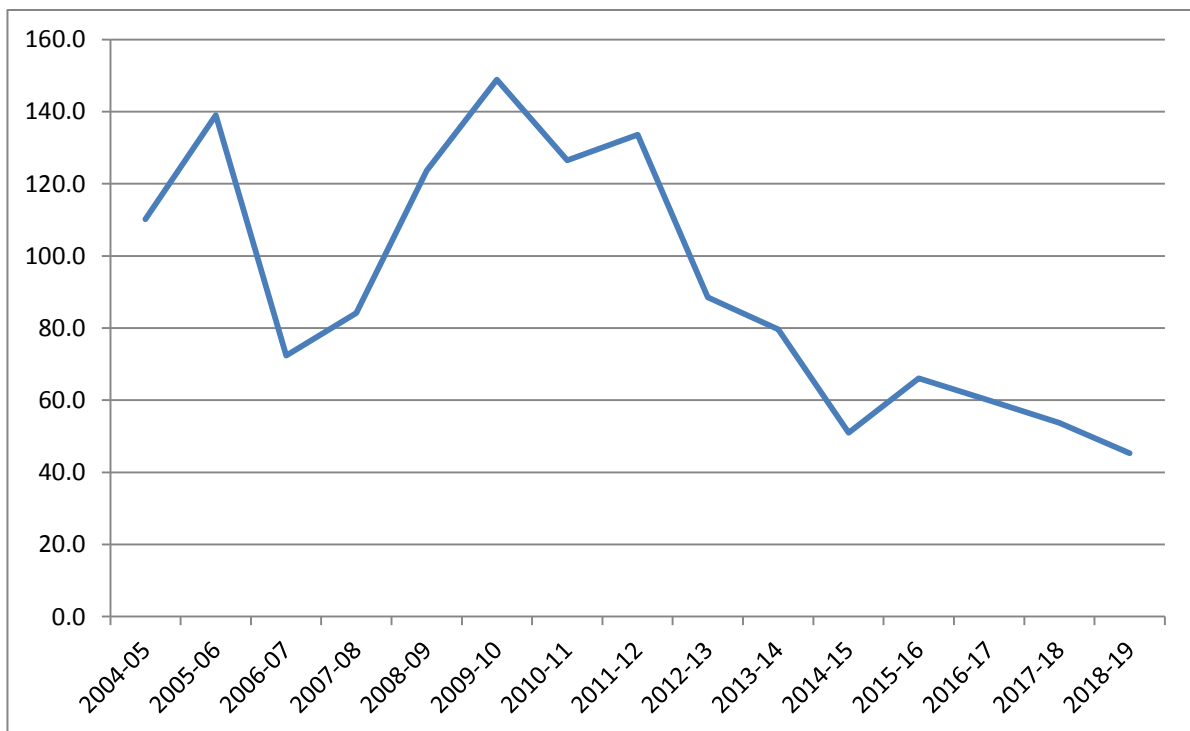


Figure 6-3 shows TasNetworks' proposed forecast capex against historical trends (\$2013–14). This indicates that TasNetworks is proposing historically low levels of capex.

Figure 6-3 Historic capex and forecast capex for TasNetworks (million \$2013/14)



6.4.4 Interrelationships

There are a number of interrelationships between TasNetworks' total forecast capex for the 2014–19 period and other components of its transmission determination that we have taken into account in coming to our draft decision. Table 6-4 summarises these other components and their interrelationships with the total forecast capex.

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

Other component	Interrelationships
Total forecast opex	<p>There are elements of the TasNetworks' total forecast opex, as assessed in Attachment 7, that are interrelated with its total forecast capex. These are:</p> <ul style="list-style-type: none"> ▪ the labour cost escalators and ▪ the amount of maintenance opex that is reflected in TasNetworks' opex base year. <p>The labour cost escalators are interrelated because TasNetworks' total forecast capex includes expenditure for capitalised labour. As to the amount of maintenance opex, although we did not approve a specific amount of maintenance opex as part of assessing TasNetworks' total forecast opex, it is interrelated. This is because the amount of maintenance opex that is reflected in TasNetworks' opex base in part determines the extent to which TasNetworks needs to spend repex during the 2014–19 period.</p>
Forecast demand	<p>Forecast demand is interrelated with the amount of forecast growth driven capex that is included in TasNetworks' 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> <p>System peak demand in Tasmania decreased on average by around 0.63 per cent per annum over the past five years. In addition, growth in peak demand is expected to be on average 1.18 per cent per annum in the 2014–19 period. These expectations indicate that only modest amounts of growth related expenditure will be required in the forthcoming period. This is reflected in our alternative estimated of augex and connections capex.</p>
CESS	<p>The CESS is interrelated to TasNetworks' 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. 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 TasNetworks' regulatory asset base. In particular, the CESS will ensure that TasNetworks bears at least 30 per cent of any overspend against the capex allowance. Similarly, if TasNetworks can fulfil its objectives without spending the full capex allowance, it will be able to retain 30 per cent of the benefit of this. In addition, if an overspend is found to be inefficient through the ex post review, TasNetworks risks having to bear the entire overspend.</p>
STPIS	<p>The STPIS is interrelated to TasNetworks' 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 2014–19 period. This is because such expenditure should be offset by rewards provided through the application of the STPIS (of which our incentive rates ensures that such rewards reflect the value customers place on reliability improvement).</p>

Source: AER analysis

6.4.5 Consideration of the capex factors

In applying our assessment techniques to determine whether we are satisfied that TasNetworks' proposed total forecast capex and our alternative estimate reasonably reflects the capex criteria, we have had regard to the capex factors. Where relevant, we have also had regard to the capex factors in assessing the forecast capex associated with its underlying capex drivers as set out in Appendix A. Table 6-5 summarises how we have taken into account the capex factors.

Table 6-5 AER consideration of the capex factors

Capex factor	AER consideration
The most recent annual benchmarking report and benchmarking capex that would be incurred by an efficient TNSP over the relevant regulatory control period	We have had regard to our most recent benchmarking report in assessing TasNetworks' proposed total forecast capex and in determining our alternative estimate for the 2014–19 period. This can be seen in the metrics we used in our assessment of TasNetworks' capex performance in section 6.4.3.
TasNetworks' actual and expected capex during any preceding regulatory control periods	We have had regard to TasNetworks' actual and expected capex during the 2009–14 and preceding regulatory control periods in assessing its proposed total forecast capex and in determining our alternative estimate for the 2014–19 period. This can be seen in our assessment of TasNetworks' capex performance in section 6.4.3. It can also be seen in our assessment of the forecast capex associated with each of the capex drivers that underlie TasNetworks' total forecast capex. In these cases, we have applied trend analysis which is reasonably likely to be recurrent in nature (e.g. compliance related expenditure, non-network related expenditure and replacement related expenditure).
The extent to which the capex forecast includes expenditure to address concerns of electricity consumers as identified by TasNetworks in the course of its engagement with electricity consumers	We have had regard to the extent to which TasNetworks' proposed total forecast capex and our alternative estimate includes expenditure to address consumer concerns that have been identified by TasNetworks.
The relative prices of operating and capital inputs	We have had regard to the relative prices of operating and capital inputs in assessing TasNetworks' proposed real cost escalation factors for materials. We discuss this in Appendix D.
The substitution possibilities between operating and capital expenditure	We have had regard to the substitution possibilities between opex and capex. We have considered whether there are more efficient and prudent trade-offs in investing more or less in capital in place of ongoing operations. See our discussion about the interrelationships between TasNetworks' 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 TasNetworks	We have had regard to whether TasNetworks' proposed total forecast capex is consistent with the CESS and the STPIS. See our discussion about the interrelationships between TasNetworks' 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 DNSP that do not reflect arm's length terms	We have had regard to whether any part of TasNetworks' proposed total forecast capex or our alternative estimate is referable to arrangements with a person other than TasNetworks that do not reflect arm's length terms. We did not identify any such parts.

Capex factor	AER consideration
Whether the capex forecast includes an amount relating to a project that should more appropriately be included as a contingent project	We have had regard to whether any amount of TasNetworks' proposed total forecast capex or our alternative estimate relates to a project that should more appropriately be included as a contingent project. We did not identify any such amounts.
The most recent National Transmission Network Development Plan (NTNDP), and any submissions made by AEMO, on the forecast of TasNetworks' required capex	We have had regard to the most recent NTNDP and submissions made by AEMO in our assessment of the forecast capex associated with the augex capex driver. See Appendix A.
The extent to which TasNetworks has considered and made provision for efficient and prudent non-network alternatives	We have had regard to the extent to which TasNetworks made provision for efficient and prudent non-network alternatives as part of our assessment of the capex associated with the non-network capex driver. We discuss this further in Appendix A.
Any relevant project assessment conclusions report required under clause 5.6.6 of the NER	There are no project assessment conclusions reports relevant to TasNetworks.
Any other factor the AER considers relevant and which the AER has notified TasNetworks in writing, prior to the submission of its revised Revenue Proposal under cl.6A.12.3, is a capex factor	We did not identify any other capex factor that we consider relevant.

Source: AER analysis

A Assessment of forecast capex drivers

As we discuss in Attachment 6, we are not satisfied that TasNetworks' proposed total forecast capex reasonably reflects the capex criteria. This conclusion is based in part on our analysis of the capex drivers that underlie TasNetworks' forecast capex for the 2014–19 period as set out in this Appendix. This analysis also explains the basis for our substitute estimate of TasNetworks' total forecast capex that we are satisfied reasonably reflects the capex criteria.

This Appendix considers each capex driver as follows:

- Section A.1: augmentation capex (augex)
- Section A.2: customer connections capex
- Section A.3: asset replacement capital expenditure (repex)
- Section A.4: non-network capex

A.1 AER findings and estimate for augex

Growth driven 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. Growth-driven capex includes augmentations and new connections.

TasNetworks' proposal included a forecast of \$36.8 million (\$2013–14) for growth capex for the 2014–19 period. The vast majority of this forecast was driven by two individual projects the Waddamana–Palmerston 220 kV security augmentation project, and the Newton–Queenstown security augmentation project.²³

On 30 September 2014, TasNetworks submitted further information to the AER regarding its proposed forecast augex, specifically that:

- the proposed Waddamana-Palmerston security augmentation project could be prudently deferred until after the 2014-19 period based on revised demand forecasts. Additional capital works will need to be undertaken to sustain the reliability of the transmission system. TasNetworks suggested that this would reduce its proposed expenditure of \$21 million for this project to \$1.4 million.²⁴
- the Newton-Queenstown security augmentation does not need to be completed in its entirety in the 2014-19 period due to a reduction in customer demand. TasNetworks proposes to complete only those components of the project that are necessary to maintain reliability of supply. TasNetworks suggested that this would reduce its proposed expenditure of \$14.1 million for this project to \$4.2.²⁵

These changes result in a \$35.2 million (\$2013–14) reduction in TasNetworks proposed augex to \$1.6 million (\$2013–14). This outcome is consistent with the findings of AEMO's independent review into

²³ TasNetworks proposal, p. 68.

²⁴ TasNetworks, Revised capital project scopes for transmission revenue proposal, 30 September 2014, p. 1

²⁵ TasNetworks, Revised capital project scopes for transmission revenue proposal, 30 September 2014, p. 1

these two projects in August 2014 which we took into account.²⁶ TasNetworks submits it will require an additional \$5.6 million (\$2013-14) in asset replacement expenditure (repex) to replace ageing assets that would have been replaced as part of the original augmentation projects. This expenditure is considered as part of TasNetworks' repex in section A.3.

We have accepted the new information provided by TasNetworks and the findings of the independent technical review undertaken by AEMO. We consider that the remaining forecast of \$1.6 million (\$2013–14) reasonably reflects TasNetworks' requirement for growth capex, and have included an allowance for this amount in our estimate of the total capex for the 2014-19 period.

A.2 AER findings and estimates for connections capex

Connections capex for transmission networks is necessary to meet joint planning requirements with the surrounding distribution network.

TasNetworks' proposed \$19.03 million (\$2013-14) forecast connections capex for the 2015–19 period. This represents a 72 per cent reduction from the 2009–14 period. We accept TasNetworks' proposal and will include it in our alternative estimate.

In coming to this view, we are satisfied that TasNetworks' proposed connections capex reflects the trend in reduced demand at the state level since the 2009-14 period. We also considered AEMO's assessment of the Rosebury substation augmentation, which represents \$6.13 million (2013/14), or around 30 per cent, of TasNetworks' proposed connections capex. AEMO concluded that the Rosebury substation was justified to prepare the network capacity for periods of high localised demand and the risk of lost load.²⁷ We accept the findings of AEMO's assessment of this project.

A.3 AER findings and estimates for asset replacement 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 the existing asset's inability to efficiently maintain its service performance requirement.

TasNetworks' proposed \$207.4 million (\$2013-14) for 'renewal/enhancement capex' for the 2014-19 period. This proposed \$207.4 million consists of:

- \$145.4 million (\$2013–14) for asset renewals
- \$14.4 million (\$2013–14) for security and compliance
- \$15.1 million (\$2013–14) for spare assets
- \$32.5 million (\$2013–14) for operational support systems (OSS).

²⁶ AEMO, Independent Planning Review, Attachment B: TasNetworks Project Assessment Reports; NER, clause 6A.6.7(e)(11).

- We have assessed these asset categories as repex for the purposes of this draft decision.²⁸

As noted in section A.1, based on updated information, TasNetworks submitted that deferral of two key augmentation projects (a reduction of \$35.2 million to its proposed augex) would necessitate an additional \$5.6 million increase in its asset replacement forecast.²⁹ The capex is to replace a number of aging assets that would have been replaced as part of augmentation projects that are unlikely to be required in the 2014–19 period.³⁰

We consider that a forecast of \$213 million (\$2013–14) for repex reasonably reflects the requirement for this expenditure category and have included an allowance for this amount in our estimate of total capex for the 2014-19 period. This consists of the TasNetworks' proposed \$207.3 million, plus the additional \$5.6 million to account for the deferral of two augmentation projects.

In forming this view, we have considered trend analysis which compares the proposed repex with historic expenditure levels, and considered TasNetworks' justification for its forecast expenditure. We have applied our analysis to each asset category. AEMO also reviewed the need for two asset replacement projects and one spare asset investment. We have accepted the results of the independent assessment undertaken by AEMO, which we are required into account.³¹

Figure A-1 shows TasNetworks' forecast capex for the replacement expenditure categories and the actual expenditure it incurred in the previous two regulatory periods. While TasNetworks proposed asset replacement capex makes up the largest proportion of its total capex, it is considerably lower than in previous regulatory control periods.

²⁸ While operational support systems expenditure is also relevant for other capex categories, such as augex, we have assessed the proposed capex in this section of our draft decision.

²⁹ TasNetworks, TasNetworks Amended Capex Proposal 30 Sep 2014

³⁰ TasNetworks, TasNetworks Amended Capex Proposal 30 Sep 2014, p. 6 and 8

³¹ NER, clause 6A.6.7(e)(11).

Figure A-1 TasNetworks repex components (million \$2013-14)



Source: TasNetworks proposal, AER analysis

Our assessment of TasNetworks' individual repex components are as follows.

Asset renewal

TasNetworks' proposed asset renewal repex for the 2014–19 period represents a 41 per cent decrease on the actual expenditure in the 2009–14 regulatory control period. The average annual expenditure for 2014-19 is also 69 per cent lower than the peak expenditure between 2012 and 2014, and is below the long-term average by 21 per cent. However, TasNetworks overspent on asset replacement in 2009-14 by 21 per cent compared to its regulatory allowance.

TasNetworks submitted that its forecast asset renewal capex for the 2014-19 period is lower than the current period because it is coming to the end of a period of relatively high asset renewal and enhancement capex. TasNetworks submitted that this explains the high amount of repex between 2012 and 2014. However, TasNetworks recognises that asset replacements continue to be a major expenditure driver.³²

The CCP expressed some concern about TasNetworks' asset replacement proposal. The CCP submitted that, due to the repex overspend in the current period, TasNetworks has effectively 'pre-installed' good deal of its replacement capex requirements for the next regulatory control period.

³² The main drivers of proposed asset replacement capex in 2014-19 are transmission line insulator assemblies, increased investment required in telecommunications assets (partially funded by non-regulated telecommunications customers), and connecting Upper Derwent generation into the adjacent 220 kV network (commencing at the end of the period).

Consequently, they expressed concern with TasNetworks proposed major replacement capex program for the next period.³³

These concerns were shared by EUAA³⁴ and Bell Bay Aluminium, who requested that we closely scrutinise the costing of TasNetworks' capital projects.³⁵ Consistent with our expenditure guidelines, we have had regard to a combination of top down (e.g. trend analysis and benchmarking) and some bottom up (e.g. individual project review) techniques to assess TasNetworks' capex proposal. In the context of repex, given the significant decrease in the proposal compared to the previous period, we intend to rely primarily on trend analysis rather than individual project review. Where appropriate, we are informed by the findings from AEMO in relation to individual projects.

In August 2014, AEMO published the results of an independent review of TasNetworks' proposed Lindisfarne substation transformer replacement and the George Town 110kV substation redevelopment. The total proposed capex for these two projects is \$13 million over the 2014-19 period. AEMO found that the network investment needs of both projects were justified.³⁶

In light of the significant reductions to repex and maintenance expenditure,³⁷ we requested that TasNetworks explain how it will be able to maintain its required service levels.³⁸ TasNetworks stated that its asset replacement programs over 2009-14 period have resulted in maintenance intensive assets being replaced with modern equivalents which are less maintenance intensive. TasNetworks' commented that this is consistent with its proposal which stated that it has replaced assets with modern equivalent equipment that often provides enhanced quality and functionality compared to the originally installed assets.³⁹

As noted in section A.1, based on updated information, TasNetworks also proposed an additional \$5.6 million increase in its asset replacement forecast after submitting its revenue proposal.⁴⁰ We are satisfied that this additional amount of additional capex is required on the basis that reduced augmentation investment is likely to require some additional repex to maintain network reliability.

Based on a comparison with previous expenditure we are satisfied that the TasNetworks' updated forecast of \$151.0 million reasonably reflects its requirement for asset replacement capex and will include an allowance for this amount in our estimate of the total capex for the 2014-19 period.

Security and compliance

TasNetworks underspent on security and compliance in the 2009-14 regulatory control by 35 per cent compared to its regulatory allowance. For the 2014-19 period, TasNetworks' proposed the same amount of security and compliance capex as it actually spent over the 2009–14 regulatory control period. This amount is significantly below the historical capex spent over the 2004-2009 period.

TasNetworks submitted that the forecast capex will address the physical protection security of its assets and the safety of employees and the public. Projects include the renewal of fire suppression

³³ CCP (CCP6 subpanel) submission, p. 9

³⁴ EUAA submission, pp. 9-10

³⁵ Bell Bay submission, p. 2 and 4-5

³⁶ AEMO, Independent Planning Review, Attachment B: TasNetworks Project Assessment Reports, pp. 21-26

³⁷ TasNetworks has also proposed reduced maintenance operating expenditure, which also follows from underspending operating expenditure in 2009-14

³⁸ AER info request, TasNetworks capex 01, 28 August 2014

³⁹ TasNetworks proposal, p. 71

⁴⁰ TasNetworks, TasNetworks Amended Capex Proposal 30 Sep 2014

systems in substations, implementation of fall arrestor systems and warning signs on transmission towers, and renewal of transmission line access tracks and access security systems.⁴¹

Based on a comparison with previous expenditure, we are satisfied that TasNetworks' proposed \$14.4 million for security and compliance reflects the requirement for this expenditure category.

Spare assets

TasNetworks' proposed spare assets capex for the 2014–19 period represents a 53 per cent increase on the actual expenditure in the 2009–14 regulatory control period. TasNetworks proposed relatively significant expenditure on spare assets in 2015-16 and 2016-17.

TasNetworks submitted that increases in the asset spares category in 2015–16 and 2016–17 principally reflect the purchase of three strategic spare transformers with varying transformation voltages, together with a mobile 110/33/22/11 kV substation. TasNetworks states that this investment accords with its policy of extending the life of a number of in-service transformers and substation assets, but with strategic spares being held for multiple sites to manage failure or unforeseen rapid deterioration in condition.⁴²

In August 2014, AEMO published the results of an independent review of TasNetworks' proposed spare mobile 110/33/22/11 kV substation. The total proposed capex for this project is \$7.1 million over 2014-19 (which represents approximately half of its proposed capex for spare assets). AEMO found that the network investment needs for this investment was justified.⁴³

We are satisfied that TasNetworks' proposed \$15.1 million capex for spare assets is required because it will enable TasNetworks to manage network reliability. This is in the context of the significant forecast reduction to asset replacement repex from the previous period and decreased maintenance expenditure.

Operational support systems

TasNetworks' proposed operational support system (OSS) capex for the 2014–19 period represents a 103 per cent increase on the actual expenditure in the 2009–14 regulatory control period. TasNetworks underspent on OSS in 2009-14 by 33 per cent compared to its regulatory allowance.

TasNetworks submitted that its increased forecast partially reflects the deferral of some projects from the current regulatory period to "derive synergies from systems developed as part of the TasNetworks merged network business".⁴⁴ The forecast also reflects increased investment in systems to strengthen asset condition and geographical information, enhance risk management and asset analysis tools, renew operational systems to extract the optimum capacity and life from its assets, and to progress its smart transmission grid development program.⁴⁵

EUAA submitted that "it is rather surprising to see such an increase in operational support systems following a merger that would supposedly highly leverage systems such as those proposed".⁴⁶ To the extent that operational support system capex is used to support the merged businesses, we expect that it is prudent to delay some expenditure from the previous period given the potential for duplication

⁴¹ TasNetworks proposal, p. 72

⁴² TasNetworks proposal, p. 72

⁴³ AEMO, Independent Planning Review, Attachment B: TasNetworks Project Assessment Reports, pp. 21-26

⁴⁴ TasNetworks proposal, p. 72

⁴⁵ TasNetworks proposal, p. 72

⁴⁶ EUAA submission, p. 10

of systems. This is especially relevant given we understand that the merged business will consolidate a number of functions, including asset planning.

Further, in light of the reduction to repex and the reduced maintenance expenditure compared to the previous period, we consider that increased expenditure on operational support systems is necessary to manage the risk of network reliability issues and to provide scope for further operational efficiencies. This is also especially relevant on the basis that we propose to accept TasNetworks' asset life extensions for significant proportion of its assets (as discussed in Attachment 5).

We are satisfied that TasNetworks' proposed \$32.5 million capex for operational support systems reflects the requirement for this expenditure category.

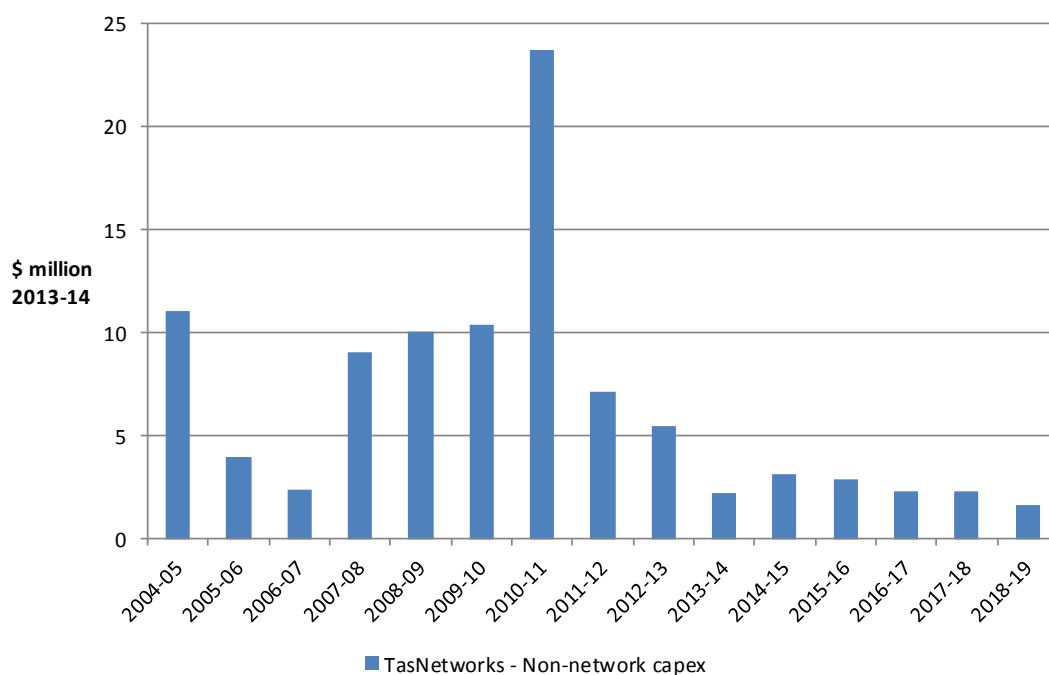
A.4 AER findings and estimates for non-network capex

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

TasNetworks' forecast total non-network capex is \$12.7 million (\$2013-14) for the 2014-19 period.⁴⁷ We accept TasNetworks' forecast of non-network capex and have included it in our alternative estimate of total capex for the 2014-19 period.

Figure A-2 shows TasNetworks' historical non-network capex for regulatory periods from 2004-05 to 2013-14, and forecast capex for the 2014-19 period.

Figure A-2 TasNetworks' non-network capex 2004-05 to 2018-19 (\$million, 2013-14)



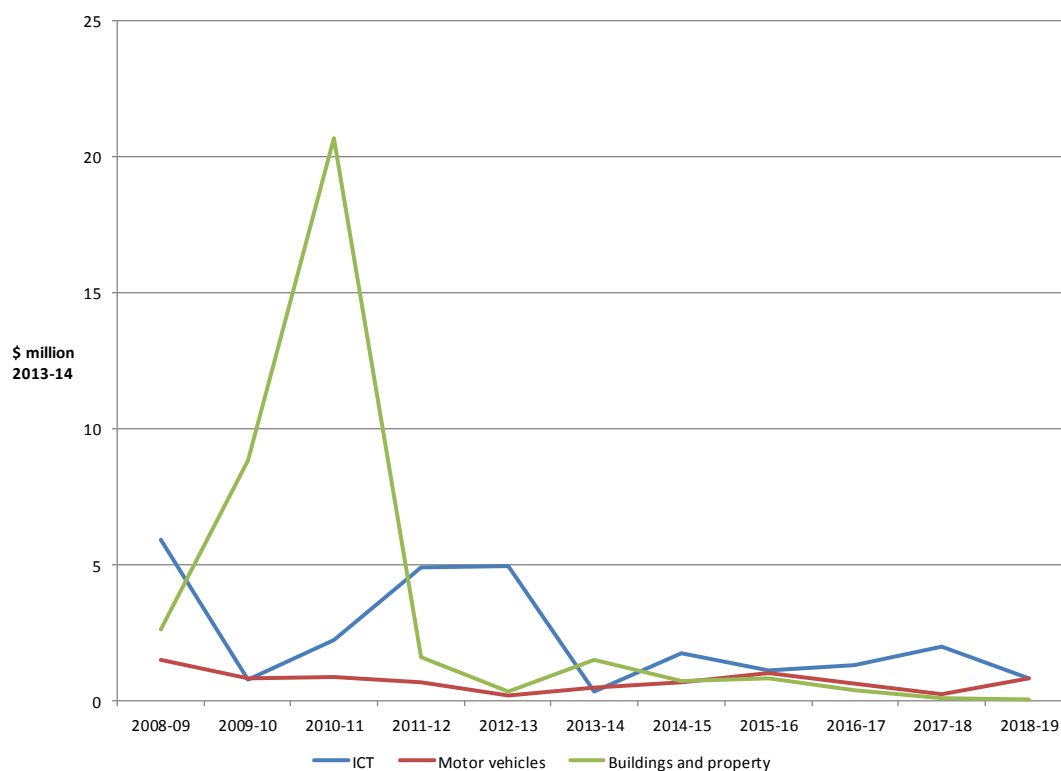
Source: TasNetworks, *Regulatory information notice*, template 2.5; TasNetworks, *Appendix 22 - Capital expenditure 2003-04 to 2018-19*, 31 May 2014; AER analysis.

⁴⁷ TasNetworks, *Regulatory proposal*, 31 May 2014, p. 66.

TasNetworks' forecast non-network capex for the 2014-19 period is 75 per cent lower than actual/expected capex in the 2009-14 regulatory control period. This is greater than TasNetworks' forecast reduction in total capex of 52 per cent.⁴⁸ Further, our analysis of longer term trends in non-network capex suggests that TasNetworks has forecast capex for this category at historically low levels. Non-network capex for the 2014-19 period is forecast to be consistent with expenditure in the 2006-07 year, prior to the spike in investment experienced in the 2009-14 regulatory control period. This suggests that TasNetworks' forecast of non-network capex requirements in the 2014-19 period is likely to be reasonable having regard to past expenditure.⁴⁹

We have also assessed forecast expenditure in each category of non-network capex. Analysis at this level has been used to inform our view of whether forecast capex is reasonable relative to historical rates of expenditure in each category, and to identify trends in the different category forecasts which may warrant specific investigation.⁵⁰ Figure A-3 shows TasNetworks' actual and forecast non-network capex by category for the period from 2008-09 to 2018-19.

Figure A-3 TasNetworks' non-network capex by category (\$million, 2013-14)



Source: TasNetworks, *Regulatory information notice*, template 2.5.

TasNetworks has forecast significant reductions in both ICT and buildings and property capex, while motor vehicles capex is forecast to remain relatively steady in the 2014-19 period. Forecast capex for each category is low and stable across the 2014-19 period. TasNetworks has identified that the slight upturn in ICT capex from the low in 2013-14 partially reflects deferral of some projects in the 2009-14 regulatory control period to avoid re-work and derive synergies from systems developed as part of the

⁴⁸ TasNetworks, *Regulatory proposal*, 31 May 2014, p. 65.

⁴⁹ NER, cl. 6A.6.7(e)(5).

⁵⁰ NER, cl. 6A.6.7(e)(5).

TasNetworks merged network business.⁵¹ Based on our category level review of TasNetworks' forecast non-network capex, we have not identified any areas for further specific review at the project or program level. We consider that this level of expenditure, although relatively low by historical standards for some categories, is likely to reflect some synergies from the merged transmission and distribution businesses and as such, reasonably reflects efficient costs.

We have also had regard to whether TasNetworks' forecast reduction in non-network capex reflects the substitution possibilities between opex and capex for this category of expenditure, for example undertaking building or motor vehicle maintenance versus replacement.⁵² Despite the significant reductions in forecast capex, we note that TasNetworks' non-network opex in the 2014-19 period is also forecast to decrease by approximately 10 per cent in real terms compared to the 2009-14 regulatory control period.⁵³ Taking this into account, we are satisfied that TasNetworks' forecast reduction in non-network capex does not simply reflect a reallocation of expenditure from capex to opex.

In summary, having considered TasNetworks' regulatory proposal and had regard to the capex factors⁵⁴, we are satisfied that total capex which reasonably reflects the capex criteria should include a forecast of \$12.7 million for non-network capex. Our estimate of total capex for the 2014-19 period reflects this conclusion.

⁵¹ TasNetworks, *Regulatory proposal*, 31 May 2014, p. 74.

⁵² NER, cl. 6A.6.7(e)(7).

⁵³ TasNetworks, *Regulatory information notice*, template 2.5; AER analysis.

⁵⁴ Relevantly, cl. 6A.6.7(e)(5) and 6A.6.7(e)(7).

B Assessment approaches

This Appendix discusses the assessment approaches we have applied in assessing TasNetworks' proposed forecast capex.

B.1 Economic benchmarking

Economic benchmarking is one of the key outputs of our annual benchmarking report. We are required to consider as it is a capex factor under the NER.⁵⁵ Economic benchmarking applies economic theory to measure the efficiency of a TNSP's use of inputs to produce outputs, having regard to environmental factors.⁵⁶ It allows us to compare the performance of a TNSP against its own past performance, and the performance of other TNSPs. Economic benchmarking helps us to assess whether a TNSP's capex forecast represents efficient costs.⁵⁷ As stated by the AEMC, 'benchmarking is a critical exercise in assessing the efficiency of a NSP'.⁵⁸

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 NSP's efficiency with consideration given to its inputs, outputs and its operating environment. We have considered each TNSP'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.⁵⁹ Once such exogenous factors are taken into account, we expect TNSPs 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.⁶⁰

We have calculated economic benchmarks based on actual data from the previous regulatory control period. We consider these are relevant to determining allowances for the forthcoming regulatory control period as a TNSP's capex and expenditure efficiency in the previous regulatory control period is a good indicator of its likely efficiency in the next regulatory control period. Further, any benchmark efficient level of capex in the previous period will be a useful starting point for setting the efficient level of capex in the upcoming regulatory control period, taking into account any apparent trends.

The results from the economic benchmarking give an indication of the relative efficiency of each of the TNSPs, and how this has changed over time. It indicates the likely range of forecast capex that would be required by an efficient and prudent TNSP taking into account. However, we accept that it is difficult to fully account for exogenous factors particular to each TNSP. To the extent that we are unable to adequately account for exogenous factors, we have factored this into the weighting that we have given our benchmarking, as applied to each TNSP.⁶¹ Also, we have not relied solely on economic benchmarking. It is one technique in a wide range of techniques to assist in forming our view on the reasonableness of a TNSP's proposed forecast and where required, a substitute estimate.

⁵⁵ NER, clause 6A.6.7(e)(4).

⁵⁶ AER, Explanatory Statement: Expenditure Forecasting Assessment Guidelines, November 2013.

⁵⁷ NER, clause 6A.6.7(c)

⁵⁸ AEMC, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, November 2012, p. 25.

⁵⁹ 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.

⁶⁰ AER, Annual Benchmarking Report, 2014.

⁶¹ AEMC, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, November 2012, p. 113.

B.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.⁶²

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

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.⁶³ 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 TNSP.

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 actual demand differs from forecast, a business should reassess the need for the projects. Growth in a business' network will also drive augmentation and connections related capex. For these reasons it is important to consider how trends in capex (and in particular, augex and connections) compare with trends in demand (both maximum demand and customer numbers).

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

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

⁶² NER, clause 6A.6.7(e)(5).

⁶³ NER, clause 6A.6.7(a)(3).

C Demand

This attachment sets out our observations of demand trends in TasNetworks' network for the 2014–19 period.⁶⁴

Demand forecasts are fundamental to a NSP's forecast capex and opex, and to our assessment of that forecast expenditure.⁶⁵ TasNetworks must deliver electricity to its customers and build, operate and maintain its network to manage expected changes in demand for electricity. When TasNetworks invests in its network to meet demand and increases in electricity consumption, it incurs capex. In particular, the expected growth in demand is an important factor driving network augmentation expenditure and connections expenditure (growth capex).⁶⁶ TasNetworks uses demand forecasts in conjunction with network planning to determine the amount and timing of such expenditure. TasNetworks also incurs opex in relation to the new assets it builds to meet demand.

System demand represents total demand in the TasNetworks transmission network. This attachment considers demand forecasts in TasNetworks' network at the system level. These observations give an indication of overall demand trends and for the first time include a comparison to AEMO's independent system demand forecasts. System demand trends give a high level indication of the need for expenditure on the network to meet changes in demand. Forecasts of increasing system demand generally signal an increased requirement for growth capex, and converse for forecasts of stagnant or falling system demand.⁶⁷ Accurate, or at least unbiased, demand forecasts are important inputs to ensuring efficient levels of investment in the network. For example, overly high demand forecasts may lead to inefficient expenditure as NSPs install unnecessary capacity in the network.

However, localised demand growth (spatial demand) drives the requirement for specific growth projects or programs. Spatial demand growth is not uniform across the entire network: for example, future demand trends would differ between established suburbs and new residential developments. Accordingly, there is also a need to consider spatial demand forecasts as part of determining the requirement for growth capex for the 2014-19 period. AEMO undertook this assessment of spatial demand forecasts in relation to TasNetworks' proposed projects. Section A.1 discusses this analysis in more detail.

C.1 AER position on system demand trends

We are satisfied the system demand forecasts in TasNetworks' regulatory proposal for the 2014–19 period reasonably reflects a realistic expectation of demand.⁶⁸ These forecasts are considerably lower than previous forecasts.⁶⁹ Indeed, TasNetworks has progressively downgraded its demand forecasts in its annual planning reports since its regulatory proposal for the 2009–14 regulatory control period.⁷⁰ As we would expect, one result of this trend is the significant reduction in TasNetworks' augex forecast for the 2014–19 period compared to the 2009–14 regulatory control period (see section A.1).

⁶⁴ In this appendix, 'demand' refers to winter maximum, or peak, demand (megawatts, MW) unless otherwise indicated.

⁶⁵ NER, clauses 6A.6.6(c)(3) and 6A.6.7(c)(3).

⁶⁶ Sections A.1 and A.2 discuss our consideration of TasNetworks' augex and connections expenditure.

⁶⁷ Other factors, such as network utilisation, are also important high level indicators of growth capex requirements.

⁶⁸ NER, clauses 6A.6.6(c)(3) and 6A.6.7(c)(3).

⁶⁹ TasNetworks, *Annual planning report 2014: Appendix 1 supplementary information: load forecast*, 30 June 2014; TasNetworks, *Annual planning report 2013*, 30 June 2013, p. 150; TasNetworks, *Annual planning report 2012*, 30 June 2012, p. 122; TasNetworks, *Transmission revenue proposal for the regulatory control period 1 July 2009 to 30 June 2014*, p. 72.

⁷⁰ TasNetworks, *Annual planning report 2014: Appendix 1 supplementary information: load forecast*, 30 June 2014; TasNetworks, *Annual planning report 2013*, 30 June 2013, p. 150; TasNetworks, *Annual planning report 2012*, 30 June 2012, p. 122; TasNetworks, *Transmission revenue proposal for the regulatory control period 1 July 2009 to 30 June 2014*, p. 72.

However, we understand the NSPs are in the process of updating their demand forecasts. We consider the forecasts in our decisions should reflect the most current expectations of the forecast period. Hence, we will consider updated demand forecasts and other information in the final decision to reflect the most up to date data.

For example, TasNetworks deferred an augex project it included in its regulatory proposal because of revised (lower) spatial demand forecasts (see the augex appendix).⁷¹ All else being equal, this suggests TasNetworks' updated system demand forecast would also be lower.⁷² Hence, there is evidence a lower system demand forecast (compared to TasNetworks' proposal) may also reflect a realistic expectation of demand.⁷³

AEMO forecasted trends of low system demand growth for the NSW region up to 2016, similar to TasNetworks' forecasted trends. However, AEMO then forecasts stagnant or negative demand growth to the end of the 2014–19 period.

Submissions from stakeholders also suggest there is evidence demand will continue to stagnate, or even fall, in TasNetworks' network for the 2014–19 period. We note stakeholders generally provided qualitative evidence, and did not suggest specific demand figures.

Section C.36.4.5C.3 discusses these observations in more detail.

C.2 AER approach

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

- TasNetworks' regulatory proposal
- forecasts from AEMO
- stakeholder submissions in response to TasNetworks' regulatory proposal.

AEMO has published the National electricity forecasting report (NEFR) since 2012, and published the latest edition in June 2014 (2014 NEFR).⁷⁴ The NEFR includes AEMO's summer and winter demand forecasts for all regions (states) in the National Electricity Market.

As part of our consideration of system demand forecasts, we compared TasNetworks' system demand forecast to the 2014 NEFR forecasts.

Section C.3 sets out our comparisons of the 2014 NEFR forecasts with TasNetworks' demand forecasts.

C.3 AER considerations on system demand trends

TasNetworks forecasted relatively low (but positive) demand growth for the 2014–19 period. Further, the demand forecasts in TasNetworks' regulatory proposal for the 2014–19 period are considerably lower than previous forecasts. Indeed, TasNetworks progressively downgraded its demand forecasts

⁷¹ TasNetworks, *Revised capital project scopes for transmission revenue proposal*, 30 September 2014, p. 1.

⁷² System demand forecast may remain the same (or even increase) if higher demand forecasts in other areas at least offset the lower spatial demand.

⁷³ NER, clauses 6A.6.6(c)(3) and 6A.6.7(c)(3).

⁷⁴ AEMO, *National electricity forecasting report for the National Electricity Market*, June 2014.

since its regulatory proposal for the 2009–14 regulatory control period.⁷⁵ For example, TasNetworks' regulatory proposal demand forecasts for the 2014–19 period are, on average, 87.54MW (or 2.94 per cent) lower than its 2012 Annual Planning Report demand forecasts.⁷⁶

There is also evidence demand may stagnate or even decline on TasNetworks' network. For example, the Tasmanian Small Business Council stated actual demand growth in the 2009–14 regulatory control period was minus 0.06 per cent. Hence, zero or even negative growth seems more likely for the 2014–19 period.⁷⁷ Indeed, TasNetworks recently made significant reductions to its augex forecast because demand for certain parts of its network in 2014 was lower than the forecast in its regulatory proposal.⁷⁸

We compared TasNetworks' system demand forecast to AEMO's regional forecasts for Tasmania from the 2014 NEFR. Figure C-1 shows TasNetworks' forecasts are consistently higher than AEMO's forecasts at both 10 and 50 per cent probability of exceedance (POE). Figure C-1 also indicates the general trend in TasNetworks' system demand forecast is consistent with AEMO's forecasts up to 2016. AEMO forecasted slow demand growth up to 2016 (compared to forecasts for the 2009–14 regulatory control period), then forecasted a drop in demand from 2017. AEMO then forecasted demand will be stagnant or negative for the rest of the period.

On the other hand, Figure C-1 shows TasNetworks forecasted the slow demand growth to continue to the end of the 2014–19 period. Hydro Tasmania noted this difference in demand forecasts, and requested TasNetworks review the forecasts with AEMO.⁷⁹

Some submissions stated TasNetworks' demand forecasts are still overly conservative. The Energy Users Association of Australia (EUAA) noted TasNetworks' 10 per cent POE demand forecast for the 2014–19 period is lower than its low case forecast from the previous determination.⁸⁰ Similarly, Nyrstar stated TasNetworks' demand forecast for the 2014–19 regulatory control period did not eventuate. Nyrstar therefore recommended using AEMO's demand forecast with a low growth scenario as the input for expenditure proposals.⁸¹ Bell Bay Aluminium suggested TasNetworks be compelled to use AEMO's forecasts because they are more representative of future growth in Tasmania.⁸²

⁷⁵ TasNetworks, *Annual planning report 2014: Appendix 1 supplementary information: load forecast*, 30 June 2014; TasNetworks, *Annual planning report 2013*, 30 June 2013, p. 150; TasNetworks, *Annual planning report 2012*, 30 June 2012, p. 122; TasNetworks, *Transmission revenue proposal for the regulatory control period 1 July 2009 to 30 June 2014*, p. 72.

⁷⁶ TasNetworks, *Transmission annual planning report 2013*,

⁷⁷ Tasmanian Small Business Council, *TasNetworks transmission revenue proposal 2014–15 to 2018–19: Submission*, August 2014, p. 28.

⁷⁸ TasNetworks, *Amended capex proposal*, 30 September 2014, pp. 1, 6 and 8.

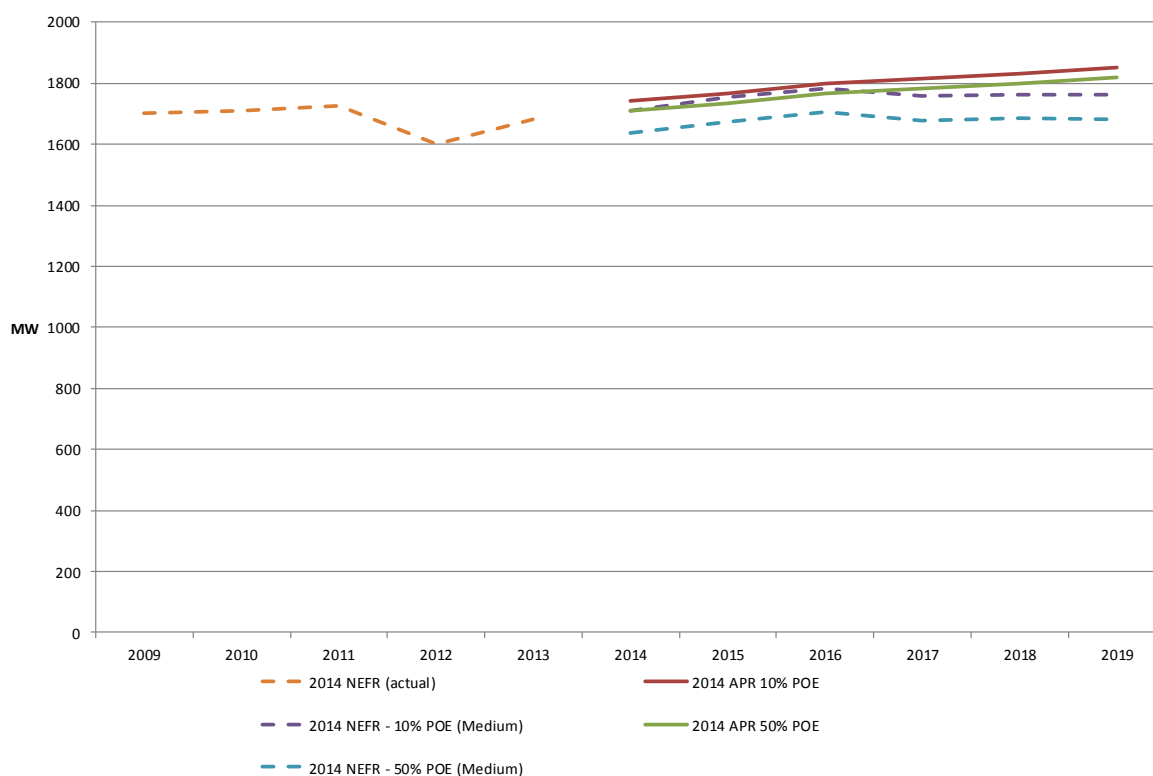
⁷⁹ Hydro Tasmania, *Submission to Tasmanian transmission revenue proposal*, 8 August 2014, p. 2.

⁸⁰ EUAA, *Submission on Transend's revenue proposal 2014–2019*, 8 August 2014, p. 6.

⁸¹ Nyrstar, *Submission on TasNetworks revenue proposal*, 8 August 2014, p. 2.

⁸² Bell Bay Aluminium, *TasNetworks transmission revenue proposal 1 July 2014 – 30 June 2019: Submission by Bell Bay Aluminium*, 8 August 2014, p. 5.

Figure C-1 Comparison of TasNetworks demand and AEMO 2014 NEFR



Source: TasNetworks, *Tasmanian transmission revenue proposal: Regulatory control period 1 July 2014 – 30 June 2019*, 31 May 2014, p. 61; TasNetworks, *Annual planning report 2014: Appendix 1 supplementary information: load forecast*, 30 June 2014; AEMO, *National electricity forecasting report for the national electricity market*, June 2014.

TasNetworks stated its forecasts differ from AEMO's forecasts due to differences in their models and assumptions. For example, AEMO uses assumptions about energy efficiency improvement programs based on national trends. TasNetworks considers national trends may not be applicable to typical existing Tasmanian businesses and households where capital may be less likely to be spent on energy efficiency investments.⁸³

TasNetworks stated it is important to take care when comparing AEMO and TasNetworks demand forecasts because of differing treatment of non-scheduled generation.⁸⁴ TasNetworks stated it will continue to work with AEMO when developing their respective load forecasts.⁸⁵ We anticipate this process will result in more comparable datasets in future regulatory determinations.

C.4 Other considerations on demand

Past forecasting inaccuracies

The Energy Market Reform Forum (EMRF) noted the electricity market experienced falling demand and consumption since the previous NSW distribution determination. Indeed, regular reviews of forecasts saw continual downward adjustments in demand and consumption.⁸⁶ As we noted in section

⁸³ TasNetworks, *Tasmanian transmission revenue proposal: Regulatory control period 1 July 2014 – 30 June 2019*, 31 May 2014, pp. 61–62.

⁸⁴ TasNetworks, *Submissions in response to TasNetworks' transmission revenue proposal*, 18 September 2018, p. 8.

⁸⁵ TasNetworks, *Tasmanian transmission revenue proposal: Regulatory control period 1 July 2014 – 30 June 2019*, 31 May 2014, p. 62.

⁸⁶ EMRF, *NSW electricity distribution revenue reset: Applications from Ausgrid, Endeavour Energy and Essential Energy: A response*, July 2014, pp. 8 and 11.

C.1, this observation also applies to TasNetworks' demand forecasts. The Consumer Challenge Panel (CCP) and Norske Skog considered the demand forecasts TasNetworks used for the 2009–14 regulatory control period were 'dramatically over-estimated' and 'unrealistic'.⁸⁷

We acknowledge demand forecasting is not a precise science and will inevitably contain errors. However, consistent over-forecasting, as the submissions above noted, may indicate a systemic bias in a NSP's demand forecasting approach.⁸⁸ PB Associates considered TasNetworks significantly improved its forecasting process since the previous Tasmanian transmission determination.⁸⁹ We will monitor the accuracy of TasNetworks' demand forecasts in future regulatory years to check for indications of bias. This in turn would aid in monitoring potentially inefficient expenditure levels in the network.

⁸⁷ CCP, *AER consumer challenge panel (CCP6 sub panel) submission on the Transend revenue proposal*, 4 September 2014, p. 9; Norske Skog, *Submission on TasNetworks revenue proposal*, 8 August 2014, p. 3.

⁸⁸ AER, *Better regulation: Explanatory statement: Expenditure forecast assessment guideline*, November 2013, p. 176.

⁸⁹ TasNetworks, *Tasmanian transmission revenue proposal: Regulatory control period 1 July 2014 – 30 June 2019: Appendix 9*, 31 May 2014, p. ii.

D Real cost escalation

Real material cost escalation is a method for accounting for expected changes in the costs of key material inputs to forecast capex. The materials input cost model submitted by TasNetworks includes forecasts for changes in the prices of commodities such as copper, aluminium, steel and crude oil, rather than the prices of intermediate outputs themselves (e.g., poles, cables, transformers) which are the inputs directly sourced by TasNetworks in the provision of its network services. TasNetworks has also escalated construction costs and land in its materials input cost model.

D.1 TasNetworks' proposal

TasNetworks applied material and labour cost escalators to various asset classes in forecasting its capex for the 2014-19 period.⁹⁰ Real cost escalation indices for the following material cost drivers were calculated for TasNetworks by Competition Economists Group (CEG):⁹¹

- aluminium
- copper
- steel
- crude oil
- construction.

CEG sourced forward rates from Bloomberg up to 2023 to convert commodities traded on international markets priced in United States dollars to Australian dollars.⁹²

TasNetworks also escalated the cost of rural land on which its assets are located.⁹³ TasNetworks used GHD to forecast rural land prices.⁹⁴

Table D-1 outlines TasNetworks' real input materials escalation forecasts.

Table D-1 TasNetworks' real materials cost escalation forecast—inputs (per cent)

	2014–15	2015–16	2016–17	2017–18	2018–19
Aluminium	4.2	5.8	5.0	4.2	3.6
Copper	-0.9	1.1	0.3	-0.3	-0.7
Steel	0.6	3.2	0.6	0.3	-0.1
Crude oil	-0.5	2.8	2.6	2.1	1.8
Construction	0.5	0.7	0.5	0.4	0.1

⁹⁰ TasNetworks, *Revenue proposal*, p. 64.

⁹¹ CEG, *Escalation factors affecting expenditure forecasts*, December 2013.

⁹² CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 9.

⁹³ TasNetworks, *Revenue proposal*, p. 64.

⁹⁴ TasNetworks, *Revenue proposal, Appendix 13 - GHD: Tasmanian Rural Land Escalation Updated Report*.

	2014–15	2015–16	2016–17	2017–18	2018–19
Land (rural)	4.7	4.8	4.9	5.0	5.1

Source: TasNetworks proposal, p. 64.

On the basis of these individual material (and labour) cost escalators, TasNetworks transformed these input cost escalators into a set that matches the cost components used in TasNetworks' cost estimating process. These cost component escalators were then applied to TasNetworks' proposed capex projects for the 2014-19 period.⁹⁵

D.2 Position

We are not satisfied that TasNetworks' proposed real material cost escalators (leading to cost increases above CPI) which form part of its total forecast capex reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period.⁹⁶ Instead we consider that zero per cent real cost escalation is likely to reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period. We have arrived at this conclusion on the basis that:

- the degree of the potential inaccuracy of commodities forecasts is such that we consider that zero per cent real cost escalation is likely to provide a more reliable estimation for the price of input materials used by TasNetworks to provide network services,
- there is little evidence to support how accurately TasNetworks' input cost model forecasts reasonably reflect changes in prices paid by TasNetworks for physical assets in the past and by which we can assess the reliability and accuracy of its forecast materials model. Without this supporting evidence, it is difficult to assess the accuracy and reliability of TasNetworks' material input cost escalators model as a predictor of the prices of the assets used by TasNetworks to provide network services, and
- TasNetworks has not provided any supporting evidence to show that it has considered whether there may be some material exogenous factors that impact on the cost of physical inputs that are not captured by the material input cost models used by TasNetworks.

Our approach to real materials cost escalation discussed above does not affect the proposed application of labour and construction cost escalators which apply to TasNetworks' standard control services capital expenditure. We consider that labour and construction cost escalation as proposed by TasNetworks is likely to more reasonably reflect a realistic expectation of the cost inputs required to achieve the capex criteria given these are direct inputs into the cost of providing network services.⁹⁷

In forming our view, we have applied our approach as set out in our Expenditure Forecast Assessment Guideline (Expenditure Guideline) to assessing the input price modelling approach to forecast materials cost.⁹⁸ In the Expenditure Guideline we stated that we had seen limited evidence to demonstrate that the commodity input weightings used by service providers to generate a forecast of the cost of material inputs have produced unbiased forecasts of the costs the service providers paid

⁹⁵ TasNetworks, *Revenue proposal, TasNetworks Capex model*,

⁹⁶ NER, clause 6A.6.7 (a).

⁹⁷ NER, clause 6A.6.7 (c)(3).

⁹⁸ AER, *Better Regulation - Explanatory Statement Expenditure Forecast Assessment Guideline*, November 2013, pp. 50-51.

for manufactured materials.⁹⁹ We considered it important that such evidence be provided because the changes in the prices of manufactured materials are not solely influenced by the changes in the raw materials that are used.¹⁰⁰ As a result, the price of manufactured network materials may not be well correlated with raw material input costs. We expect service providers to demonstrate that their proposed approach to forecast manufactured material cost changes is likely to reasonably reflect changes in raw material input costs.

In our assessment of material cost escalation, we:

- reviewed the CEG report commissioned by TasNetworks¹⁰¹
- reviewed the capex model used by TasNetworks
- reviewed the approach to forecasting manufactured material costs in the context of electricity service providers mitigating such costs and producing unbiased forecasts.

In forming our views, we also considered submissions by stakeholders. We received a submission from the Major Energy Users which addressed materials escalation forecasts by TasNetworks.¹⁰² In its submission, the Major Energy Users made the following statements in respect of materials escalation forecasts:¹⁰³

- CEG forecasts for materials costs increases for the 2014-19 period appears at odds with a report by Bloomberg that shows that materials used in the electricity industry are likely to fall
- Ausgrid and CEG do not provide the weighting of each material element to its mix of materials and demonstrate that the weighting is reflective of the actual mix of the various elements that comprise the final adjustment to the cost of materials
- materials cost movements are based on assumptions that are inappropriate for the use they are applied. EMRF questioned how accurate and robust these forecasts have been in the past and whether there been any assessment to compare the forecasts with actual costs to identify the degree of accuracy implicit in the forecasts, and
- to overcome input cost forecasting inaccuracies, an escalation factor unique to the energy market could be used. The AER would generate this escalation factor annually for adjustments to allowed revenues rather than use the CPI. Using an industry specific escalation index would reduce the inaccuracies inherent in the current AER approach and should result in a more equitable outcome for both consumers and networks.

We also received a submission from the Tasmanian Small Business Council which stated that it supports the objectives of incentive regulation whereby service providers are encouraged to seek out greater efficiencies. The Tasmanian Small Business Council also submitted that there are inherent uncertainties associated with TasNetworks' annual average real cost escalations based on prices from futures markets and forecasts of how prices in these markets might change over the next regulatory period. The Tasmanian Small Business Council stated that as with any forecast, there are inherent uncertainties associated with such methods and rather than relying purely on forecasts, we

⁹⁹ AER, *Better Regulation - Explanatory Statement Expenditure Forecast Assessment Guideline*, November 2013, p. 50.

¹⁰⁰ AER, *Better Regulation - Explanatory Statement Expenditure Forecast Assessment Guideline*, November 2013, p. 50.

¹⁰¹ TasNetworks, *Revenue proposal, Appendix 12: CEG, Escalation factors affecting expenditure forecasts*, December 2013.

¹⁰² The Major Energy Users, *Tasmanian Electricity Transmission Revenue Reset TasNetworks Application - A response by The Major Energy Users Inc*, August 2014.

¹⁰³ The Major Energy Users, *Tasmanian Electricity Transmission Revenue Reset TasNetworks Application - A response by The Major Energy Users Inc*, August 2014, pp. 24-29 and Appendix 1 - Five-year drop for commodities' prices.

should seek to place greater incentives on TasNetworks to manage these costs so as to minimise them over the next regulatory period.¹⁰⁴

Bell Bay Aluminium in its submission questioned the source of TasNetworks' escalation forecasts for aluminium for the 2014-19 period and the impact on project pricing.¹⁰⁵ In its submission, the CCP stated that it expects us to critique TasNetworks' proposed non-labour escalators and to ensure that TasNetworks' allowances appropriately incentivise TasNetworks' to minimise any cost increases associated with commodity price escalation.¹⁰⁶

Materials input cost model

TasNetworks' capex model does not demonstrate how and to what extent material inputs have affected the cost of intermediate outputs such as cables and transformers. In particular, there is no supporting evidence to substantiate how accurately TasNetworks' materials escalation forecasts reasonably reflected changes in prices they paid for intermediate outputs in the past to assess the reliability of forecast materials prices.

In our Expenditure Guideline, we requested service providers should demonstrate that their proposed approach to forecast materials cost changes reasonably reflected the change in prices they paid for physical inputs in the past. TasNetworks' proposal does not include supporting data or information which demonstrates movements or inter-linkages between changes in the input prices of commodities and the prices TasNetworks paid for physical inputs. TasNetworks' capex model assumes a weighting of commodity inputs for each asset class but does not provide information which explains the basis for the weightings or that the weightings applied have produced unbiased forecasts of the costs of TasNetworks' assets. For these reasons, there is no basis on which we can conclude that the forecasts are reliable. In summary, TasNetworks has not demonstrated that its proposed approach to forecast materials cost changes reasonably reflects the change in prices they paid for assets in the past.

Materials input cost model forecasting

TasNetworks has used its consultants' reports to estimate cost escalation factors in order to assist in forecasting future operating and capital expenditure. These cost escalation factors include commodity inputs in the case of capital expenditure. The consultants have adopted a high level approach hypothesising a relationship between these commodity inputs and the physical assets purchased by TasNetworks. Neither the consultants' reports nor TasNetworks have successfully attempted to explain or quantify this relationship, particularly in respect to movements in the prices between the commodity inputs and the physical assets and the derivation of commodity input weightings for each asset class.

We recognise that active trading or futures markets to forecast prices of physical assets such as transformers are not available and that in order to forecast the prices of these physical assets a proxy forecasting method needs to be adopted. Nonetheless, that forecasting method must be reasonably reliable to estimate the prices of intermediate outputs used by service providers to provide network services. TasNetworks has not provided any supporting information that indicates whether the forecasts have taken into account any material exogenous factors which may impact on the reliability

¹⁰⁴ Tasmanian Small Business Council, *TasNetworks Transmission Revenue Proposal, 2014/15 to 2018/19 - Submission*, August 2014, pp. 29-30.

¹⁰⁵ Bell Bay Aluminium, *TasNetworks Transmission Revenue Proposal 1 July 2014 – 30 June 2019 Submission by Bell Bay Aluminium To The Australian Energy Regulator*, August 2014.

¹⁰⁶ Consumer Challenge Panel, *AER Consumer Challenge Panel (CCP6 Sub Panel) Submission on the Transend Revenue Proposal*, September 2014, p. 12.

of material input costs. Such factors may include changes in technologies which affect the weighting of commodity inputs, suppliers of the physical assets changing their sourcing for the commodity inputs, and the general volatility of exchange rates.

Materials input cost mitigation

We consider that there is potential for TasNetworks to mitigate the magnitude of any overall input cost increases. This could be achieved by:

- potential commodity input substitution by the electricity service provider and the supplier of the intermediate outputs. An increase in the price of one commodity input may result in input substitution to an appropriate level providing there are no technically fixed proportions between the inputs. Although there will likely be an increase in the cost of production for a given output level, the overall cost increase will be less than the weighted sum of the input cost increase using the initial input share weights due to substitution of the now relatively cheaper input for this relatively expensive input.

We are aware of input substitution occurring in the electricity industry during the late 1960's when copper prices increased, potentially impacting significantly on the cost of copper cables. Electricity service provider's cable costs were mitigated as relatively cheaper aluminium cables could be substituted for copper cables. We do however recognise that the principle of input substitutability cannot be applied to all intermediate outputs, at least in the short term, because there are technologies with which some inputs are not substitutable. However, even in the short term there may be substitution possibilities between operating and capital expenditure, thereby potentially reducing the total expenditure requirements of an electricity service provider.¹⁰⁷

- the substitution potential between opex and capex when the relative prices of operating and capital inputs change¹⁰⁸ For example, TasNetworks has not demonstrated whether there are any opportunities to increase the level of opex (e.g. maintenance costs) for any of its asset classes in an environment of increasing material input costs.
- the scale of any operation change to the electricity service provider's business that may impact on its capex requirements, including an increase in capex efficiency, and
- increases in productivity that have not been taken into account by TasNetworks in forecasting its capex requirements.

By discounting the possibility of commodity input substitution throughout the 2014-19 period, we consider that there is potential for an upward bias in estimating material input cost escalation by maintaining the base year cost commodity share weights.

Forecasting uncertainty

The NER requires that a service provider's forecast capital expenditure reasonably reflects a realistic expectation of cost inputs required to achieve the capex objectives.¹⁰⁹ We consider that there is likely to be significant uncertainty in forecasting commodity input price movements. The following factors have assisted us in forming this view:

¹⁰⁷ NER, clause 6A.6.7(e)(7).

¹⁰⁸ NER, clause 6A.6.7(e)(6).

¹⁰⁹ NER, clause 6A.6.7(c)(3).

- recent studies which show that forecasts of crude oil spot prices based on futures prices do not provide a significant improvement compared to a ‘no-change’ forecast for most forecast horizons, and sometimes perform worse¹¹⁰
- evidence in the economic literature on the usefulness of commodities futures prices in forecasting spot prices is somewhat mixed. Only for some commodities and for some forecast horizons do futures prices perform better than ‘no change’ forecasts;¹¹¹ and
- the difficulty in forecasting nominal exchange rates (used to convert most materials which are priced in \$US to \$AUS). A review of the economic literature of exchange rate forecast models suggests a “no change” forecasting approach may be preferable to the forward exchange rate produced by these forecasting models.¹¹²

Strategic contracts with suppliers

We consider that electricity service providers can mitigate the risks associated with changes in material input costs by including hedging strategies or price escalation provisions in their contracts with suppliers of inputs (e.g. by including fixed prices in long term contracts). We also consider there is the potential for double counting where contract prices reflect this allocation of risk from the electricity service provider to the supplier, where a real escalation is then factored into forecast capex. In considering the substitution possibilities between operating and capital expenditure,¹¹³ we note that it is open to an electricity service provider to mitigate the potential impact of escalating contract prices by transferring this risk, where possible, to its operating expenditure.

Cost based price increases

Allowing individual material input costs that constitute cost escalation reflects more cost based price increases. We consider this cost based approach reduces the incentives for electricity service providers to manage their capex efficiently, and may instead incentivise electricity service providers to over forecast their capex. In taking into account the revenue and pricing principles, we note that this approach would be less likely to promote efficient investment.¹¹⁴ It also would not result in a capex forecast that was consistent with the nature of the incentives applied under the CESS and the STPIs to TasNetworks as part of this decision.¹¹⁵

Selection of commodity inputs

The limited number of material inputs included in TasNetworks' cost escalation model may not be representative of the full set of inputs or input choices impacting on changes in the prices of

¹¹⁰ R. Alquist, L. Kilian, R. Vigfusson, *Forecasting the Price of Oil*, Board of Governors of the Federal Reserve System, International Finance Discussion Papers, Number 1022, July 2011 (also published as Alquist, Ron, Lutz Kilian, and Robert J. Vigfusson, 2013, *Forecasting the Price of Oil*, in Handbook of Economic Forecasting, Vol. 2, ed. by Graham Elliott and Allan Timmermann (Amsterdam: North Holland), pp. 68-69 and pp. 427–508) and International Monetary Fund, *World Economic Outlook — Recovery Strengthens, Remains Uneven*, Washington, April 2014, pp. 25-31.

¹¹¹ International Monetary Fund, *World Economic Outlook — Recovery Strengthens, Remains Uneven*, Washington, April 2014, p. 27, Chinn, Menzie D., and Olivier Coibion, *The Predictive Content of Commodity Futures*, Journal of Futures Markets, 2014, Volume 34, Issue 7, p. 19 and pp. 607-636 and T. Reeve, R. Vigfusson, *Evaluating the Forecasting Performance of Commodity Futures Prices*, Board of Governors of the Federal Reserve System, International Finance Discussion Papers, Number 1025, August 2011, pp. 1 and 10.

¹¹² R. Meese, K. Rogoff, (1983), *Empirical exchange rate models of the seventies: do they fit out of sample?*, Journal of International Economics, 14, B. Rossi, (2013), *Exchange rate predictability*, Journal of Economic Literature, 51(4), E. Fama, (1984), *Forward and spot exchange rates*, Journal of Monetary Economics, 14, K. Froot and R. Thaler, (1990), *Anomalies: Foreign exchange*, the Journal of Economic Perspectives, Vol. 4, No. 3, CEG, *Escalation factors affecting expenditure forecasts*, December 2013, and BIS Shrapnel, *Real labour and material cost escalation forecasts to 2019/20, Australia and New South Wales*, Final report, April 2014.

¹¹³ NER, clause 6A.6.7(e)(7).

¹¹⁴ NEL, Part 1, section 7.

¹¹⁵ NER, clause 6A.6.7(e)(8).

intermediate outputs purchased by TasNetworks. TasNetworks' cost escalation model may also be biased to the extent that it may include a selective sub-set of commodities that are forecast to increase in price during the 2014-19 period.

Commodities boom

The relevance of material input cost escalation post the 2009 commodities boom experienced in Australia when material input cost escalators were included in determining the approved capex allowance for electricity service providers. We consider that the impact of the commodities boom has subsided and as a consequence the justification for incorporating material cost escalation in determining forecast capex has also diminished.

D.2.1 Review of consultants' reports

We have reviewed the CEG report commissioned by TasNetworks. We consider that this review, along with our review of two other reports detailed below, provides further support for our position to not accept TasNetworks' proposed materials cost escalation.

CEG report

- CEG acknowledge that forecasts of general cost movements (e.g. consumer price index or producer price index) can be used to derive changes in the cost of other inputs used by electricity service providers or their suppliers separate from material inputs (e.g. energy costs and equipment leases etc.).¹¹⁶ This is consistent with the Post-tax Revenue Model (PTRM) which reflects at least in part movements in an electricity service provider's intermediary input costs.
- CEG acknowledge that futures prices will be very unlikely to exactly predict future spot prices given that all manner of unexpected events can occur.¹¹⁷ This is consistent with our view that there are likely to be a significant number of material exogenous factors that impact on the price of assets that are not captured by the material input cost models used by TasNetworks.
- CEG provide the following quote from the International Monetary Fund (IMF) in respect of futures markets.¹¹⁸

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

This supports our view that there is a reasonable degree of uncertainty in the modelling of material input cost escalators to reliably and accurately estimate the prices of assets used by NSPs to provide network services. Whilst the IMF may conclude that commodity futures prices reflect market beliefs on future prices, there is no support from the IMF that futures prices provide an accurate predictor of future commodity prices.

- Figures 1 and 2 of CEG's report respectively show the variance between aluminium and copper prices predicted by the London Metals Exchange (LME) 3 month, 15 month and 27 month futures less actual prices between July 1993 and December 2013.¹¹⁹ Analysis of this data shows that the longer the futures projection period, the less accurate are LME futures in predicting actual commodity prices. Given the next regulatory control period covers a time span of 60 months we

¹¹⁶ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 3.

¹¹⁷ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 4-5.

¹¹⁸ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 5.

¹¹⁹ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 5-6.

consider it reasonable to question the degree of accuracy of forecast futures commodity prices towards the end of this period.

Figures 1 and 2 also show that futures forecasts have a greater tendency towards over-estimating of actual aluminium and copper prices over the 20 year period (particularly for aluminium). The greatest forecast over-estimate variance was about 100 per cent for aluminium and 130 per cent for copper. In contrast, the greatest forecast under-estimate variance was about 44 per cent for aluminium and 70 per cent for copper.

- In respect of forecasting electricity service providers future costs, CEG stated that:¹²⁰

There is always a high degree of uncertainty associated with predicting the future. Although we consider that we have obtained the best possible estimates of the NSPs' future costs at the present time, the actual magnitude of these costs at the time that they are incurred may well be considerably higher or lower than we have estimated in this report. This is a reflection of the fact that while futures prices and forecasts today may well be a very precise estimate of current expectations of the future, they are at best an imprecise estimate of future values.

This statement again is consistent with our view about the degree of the precision and accuracy of futures prices in respect of predicting electricity service providers future input costs. CEG also highlights the (poor) predictive value of LME futures for actual aluminium prices.¹²¹

- CEG also acknowledge that its escalation of aluminium prices are not necessarily the prices paid for aluminium equipment by manufacturers. As an example, CEG referred to producers of electrical cable who purchase fabricated aluminium which has gone through further stages of production than the refined aluminium that is traded on the LME. CEG also stated that aluminium prices can be expected to be influenced by refined aluminium prices but these prices cannot be expected to move together in a 'one-for-one' relationship.¹²²

GEG provided similar views for copper and steel futures. For copper, CEG stated that the prices quoted for copper are prices traded on the LME that meet the specifications of the LME but that there is not necessarily a 'one-for-one' relationship between these prices and the price paid for copper equipment by manufacturers.¹²³ For steel futures, CEG stated that the steel used by electricity service providers has been fabricated, and as such, embodies labour, capital and other inputs (e.g. energy) and acknowledges that there is not necessarily a 'one-for one' relationship between the mill gate steel and the steel used by electricity service providers.¹²⁴

These statements by CEG support our view that the input cost estimation models used by TasNetworks has not demonstrated how and to what extent material inputs have affected the cost of intermediate outputs. We note, as emphasised by CEG, there is likely to be significant value adding and processing of the raw material before the physical asset is purchased by TasNetworks.

CEG has provided data on historical indexed aluminium, copper, steel and crude oil actual (real) prices from July 2005 to December 2013 as well as forecast real prices from January 2014 to January 2021 which were used to determine its forecast escalation factors.¹²⁵ For all four commodities, the CEG forecast indexed real prices showed a trend of higher prices compared to

¹²⁰ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 13.

¹²¹ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 5.

¹²² CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 19.

¹²³ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 19.

¹²⁴ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 23.

¹²⁵ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, figures 3, 4 and 5, pp. 23, 25 and 28.

the historical trend. Aluminium and crude oil exhibited the greatest trend variance. Copper and steel prices were forecast to remain relatively stable whilst aluminium and crude oil prices were forecast to rise significantly compared to the historical trend.

In addition to our review of the CEG Report, we have also received submissions from TransGrid and Jemena Gas Networks in relation to our concurrent review of their proposals.¹²⁶ We have considered the relevance of those submissions to the issues raised by TasNetworks in order to arrive at a position that takes into account all available information. Our views on these reports are set out below. Overall, both these reports lend further support to our position to not accept TasNetworks' proposed materials cost escalation.

SKM report

- SKM caution that there are a variety of factors that could cause business conditions and results to differ materially from what is contained in its forward looking statements.¹²⁷ This is consistent with our view that there are likely to be a significant number of material exogenous factors that impact on the cost of intermediate outputs that are not captured by TasNetworks' capex model.
- SKM stated it used the Australian CPI to account for those materials or cost items for equipment whose price trend cannot be rationally or conclusively explained by the movement of commodities prices.¹²⁸
- In its modelling of the exchange rate, SKM has in part adopted the longer term historical average of \$0.80 USD/AUD as the long term forecast going forward.¹²⁹ This is consistent with our view that longer term historical commodity prices should be considered when reviewing and forecasting future prices. In general, we consider that long term historical data has a greater number of observations and as a consequence is a more reliable predictor of future prices than a data time series of fewer observations.
- SKM stated that the future price position from the LME futures contracts for copper and aluminium are only available for three years out to December 2016 and that in order to estimate prices beyond this data point, it is necessary to revert to economic forecasts as the most robust source of future price expectations.¹³⁰ SKM also stated that LME steel futures are still not yet sufficiently liquid to provide a robust price outlook.¹³¹
- SKM stated that in respect to the reliability of oil future contracts as a predictor of actual oil prices, futures markets solely are not a reliable predictor or robust foundation for future price forecasts. SKM also stated that future oil contracts tend to follow the current spot price up and down, with a curve upwards or downwards reflecting current (short term) market sentiment.¹³² SKM selected Consensus Economics forecasts as the best currently available outlook for oil prices throughout the duration of the next regulatory control period¹³³. The decision by SKM to adopt an economic forecast for oil rather than using futures highlights the uncertainty surrounding the forecasting of commodity prices.

¹²⁶ Draft decisions on TransGrid's transmission determination for 2015-18 and JGN's access arrangement for 2015-20 were released at the same time at this decision. Further information is available on our website: <http://www.aer.gov.au/networks-pipelines/determinations-and-access-arrangements>

¹²⁷ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 4.

¹²⁸ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 8.

¹²⁹ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 9.

¹³⁰ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 12.

¹³¹ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p.16.

¹³² SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 18.

¹³³ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 20.

BIS Shrapnel report

- BIS Shrapnel has forecast prices of gas service provider related materials to increase, in part due to movements in the exchange rate. BIS Shrapnel are forecasting the Australian dollar to fall to US\$0.77 from mid-2016 to mid-2018¹³⁴. This is significantly lower than the exchange rate forecasts by SKM of between US\$0.91 to US\$0.85 from 2014-15 to 2018-19.¹³⁵ CEG did not publish its exchange rate forecasts in its report but state that for the purposes of the report it sourced forward rates from Bloomberg until 2023.¹³⁶ BIS Shrapnel stated that exchange rate forecasts are not authoritative over the long term.¹³⁷

We consider the forecasting of foreign exchange movements during the next regulatory control period to be another example of the potential inaccuracy of modelling for material input cost escalation.

- In its forecast for general materials such as stationery, office furniture, electricity, water, fuel and rent, BIS Shrapnel assumed that across the range of these items, the average price increase would be similar to consumer price inflation and that the appropriate cost escalator for general materials is the CPI.¹³⁸ This treatment of general business inputs supports our view that where we cannot be satisfied that a forecast of real cost escalation for a specific material input is robust, and cannot determine a robust alternative forecast, zero per cent real cost escalation is reasonably likely to reflect the capex criteria and under the PTRM the electricity service provider's broad range of inputs are escalated annually by the CPI.

Comparison of consultant's cost escalation factors

To illustrate the potential uncertainty in forecasting real material input costs, we have compared the material cost escalation forecasts derived by the consultants as shown in Table D-2.

Table D-2 Real material input cost escalation forecasts (\$2012-13)

	2014–15 (%)	2015–16 (%)	2016–17 (%)	2017–18 (%)	2018–19 (%)
Aluminium					
CEG	4.2	5.8	5.0	4.2	3.6
SKM	4.69	4.88	3.09	4.42	2.97
BIS Shrapnel	1.4	5.6	3.9	11.0	-6.5
Range (low to high)	1.4 to 4.69	4.88 to 5.8	3.09 to 5.0	4.2 to 11.0	-6.5 to 3.6
Copper					

¹³⁴ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. 6.

¹³⁵ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 10.

¹³⁶ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 9.

¹³⁷ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. A-7.

¹³⁸ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. 48.

	2014–15 (%)	2015–16 (%)	2016–17 (%)	2017–18 (%)	2018–19 (%)
CEG	-0.9	1.1	0.3	-0.3	-0.7
SKM	-0.17	0.17	-1.15	-0.16	-1.45
BIS Shrapnel	-0.9	-1.5	0.3	9.3	-8.7
Range (low to high)	-0.9 to 0.17	-1.5 to 1.1	-1.15 to 0.3	-0.3 to 9.3	-8.7 to -0.7

Steel

CEG	0.6	3.2	0.6	0.3	-0.1
SKM	2.84	2.45	-0.35	0.38	-1.11
BIS Shrapnel ¹	5.1	1.0	-0.2	8.0	-8.9
Range (low to high)	0.6 to 5.1	1.0 to 3.2	-0.35 to 0.6	0.3 to 8.0	-0.1 to -8.9

Oil

CEG	-0.5	2.8	2.6	2.1	1.8
SKM	-5.11	-0.79	0.74	1.85	0.51
BIS Shrapnel ²	1.4	-1.1	-0.2	6.5	-6.2
Range (low to high)	-5.11 to 1.4	-1.1 to 2.8	-0.2 to 2.6	1.85 to 6.5	-6.2 to 1.8

2014–15 (%) 2015–16 (%) 2016–17 (%) 2017–18 (%) 2018–19 (%)

Source: CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 21, 24 and 27, SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 2 and BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. iii.

1 Asian market price as BIS Shrapnel believes the Asia market is more appropriate.¹³⁹

2 BIS Shrapnel have forecast plastics prices based on price changes in Nylon-11 and HDPE (Polyethylene). BIS Shrapnel state that Castor Oil is the key raw material of Nylon-11 and because it does not have any historical data on Castor Oil, it has approximated Nylon-11 by using HDPE growth rates. HDPE (Polyethylene) prices are proxied by BIS Shrapnel using Manufacturing Wages, General Materials, and Thermoplastic Resin prices. BIS Shrapnel state that Thermoplastic Resin is primarily driven by Crude Oil.¹⁴⁰

As Table D-2 shows, there is considerable variation between the consultant's commodities escalation forecasts. The greatest margin of variation is 10.1 per cent for aluminium in 2018-19, where CEG has forecast a real price increase of 3.6 per cent and BIS Shrapnel a real price decrease of 6.5 per cent. BIS Shrapnel's forecasts exhibit the greatest margin of variation but there also considerable variation between CEG and SKM's forecasts. These forecast divergences between consultants further demonstrate the uncertainty in the modelling of material input cost escalators to reliably and

¹³⁹ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. 40.

¹⁴⁰ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. iii.

accurately estimate the prices of intermediate outputs used by service providers to provide network services. This supports our view that TasNetworks' forecast real material cost escalators do not reasonably reflect a realistic expectation of the cost inputs required to achieve the capex objectives over the 2014–19 period.¹⁴¹

D.2.2 Conclusions on materials cost escalation

We are not satisfied that TasNetworks has demonstrated that the weightings applied to the intermediate inputs have produced unbiased forecasts of the movement in the prices it expects to pay for its physical assets. In particular, TasNetworks has not provided sufficient evidence to show that the changes in the prices of the assets they purchase are highly correlated to changes in raw material inputs.

CEG, in its report to TasNetworks identified a number of factors which are consistent with our view that TasNetworks' capex model has not demonstrated how and to what extent material inputs are likely to affect the cost of assets. CEG acknowledged that forecasts of general cost movements (e.g. CPI or producer price index) can be used to derive changes in the cost of other inputs used by electricity service providers or their suppliers separate from material inputs.¹⁴² CEG stated that futures prices are unlikely to exactly predict future spot prices given that all manner of unexpected events can occur.¹⁴³ CEG also stated that while futures prices and forecasts today may well be a very precise estimate of current expectations of the future, they are at best an imprecise estimate of future values.¹⁴⁴

Recent reviews of commodity price movements show mixed results for commodity price forecasts based on futures prices. Further, nominal exchange rates are in general extremely difficult to forecast and based on the economic literature of a review of exchange rate forecast models, a “no change” forecasting approach may be preferable.

It is our view that where we are not satisfied that a forecast of real cost escalation for materials is robust, and we cannot determine a robust alternative forecast, then real cost escalation should not be applied in determining a service provider's required capital expenditure. We accept that there is uncertainty in estimating real cost changes but we consider the degree of the potential inaccuracy of commodities forecasts is such that there should be no escalation for the price of input materials used by TasNetworks to provide network services.

In previous AER decisions, namely our Final Decisions for Envestra's Queensland and South Australian networks, we took a similar approach. This was on the basis that as all of Envestra's real costs are escalated annually by CPI under its tariff variation mechanism, CPI must inform the AER's underlying assumptions about Envestra's overall input costs. Consistent with this, we applied zero real cost escalation and by default Envestra's input costs were escalated by CPI in the absence of a viable and robust alternative. Likewise, for TasNetworks, we consider that in the absence of a well-founded materials cost escalation forecast, escalating real costs annually by the CPI is the better alternative that will contribute to a total forecast capex that reasonably reflects the capex criteria.

The CPI can be used to account for the cost items for equipment whose price trend cannot be conclusively explained by the movement of commodities prices. This approach is consistent with the revenue and pricing principles of the NEL which provide that a regulated network service provider

¹⁴¹ NER, clause 6A.6.7 (a).

¹⁴² CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 3.

¹⁴³ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 4-5.

¹⁴⁴ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 13.

should be provided with a reasonable opportunity to recover at least the efficient costs it incurs in providing direct control network services.¹⁴⁵

D.3 Labour and construction escalators

Our approach to real materials cost escalation does not affect the application of labour and construction cost escalators, which will continue to apply to standard control services capital and operating expenditure.

We consider that labour and construction cost escalation more reasonably reflects a realistic expectation of the cost inputs required to achieve the opex and capex objectives.¹⁴⁶ We consider that real labour and construction cost escalators can be more reliably and robustly forecast than material input cost escalators, in part because these are not intermediate inputs and for labour escalators, productivity improvements have been factored into the analysis (refer to attachment 7 of this draft decision (opex)).

Construction costs can be forecast with greater precision because the drivers (construction and manufacturing wages, plant equipment and other fabricated metal products, and plant and equipment hire) are reasonably transparent and can be predicted with some degree of accuracy.

Further details on our consideration of labour cost escalators are discussed in Attachment 7 of this decision.

¹⁴⁵ NEL, section 7A(2).

¹⁴⁶ NER, clauses 6A6.6.(c)(3) and 6A.6.7(c)(3).