



**FINAL DECISION**  
**AusNet Services transmission**  
**determination**  
**2017-2022**

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

April 2017

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## Note

This attachment forms part of the AER's final decision on AusNet Services' revenue proposal 2017–22. It should be read with other parts of the final decision.

The final decision includes the following documents:

Overview

Attachment 1 – maximum allowed revenue

Attachment 2 – regulatory asset base

Attachment 3 – rate of return

Attachment 4 – value of imputation credits

Attachment 5 – regulatory depreciation

Attachment 6 – capital expenditure

Attachment 7 – operating expenditure

Attachment 8 – corporate income tax

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Attachment 11 – service target performance incentive scheme

Attachment 12 – pricing methodology

Attachment 13 – pass through events

Attachment 14 – negotiated services

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## Shortened forms

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

Shortened form	Extended form
NSP	network service provider
NTSC	negotiated transmission service criteria
opex	operating expenditure
PPI	partial performance indicators
PTRM	post-tax revenue model
RAB	regulatory asset base
RBA	Reserve Bank of Australia
repex	replacement expenditure
RFM	roll forward model
RIN	regulatory information notice
RPP	revenue and pricing principles
SLCAPM	Sharpe-Lintner capital asset pricing model
STPIS	service target performance incentive scheme
TNSP	transmission network service provider
TUoS	transmission use of system
WACC	weighted average cost of capital

## 6 Capital expenditure

Capital expenditure (capex) refers to the capital expenses incurred in the provision of prescribed transmission services. This investment mostly relates to assets with long lives and these costs are recovered over several regulatory control periods. However, on an annual basis the return on and of forecast capex are two of the building blocks that form part of AusNet Services' total revenue requirement.<sup>1</sup>

This attachment sets out our final decision on AusNet Services' proposed total forecast capex for the 2017–22 regulatory control period. Further detailed analysis is in the following appendices:

- Appendix A - Demand
- Appendix B - Contingent projects
- Appendix C - Ex post review - 2014–15 capex

### 6.1 Final decision

We are not satisfied that AusNet Services' proposed total forecast capex of \$751.3 million (\$2016–17) reasonably reflects the capex criteria. We have substituted it with our estimate of AusNet Services' total forecast capex for the 2017–22 regulatory control period. We are satisfied that our substitute estimate of \$719.1 million (\$2016–17) reasonably reflects the capex criteria. Table 6.1 outlines our final decision. Unless otherwise stated, all dollar values are in \$2016–17.

**Table 6.1 Final decision on AusNet Services' total forecast capex (\$2016–17, million)**

	2017–18	2018–19	2019–20	2020–21	2021–22	Total
AusNet Services' revised proposal	181.0	161.6	154.7	137.3	116.7	751.3
AER final decision	180.5	157.6	146.5	127	107.5	719.1
Total adjustment	-0.5	-4.0	-8.1	-10.3	-9.2	-32.1
Total adjustment (%)	-0.3%	-2.5%	-5.3%	-7.5%	-7.9%	-4.3%

Source: AusNet Services, *Revised regulatory proposal*, 21 September 2016, p. 81; and AER analysis.

Note: Numbers may not add up due to rounding.

AusNet Services' capex proposal consists of \$116.5 million for CBD station rebuilds, \$210.0 million for major station replacement, \$245.2 million for asset replacement programs, \$70.1 million for safety, security and compliance, and \$109.5 million for non-

<sup>1</sup> NER, cl. 6A.6.4(a).



network capex. In our substitute estimate, we accept AusNet Services' forecast for all categories except for major station replacement.

AusNet Services' major station replacement capex forecast consists of projects at a number of non-CBD terminal stations. AusNet Services' forecasting methodology for this capex uses a quantified risk based approach that supports an economic analysis of the costs and benefits of these projects. AusNet Services quantifies the supply security risk, the health and safety risk, the environmental risk and plant collateral damage risk. AusNet Services replaces the relevant assets when the quantified costs of these risks outweigh the forecast project costs. This risk quantification approach is generally consistent with good industry practice.

We have examined AusNet Services' forecasting methodology and have identified issues relating to AusNet Services' estimation of the cost of safety related risks and supply security risks. We also engaged consultants to examine AusNet Services' safety risk calculation process. Our concerns with some aspects of AusNet Services' risk quantification methodologies for safety and reliability have led us to reduce AusNet Services' major station replacement capex forecast by \$32.1 million, which accounts for the entirety of the difference between AusNet Services' revised proposal of \$751.3 million and our alternate estimate of \$719.1 million.

**Table 6.2 Summary of AER reasons and findings**

Issue	Reasons and findings
Total capex forecast	<p>AusNet Services proposed a total capex forecast of \$751.3 million (\$2016–17) in its revised proposal. We are not satisfied this revised forecast reflects the capex criteria.</p> <p>We are satisfied our substitute estimate of \$719.1 million (\$2016–17) reasonably reflects the capex criteria. Our substitute estimate is 4.3 per cent lower than AusNet Services' revised proposal.</p> <p>The reasons for this final decision are summarised in this table and detailed in the remainder of this attachment.</p>
Forecasting methodology, key assumptions and past capex performance	<p>As for our draft decision, we remain concerned that some aspects of AusNet Services' forecasting methodology and key assumptions are likely to result in a forecast of total capex that we are not satisfied reasonably reflects the capex criteria. These issues include:</p> <ul style="list-style-type: none"> <li>• overestimation of safety related risks from asset failures resulting in an overestimation of the capex forecast</li> <li>• overestimation of energy at risk from asset failures resulting in an overestimation of the capex forecast.</li> </ul> <p>In constructing our alternative estimate we have addressed these aspects of AusNet Services' forecasting methodology and key assumptions.</p>
CBD station rebuilds	<p>We accept AusNet Services' forecast repex of \$116.9 million (\$2016–17), excluding overheads, as a reasonable estimate of the efficient costs a prudent operator would require for this category. We have included it in our estimate of total capex for the 2017–22 regulatory control period.</p>
Major stations replacement	<p>We do not accept AusNet Services' forecast repex of \$210.0 million (\$2016–17), excluding overheads. In particular, on the basis that AusNet Services has overestimated safety risk and supply security risk we consider that a lower amount of capex is prudent and efficient. We have instead included in our substitute estimate of overall total capex an amount of \$176.4 million (\$2016–17) for repex related to major</p>

	stations.
Asset replacement programs	We accept AusNet Services' forecast repex of \$246.1 million (\$2016–17), excluding overheads, for asset replacement programs as a reasonable estimate of the efficient costs a prudent operator would require for this category. We adjusted the models for the programs that are driven by the need to address safety risk and found that the level of capex was still justified. We have included the amount in our estimate of total capex for the 2017–22 regulatory control period.
Safety, security and compliance	We accept AusNet Services' forecast repex related to safety, security, and compliance of \$70.3 million (\$2016-17), excluding overheads, as a reasonable estimate of the efficient costs a prudent operator would require for this category. We have included it in our estimate of total capex for the 2017–22 regulatory control period.
Non-network capex	<p>We accept AusNet Services' forecast non-network capex of \$104.0 million (\$2016–17), excluding overheads, as a reasonable estimate of the efficient costs a prudent operator would require for this category. We have included it in our estimate of total capex for the 2017–22 regulatory control period.</p> <p>Consistent with our draft decision, we accept AusNet Services' forecasts for motor vehicles and buildings and property capex as reasonably reflecting required expenditure in these categories. We are also now satisfied, based on the additional information provided by AusNet Services in its revised proposal, that AusNet Services' IT capex forecast is appropriately supported by business case documentation and reasonably reflects the efficient costs of a prudent operator.</p>
Capitalised overheads	<p>We do not accept AusNet Services' proposed forecast of capitalised overheads of \$54.8 million (\$2016–17). We have instead included in our substitute estimate of total capex an amount of \$54.2 million (\$2016–17) for capitalised overheads.</p> <p>We reduced AusNet Services' capitalised overheads to reflect the reductions we made to the total capex forecast.</p>

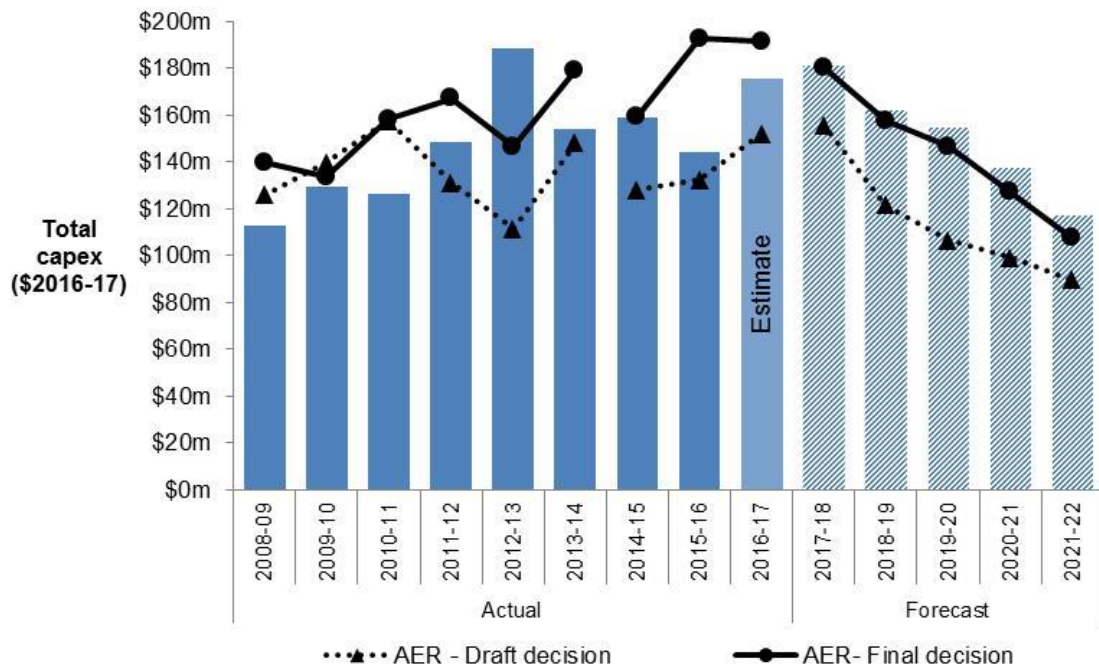
Source: AER analysis.

## 6.2 AusNet Services' revised proposal

In its revised proposal, AusNet Services proposed total forecast capex of \$751.3 million (\$2016–17) for the 2017–22 regulatory control period. This is 31 per cent higher than our draft decision, and one per cent higher than AusNet Services' initial regulatory proposal.

Figure 6.1 shows the difference between AusNet Services' revised proposal and our draft and final decisions for the 2017–22 period, as well as the actual capex that AusNet Services spent during the 2012–17 regulatory control period.

**Figure 6.1 AusNet Services' total actual and forecast capex**



Source: AER analysis.

AusNet Services accepted some aspects of our draft decision, but raised issues with other aspects of our decision. Matters raised by us in our draft decision and addressed by AusNet Services in its revised proposal included:

- AER's capex assessment approach
- adjustment to the safety risk cost calculation
- appropriate demand forecasts
- cost estimation bias adjustment
- additional expenditure for the East Rowville terminal station replacement project, and
- non-network IT capex forecast.

### 6.3 Assessment approach

We must determine whether AusNet Services' proposal reasonably reflects the capex criteria set out in the NER.<sup>2</sup> We use various assessment techniques, both qualitative and quantitative, to assess the different elements of AusNet Services' proposal. We also use these techniques to develop our alternative estimate of the total forecast capex, which we use to test AusNet Services' total forecast capex.

<sup>2</sup> NER, cl. 6A.6.7(c).

If we are satisfied that AusNet Services' proposal reasonably reflects the capex criteria in meeting the capex objectives, we accept it.<sup>3</sup> If we are not satisfied, the NER requires us to put in place a substitute estimate which we are satisfied reasonably reflects the capex criteria.<sup>4</sup> Where we have done this, our substitute estimate is based on our alternative estimate.

To assess AusNet Services' proposed forecast capex, we have used the following techniques: economic benchmarking, trend analysis, methodology review, and predictive modelling. Our assessment approach is outlined in more detail in the draft decision.<sup>5</sup>

In particular, we have used methodology review to consider whether AusNet Services' methodology is a sound basis for developing expenditure forecasts that reasonably reflect the capex criteria.<sup>6</sup> In relation to AusNet Services' proposed amount for repex we have focused on the following key inputs used in its expenditure forecasting methodology:

- proposed top down adjustment to the total capex forecast for projected cost savings
- the estimation of safety risk associated with asset failures
- the selection of demand forecasts to estimate the risk of unserved energy resulting from asset failures; and
- the selection of particular variable values to estimate the risk of unserved energy resulting from asset failures.

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

### **6.3.1 AusNet Services' submission on AER's capex assessment approach**

In its revised proposal, AusNet Services expressed its concern that we relied heavily on a single assessment technique in reaching our decision in respect to AusNet Services' capex requirement for the 2017–22 regulatory control period.<sup>7</sup> AusNet Services submitted that whilst we promoted the use of a number of assessment techniques to form a view of the reasonableness of our capex forecast in our draft decision, our assessment exclusively relied on key inputs into AusNet Services' forecasting methodology. AusNet Services considered that we ignored a number of

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<sup>3</sup> NER, cl. 6A.6.7(a).

<sup>4</sup> NER, cl. 6A.14.1(2)(ii).

<sup>5</sup> AER, Draft decision, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-12 to 6-18, 6-28 to 6-31.

<sup>6</sup> AER, *Expenditure Forecasting Assessment Guideline*, December 2013.

<sup>7</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 25.

other assessment techniques that supported its capex forecast.<sup>8</sup> In particular, AusNet Services submitted that the following assessment techniques that we referred to in our draft decision supported its forecast capex:<sup>9</sup>

- Economic benchmarking – the published evidence indicates that AusNet Services' productivity has remained steady over time and is closely aligned to the industry average. AusNet Services stated that we concluded that its 2014–15 capex is not inefficient and that we did not express any concerns regarding AusNet Services' efficiency on the basis of our economic benchmarking analysis.
- Historical capex performance – AusNet Services' proposed total capex is forecast to decline. AusNet Services considers that although our draft decision includes some discussion on its forecast capex compared to historical trends, we do not present any conclusions based on this evidence.
- Forecasting methodology review – AusNet Services commented that we concluded that AusNet Services' forecasting methodology adopts a risk based economic planning approach which reflects good industry practice. Notwithstanding this, AusNet Services stated that we adjusted key assumptions applied in its economic evaluations for replacement based on a perceived overestimation of safety risk, using updated demand forecasts, and applied a project cost estimation bias adjustment.
- Predictive modelling – AusNet Services noted that we only applied predictive modelling for SCADA and network protection assets and that the results validated its forecast for this capex category. AusNet Services also noted that we expressed concerns with this technique due to inconsistencies with our findings in relation to safety risk and project cost estimation and therefore placed limited weight on our predictive modelling outcomes. AusNet Services submitted that safety is not a driver of SCADA and network protection capex as its capex program for these assets replaces obsolete secondary assets and does not address safety risk.<sup>10</sup>
- Network health indicators – AusNet Services risk assessment summary concluded that its capex forecast maintains risk for all asset classes except for conductors, for which risk would marginally increase, and towers, for which risk would be reduced. AusNet Services submitted that its asset age profile shows that a significant proportion of substation switchbays are in service beyond their estimated mean economic lives and that the health of its asset base may be expected to deteriorate for conductors, substation and transformer assets and underground assets. AusNet Services did not accept our view that a large volume of recent replacements can lead to an increase in residual service lives as the residual service lives of its asset categories are reducing. Further details on AusNet Services' comments on network health indicators are discussed below.

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<sup>8</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 26.

<sup>9</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 26-27.

<sup>10</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 28.

In summary, AusNet Services considers that our approach to assessing its proposed capex is different to that outlined in our Expenditure Forecast Assessment Guideline, which states that we 'intend(s) to move away from detailed techniques such as project review.' AusNet Services submitted that whilst we may not consider our approach constitutes a detailed project review, we have adjusted a key assumption in each proposed major project justification, and reduced its capex forecast on a project-by-project basis.<sup>11</sup>

#### *AER capex assessment approach*

As we stated in our Expenditure Forecast Assessment Guideline for transmission services, when we assess expenditure, we will typically follow a filtering process. That is, we will apply high level techniques in the first instance and apply more detailed techniques as required. We also stated that high level techniques such as economic benchmarking and category analysis will likely provide a 'first pass' assessment, which will indicate our preliminary view on the TNSP's expenditure forecasts. We determined that whilst we intend to move away from detailed techniques such as project review, we are likely to rely on them in some cases, such as to assess certain types of capex.<sup>12</sup>

In our draft decision, we considered that high level benchmarking at the overall capex level is suitable to gain an overall understanding of AusNet Services' proposal in a broader context. We did not rely on our high level benchmarking metrics in our capex assessment other than to note that these metrics generally support the outcomes of our other techniques. We did not use this analysis deterministically in our capex assessment in our draft decision.<sup>13</sup> We considered that for TNSPs, whilst economic benchmarking can give an indication of how the efficiency of each service provider has changed over time, it is not currently robust enough to draw conclusions about the relative efficiency of these service providers.<sup>14</sup>

As we reported in our draft decision, we did investigate trends in capex across a range of levels, including at the total capex level, for replacement and non-network capex, and categories of replacement and non-network capex.<sup>15</sup>

In our draft decision we considered that whilst predictive modelling for replacement assets is currently not ideal for the majority of transmission assets, some asset groups may be suitable for modelling as a first pass assessment. For AusNet Services, we

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<sup>11</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 29.

<sup>12</sup> AER, *Better Regulation: Expenditure Forecast Assessment Guideline for Electricity Transmission*, November 2013, p. 15.

<sup>13</sup> AER, *Draft decision AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-22.

<sup>14</sup> AER, *Draft decision AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-29.

<sup>15</sup> AER, *Draft decision AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-30.

identified the SCADA and network protection assets as such assets.<sup>16</sup> For our final decision, we maintain our view that transmission is characterised by fewer assets that are high value in nature, and are replaced in groups, leading to lumpy expenditure over time. This infrequency of replacement and fewer assets means that it is more difficult to use the repex model, given the historical data available is for a short period.

Details of our analysis and views on the impact of AusNet Services' network health indicators on its capex forecast are discussed below.

The basis for the majority of our adjustments to AusNet Services' forecast capex was as a result of our review of the methodology that AusNet Services used to determine its capex forecasts, including assumptions, inputs and models. In particular, our most significant adjustments were to key inputs used in AusNet Services' repex expenditure forecasting methodology which impacted a significant number of projects.<sup>17</sup> A consequence of the adjustments to key inputs used in AusNet Services' modelling was an adjustment to the forecast capex for a number of projects proposed by AusNet Services.

We consider our approach to assessing AusNet Services' proposed capex to be consistent with our views in the Expenditure Forecast Assessment Guideline that we will apply high level techniques in the first instance and apply more detailed techniques as required, and the requirements of the NER that a TNSP's proposed total capex forecast reasonably reflect the capex criteria.<sup>18</sup> We used various assessment techniques such as economic benchmarking and trend analysis to inform us about AusNet Services' overall capex, and adjustments to AusNet Services' methodology to determine a substitute capex amount.

## 6.4 Reasons for final decision

In this final decision, we are not satisfied AusNet Services' total forecast capex reasonably reflects the capex criteria. We compared AusNet Services' capex forecast to the alternative capex forecast we constructed using the approach and techniques outlined below. AusNet Services' proposal is materially higher than ours. We are satisfied that our alternative estimate reasonably reflects the capex criteria.

Table 6.3 sets out the capex amounts by driver that we included in our alternative estimate of AusNet Services' total forecast capex for the 2017–22 regulatory control period.

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<sup>16</sup> AER, *Draft decision AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-31.

<sup>17</sup> AER, *Draft decision AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-30.

<sup>18</sup> NER, clauses 6A.6.6(c), 6A.6.7(c).

**Table 6.3 Final decision assessment of required capex by capex driver 2017–22 (\$2016-17, million)**

Category	2017–18	2018–19	2019–20	2020–21	2021–22	Total
CBD station rebuilds	33.0	23.6	26.9	16.6	7.5	107.6
Major stations replacement	48.1	32.0	30.3	28.7	23.2	162.4
Asset replacement programs	45.0	50.5	45.9	44.4	40.5	226.3
Safety, security and compliance	13.3	12.6	13.3	12.1	13.4	64.7
Non-network	28.8	26.6	18.0	15.7	14.9	104.0
<b>Total direct costs</b>	<b>168.2</b>	<b>145.3</b>	<b>134.4</b>	<b>117.5</b>	<b>99.5</b>	<b>664.9</b>
Capitalised overheads	12.2	12.3	12.1	9.5	8.0	54.2
<b>Total capex</b>	<b>180.5</b>	<b>157.6</b>	<b>146.5</b>	<b>127.0</b>	<b>107.5</b>	<b>719.1</b>

Source: AER analysis.

Note: Numbers may not add up due to rounding.

Our alternative estimate of \$719.1 million is \$32.1 million lower than AusNet Services' forecast of \$751.3 million. The key components of our final decision include:

- reductions in repex related to estimated risks associated with safety based on a more realistic assumption of the probability of safety related outcomes,
- reductions in repex related to reliability risk driven by adoption of AEMO's forecasts of transmission connection point demand, and
- reductions in repex related to reliability risk based on more realistic assumptions on the time to restore supply after a failure.

Our assessments of capex drivers are below. These set out the application of our assessment techniques to the capex drivers, the weighting we gave to particular techniques and the reasoning applied to form our alternative estimate.

We discuss our assessment of AusNet Services' forecasting methodology, key assumptions and past capex performance in the sections below.

### 6.4.1 Ex post review of 2014–15 capex

The capex incentive regime aims to ensure that only capex that is efficient should enter the RAB to be recovered from consumers.<sup>19</sup> We are required to provide a statement on whether roll forward of the RAB from the previous period contributes to the

<sup>19</sup> AEMC, *Final Position Paper - National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 15 November 2012, p. v.



achievement of the capital expenditure incentive objective.<sup>20</sup> We are satisfied that the AusNet Services capex in the 2014–15 regulatory year should be rolled into the RAB. We discuss this in appendix C.

## 6.4.2 Forecast repex

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 asset. 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. The majority (76 per cent) of AusNet Services' revised capex proposal is repex.

### 6.4.2.1 Position

We do not accept AusNet Services' proposed repex of \$571.7 million (\$2016-17). We instead included in our alternative estimate of overall total capex an amount of \$539.3 million (\$2016-17) for repex. This is 5.6 per cent lower than AusNet Services' proposal. We are satisfied that this amount reasonably reflects the capex criteria. In coming to this view, we applied:

- trend analysis, comparing past trends in total actual and forecast repex for the proposed repex programs
- a methodology review of AusNet Services expenditure forecasting methodology, including key inputs and assumptions; and
- predictive modelling to assess the proposed expenditure for some repex programs.

Table 6.4 summarises AusNet Service's proposal and our alternative amount for repex.

**Table 6.4 Final decision on AusNet Services' total forecast repex (\$2016-17, million)**

	2017-18	2018-19	2019-20	2020-21	2021-22	Total
AusNet Services' revised proposal	136.4	119.9	121.0	107.8	86.6	571.7
<b>AER final decision</b>	135.9	115.9	112.8	97.4	77.3	539.3
Total adjustment	-0.5	-4.0	-8.2	-10.4	-9.3	-32.4
Total adjustment (%)	-0.4%	-3.3%	-6.8%	-9.6%	-10.7%	-5.6%

Source: AER analysis.

Note: Numbers may not add up due to rounding.

<sup>20</sup> NER, cl. 6A.14.2(b).

### 6.4.2.2 AusNet Services' revised repex revenue proposal

AusNet Services' forecast repex is \$571.7 million (excluding overheads). AusNet Services did not accept our reductions to repex in our draft decision.<sup>21</sup> AusNet Services also submitted that a further \$19.8 million is required in repex for a major station replacement at East Rowville terminal station due to transformer type fault that it has only discovered since its initial proposal.<sup>22</sup>

### 6.4.2.3 Historical and forecast repex trends

We discussed AusNet Services' historical and forecast repex trends in our draft decision. We found that while AusNet Services' repex spend had been steadily increasing over time, it is forecast to decline over the 2017–22 regulatory control period. Further detail of AusNet Services' historical trend can be found in our draft decision.<sup>23</sup>

#### *Methodology review – key findings*

We have reviewed AusNet Services' expenditure forecasting methodology, including key input assumptions in assessing whether the capex forecast reasonably reflects the capex criteria.

Our assessment of AusNet Services' key assumptions is outlined below. We have specifically focussed on the issues previously considered in our draft decision.

### 6.4.2.4 Project cost estimation and top down adjustment

In our draft decision, we made an adjustment to some<sup>24</sup> of AusNet Services' project cost estimates to account for an apparent bias towards overestimating project costs which we observed in a sample of 185 projects completed since 2007. Based on our analysis of the estimated and actual costs of these completed projects, we considered that AusNet Services' cost estimation methodology appeared to result in cost estimates which were upwardly biased and tended to overestimate actual outturn project costs. For these reasons, in modelling our alternative estimate of forecast capex, we reduced AusNet Services' project cost estimates by 4.6 per cent or \$13.5 million (\$2016–17).<sup>25</sup>

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<sup>21</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 23.

<sup>22</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 77-78.

<sup>23</sup> AER, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-33 to 6-36.

<sup>24</sup> Our adjustment related only to project cost estimates described by AusNet Services as 'indicative' or 'planning' cost estimates.

<sup>25</sup> AER, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-39 and 6-56.

AusNet Services did not accept our draft decision in relation to this adjustment. AusNet Services submitted that the 0.89 per cent top down adjustment proposed in its initial revenue proposal should be applied as the cost estimation adjustment.<sup>26</sup>

In its revised proposal, AusNet Services submitted that our analysis of cost estimation bias in the draft decision was flawed because it implicitly assumed that the observed variations between forecast and actual project costs were normally distributed. AusNet Services presented analysis that showed, while project costs were historically more often overestimated than underestimated, the average size of each underestimate was approximately 42 per cent greater than the average size of each overestimate. Therefore, AusNet Services concluded that the distribution of the variances between estimated and actual project costs was negatively skewed.<sup>27</sup>

We sought further information from AusNet Services to explain why the distribution of the variations between estimated and actual project costs was negatively skewed. AusNet Services submitted that this negative skew may be attributable to unpredictable and project specific factors such as scope change, safety incidents, government intervention, necessary contractor dismissal or weather events which have the potential to increase costs significantly. In contrast, project underspends are typically driven by cost efficiencies within the control of AusNet Services which, on average, would reasonably be expected to be less than the magnitude of project overspends caused by unforeseen circumstances out of AusNet Services' control.<sup>28</sup>

On balance, having considered AusNet Services' revised proposal and based on the information available, we are not satisfied that an adjustment to AusNet Services' cost estimates to account for a historical cost estimation bias is necessarily justified. Noting AusNet Services' view regarding the possible negative skew in the distribution of project cost variances, it is not clear that applying the 4.6 per cent cost estimation adjustment in the manner set out in our draft decision would necessarily result in an estimate of total forecast capex which better reflects the capex criteria. Rather, for this final decision we will apply AusNet Services' estimate of the top down efficiency adjustment of -0.89 per cent, as proposed by AusNet services in its revised proposal.

#### **6.4.2.5 Assessment of economic risk based approach**

AusNet Services' expenditure forecasting methodology is based on a quantified risk based approach that supports an economic analysis. This approach adopts a risk based cost benefits analysis, where the benefits are the avoided costs of the risks and the cost is the proposed network investment. The following risks are quantified:<sup>29</sup>

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<sup>26</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 74.

<sup>27</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 75.

<sup>28</sup> AusNet Services, *Follow-up to 5 December 2016 capex workshop*, 15 December 2016, pp. 8-9.

<sup>29</sup> AusNet Services, *AMS 10-24 Asset Renewal Planning Guide - PUBLIC*, October 2015, p.19.

- supply security risk – load at risk that would not be supplied in the event of an asset failure, evaluated based on AEMO’s terminal station demand forecast and the latest value of customer reliability (VCR)
- health and safety risk – the hazards to the safety of any person in an event of asset explosive failure, for example human injury and fatality
- environmental risk – the threat of adverse effects on the environment, for example environmental impacts due to oil leaks.
- plant collateral damage risk – the potential collateral damage of adjacent plants due to an asset explosive failure.

AusNet Services' approach considers the probability of asset failure, and the consequences in terms of outage, safety and environmental costs, to determine the expected cost of asset failures. This approach of quantifying risks is necessary to ensure that capital investment decisions are justified with regard to all relevant costs and benefits, and in our view is consistent with good industry practice. However, following our assessment of AusNet Services' revised revenue proposal, and as we did in our draft decision, we have identified some issues related to AusNet Services' estimation of the cost of safety related risks and loss of supply risks (in terms of the application of demand forecasts and assessing the probability of coincident asset failures). We consider that these risk costs are likely to be overstated and, to the extent that these risk costs have been used to justify forecast capex, are likely to result in forecasts which exceed the efficient costs that a prudent operator would require to achieve the capex objectives.<sup>30</sup>

These are discussed in turn below.

## Estimation of safety risk

In our draft decision, we recognised the importance of maintaining network safety and acknowledged AusNet Services' approach in attempting to quantify safety risk to justify economic asset replacement decisions as being consistent with good industry practice.<sup>31</sup> Making a quantitative assessment of safety risk can be difficult and can produce imprecise and uncertain estimates. However, in our draft decision we were concerned that some of AusNet Services' assumptions and inputs to its risk quantification methodology were not realistic and had the effect of overestimating the cost of safety risk in AusNet Services' economic justification of forecast repex. In particular, we considered that AusNet Services' assumption that a fatality occurs in every instance of an explosive asset failure did not reflect AusNet Services' actual operating environment, and was likely to overestimate the cost of safety risk in AusNet Services' economic justification of forecast repex. We considered that an efficient estimate of AusNet Services' repex requirements must reflect the actual safety risks

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<sup>30</sup> NER, cl. 6A.6.7(c).

<sup>31</sup> AER, Draft Decision, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-45 and 6-51.

presented by AusNet Services' operating environment, including accounting for the likelihood that a person is in the vicinity of an asset at the time of failure.<sup>32</sup>

In determining our alternative estimate of forecast capex for the 2017–22 regulatory control period, we sought to apply assumptions which were realistic and would result in forecasts which reasonably reflect the efficient costs that a prudent operator would require to achieve the capex objectives.<sup>33</sup> We considered that a more realistic estimate of the likelihood that a person is in the vicinity and therefore at risk from a safety related asset failure (the Hazard Zone Occupancy (HZO) rate) was in the order of one per cent of the time, rather than 100 per cent as implicitly assumed by AusNet Services. Our estimate was an approximation based on assumptions regarding the typical frequency and duration of proximity to relevant assets. We invited AusNet Services to provide further information in its revised proposal to support any alternative assumptions.<sup>34</sup>

### ***AusNet Services' revised proposal***

In its revised proposal, AusNet Services did not adopt our approach to quantifying safety risk. AusNet Services acknowledged that its approach is relatively simple and that our inclusion of an HZO rate is one way in which its approach to quantifying safety risk could be refined.<sup>35</sup> AusNet Services acknowledged that other TNSPs have estimated an HZO rate which is below 100 per cent, and advised that it intends to review all aspects of its approach to quantifying safety risk before the next regulatory review.<sup>36</sup> However, AusNet Services submitted that, while elements of its approach could be refined, it leads to the targeted replacement of the most risky assets to the degree required by safety obligations and is reasonable overall.<sup>37</sup>

In summary, AusNet Services maintained its existing approach to quantifying safety risks and identified the following criticisms of our draft decision:

- Cost benefit analysis relies on a quantitative assessment of safety risk, which is inherently imprecise and uncertain. Addressing safety risk is a legal obligation. It is therefore important to consider the estimated risk cost broadly, to ensure the overall outcome is reasonable.<sup>38</sup>
- Adjusting the HZO rate assumption in isolation is not appropriate. AusNet Services considered that it is essential to conduct a comprehensive review of each assumption underlying the risk quantification methodology (including asset failure

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<sup>32</sup> AER, Draft Decision, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-51 and 6-52.

<sup>33</sup> NER, cl. 6A.6.7(c).

<sup>34</sup> AER, Draft Decision, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-46, 6-48 and 6-52.

<sup>35</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 31 and 43.

<sup>36</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 23 and 49.

<sup>37</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 31.

<sup>38</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 31.

rates, explosive failure rates, and risk consequence) to ensure the resulting safety outcomes are acceptable.<sup>39</sup>

- The draft decision referred to AusNet Services' estimate of risk consequence as achieving compliance with the 'as low as reasonably practicable (ALARP) principle'. However, AusNet Services' obligations extend to eliminating risk 'so far as is practicable'. AusNet Services submitted advice from its consultant GHD which contends that this is a regulatory mandate and takes precedence over the ALARP principle.<sup>40</sup>
- Our estimate of a one per cent HZO rate is not appropriate because:
  - it is based on average occupancy over the duration of the asset's life rather than the circumstances that exist during major replacement projects. AusNet Services submitted that the occupancy rate and risk level that is relevant is the level of risk at the specific site during the replacement project itself when occupancy rates are high, not the average over the total asset life and total asset population.<sup>41</sup>
  - it does not account for the presence of the general public within the hazard zone. AusNet Services submitted that safety risk to the public must be considered as the equipment hazard zone at some sites extends beyond the site boundary to include public roads, railways and buildings.<sup>42</sup>
  - it does not accurately represent the operating and maintenance requirements of transmission assets. AusNet Services submitted that our estimate of the time spent by workers on site in an average year is unrealistically low. AusNet Services provided estimates of hours spent on site which equate to a hazard zone occupancy rate of 17 per cent. However, AusNet Services did not apply this estimate as it has focussed on site occupancy during the period of the major replacement projects.<sup>43</sup>
- Our substitute estimates for each major project do not represent feasible project scopes. AusNet Services considered that while reducing the estimate of safety risk could defer a project, our approach of reducing the project costs rather than deferring the project timing is unreasonable as individual projects are not perfectly scalable.<sup>44</sup>
- Our adjustment to asset replacement programs based on the sensitivity of a sample of programs to the safety risk quantification issue is flawed as the sample was not representative of the extent to which explosive safety risk is a driver of the asset replacement programs. AusNet Services provided further information

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<sup>39</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 31.

<sup>40</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 35 and GHD, *Safety risk quantification report*, September 2016 (submitted as Appendix 3A to the revised revenue proposal).

<sup>41</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 45-46.

<sup>42</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 46-47.

<sup>43</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 47.

<sup>44</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 59-62.

identifying which specific asset replacement programs are driven by the need to address explosive failure safety risks.<sup>45</sup>

AusNet Services submitted that, taken as a package, its safety risk assessment approach is reasonable and to assume an increased level of safety risk would be imprudent, inconsistent with legislative obligations, and would not provide lowest cost outcomes for consumers.<sup>46</sup>

### ***AER's analysis and conclusions***

In making this final decision, we have considered the issues raised by AusNet Services in its revised revenue proposal, including the report prepared by AusNet Services' consultant GHD on these matters. We have also considered advice from our engineering consultant EMCa, and had regard to submissions received from Energy Safe Victoria,<sup>47</sup> the Consumer Challenge Panel (Panel 5),<sup>48</sup> and AusNet Services.<sup>49</sup>

As the Australian Competition Tribunal has recently reaffirmed in its SA Power Networks decision, safety-related capex is subject to the same assessment under the capex criteria as any other claimed capex.<sup>50</sup> In that regard, while we endorse AusNet Services' use of a quantitative safety risk estimation methodology, the need for rigorous consideration of both the proposed methodology and quantitative inputs applies no differently in this setting than it does for other capex requirements. Over the forthcoming period, we intend to continue to work with AusNet Services and other TNSPs to refine and improve a generally applicable quantitative methodology for the assessment of safety risk in the context of capex proposals.

In summary, our final decision on forecast capex reflects the following conclusions regarding AusNet Services' estimation of safety risk in its economic modelling of asset replacement requirements:

- It is necessary to account for the level of exposure to safety hazards, through an HZO rate or similar factor, in order to reasonably quantify safety risk and forecast the prudent volume of asset replacement expenditure required to achieve the capex objectives.<sup>51</sup>
- The estimate of the HZO rate which should be used in safety risk calculations to justify the need for asset replacement is the HZO rate during normal operations. It

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<sup>45</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 62-66.

<sup>46</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 62-66.

<sup>47</sup> Energy Safe Victoria, *Submission on draft decision, AusNet Services' transmission revenue review 2017–2022*, 13 October 2016.

<sup>48</sup> CCP (sub-panel 5: Mark Henley and Ruth Lavery), *Transmission for the Generations II, Response to AER draft decision for AusNet Services transmission revenue review 2017-22*, September 2016; and CCP (sub-panel 5: Mark Henley and Ruth Lavery), *Transmission for the Generations III, Response to revised revenue proposal by AusNet Services for transmission revenue review 2017-22*, October 2016.

<sup>49</sup> AusNet Services, *Submission on revised proposal*, October 2016.

<sup>50</sup> *Re SA Power Networks [2016] ACompT 11* at [481].

<sup>51</sup> NER, cl. 6A.6.7(c).

is the level of risk assessed in the normal course of operations that justifies the need for asset replacement in the first instance.

- AusNet Services' estimate of the HZO rate during normal operations of 17 per cent reasonably reflects the operating and maintenance requirements of AusNet Services' transmission assets and is within the range of reasonable estimates for this parameter.
- AusNet Services' estimates and modelling approaches for other parameters in its safety risk quantification methodology (risk consequence, asset failure rates, and explosive failure rates) are not well supported and appear to upwardly bias safety risk quantification. Further research and analysis is required to support these estimates or to identify preferable alternative values and approaches. However, for this decision, we propose to apply those inputs as proposed by AusNet Services.
- AusNet Services should, as it has undertaken to do, review its safety risk quantification methodology, modelling, inputs and assumptions prior to the next revenue determination to ensure its approach is reasonable, robust and consistent with good industry practice.

Our reasons for reaching these conclusions are set out below.

### *Meeting AusNet Services' safety obligations*

In its revised proposal, AusNet Services submitted that it is required to eliminate, where practicable, the risk of an incident before it occurs. This is the effect of legislative and regulatory requirements which oblige AusNet Services to maintain a safe workplace, safe systems of work, a safe electricity supply and the safety of staff and the public.<sup>52</sup> Specifically, AusNet Services stated that the *Electricity Safety Act 1998* (Vic) requires it to comply with a 'so far as is practicable' principle, which its consultant GHD characterised as:<sup>53</sup>

a practicality based process which focuses partially on financial capacity, but also on the severity and state of knowledge of a hazard as well as the availability and suitability of removing or mitigating the hazard. i.e. for legislative purposes, high consequence hazards with information of increased risk due to its condition, focusses on what ought to be done to remove or mitigate the risk considering availability, suitability and cost.

AusNet Services submitted that its approach meets this obligation by eliminating the hazard to the extent practicable, where the extent practicable is determined by the point at which the costs of taking further action exceed the benefits.<sup>54</sup> In contrast, AusNet Services argued that our alternative approach would increase the number of asset failures, including explosive failures, and result in a decline in safety standards

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<sup>52</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 34.

<sup>53</sup> GHD, *Safety risk quantification report*, September 2016, p. 6.

<sup>54</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 35.



and reliability of supply.<sup>55</sup> A similar concern was expressed by the AusNet Services Board, which submitted that:<sup>56</sup>

The Board takes an active role in the safety programs of AusNet Services, as required under applicable legislation. This approach to safety includes the production and assessment of quantifiable data regarding safety risks, to enable the business to target and focus on areas exposed to the greatest risk. It is the Board's considered position that this safety risk assessment, and the safety standard it produces, are not only appropriate, but necessary.

It has caused concern to the Board that the AER has suggested that the safety standards of AusNet Services are at a level beyond that which a prudent network service provider would, or should, maintain.

We do not accept AusNet Services' view that our approach would lower safety standards or increase safety risks.<sup>57</sup> This is a mischaracterisation of the effect of our decision regarding AusNet Services' methodology for quantifying safety risk. We have not concluded that AusNet Services' safety standards are too high or that AusNet Services should not comply with its safety obligations at all times. On the contrary, as confirmed by EMCa, we are satisfied that AusNet Services' approach of seeking to eliminate safety hazards as the first preference by replacing hazardous assets where economically justified is consistent with its safety-related legislative obligations.<sup>58</sup>

In our view, our approach is also consistent with meeting AusNet Services' regulatory obligations in respect to safety. Our approach allows for a quantum of forecast capex which is commensurate with the quantified safety risk, in that it reflects the amount of capex that a prudent operator would require to efficiently maintain the safety of its network. That is, our approach also provides for safety risks to be eliminated or reduced to the extent practicable, where the extent practicable is determined by the point at which the costs of taking further action (capex) no longer reasonably reflect the risk reduction benefits. The key issue then is how the safety risks posed by potentially hazardous assets are quantified. The CCP expressed this point in the following way:<sup>59</sup>

We have no doubt about AusNet Services' commitment to safety and understand that the business has worked diligently to incorporate safety understanding and practice across every aspect of the businesses' culture and practice. This is clear, laudable and well understood.

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There is a point at which significant additional safety expenditure produces small amounts of safety gain and consequently is not in the best interests of

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<sup>55</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 37 and 67.

<sup>56</sup> AusNet Services, *Appendix 3B: Statement from the Board of AusNet Services*, 21 September 2016, p. 1.

<sup>57</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 37, 53 and 66-69.

<sup>58</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 12.

<sup>59</sup> CCP (sub-panel 5: Mark Henley and Ruth Lavery), *Transmission for the Generations II, Response to AER draft decision for AusNet Services transmission revenue review 2017-22*, September 2016, p. 10.

consumers. The question of how much extra safety expenditure produces safety gain AND consumer benefit is the critical judgement call for the AER as well as for AusNet Services.

The key difference between AusNet Services' approach and our approach lies in the methodology for quantifying safety risk. We consider that AusNet Services' approach overestimates safety risk by assuming a 100 per cent likelihood of a fatality occurring upon each explosive failure, and thereby failing to account for the actual level of exposure of persons to the safety hazard. In turn, this overstates the level of replacement capex which is economically justified to address these risks. The advice we have received from EMCa supports this view.<sup>60</sup> Our alternative approach to quantifying safety risk is discussed further below.

### *Quantifying safety risk*

The quantification of safety risk is an important component of AusNet Services' economic evaluation of asset replacement requirements. Safety risk relates to the risk that assets fail in such a way that could result in serious injury or fatality to an employee or member of the public. AusNet Services quantifies this safety risk with reference to:<sup>61</sup>

- the likelihood of major asset failure for the relevant asset class
- the probability of that failure presenting a safety risk, for example due to explosive failure or fire
- the risk consequence of a fatality in dollar terms.

As we noted in our draft decision, AusNet Services' approach is expressed in the following equation:<sup>62</sup>

$$\boxed{\text{Safety risk cost}} = \boxed{\text{Asset failure rate}} \times \boxed{\text{Probability of safety related failure}} \times \boxed{\text{Risk consequence}}$$

In our draft decision, we concluded that AusNet Services' methodology for quantifying the cost of safety risk omitted a key factor, resulting in an overestimation of the likely cost of safety risk. AusNet Services' methodology assumes that, at all times, on average one person will be in the vicinity of hazardous equipment and will be killed in the event of an explosive failure. In our draft decision, we concluded that this was an unrealistic assumption which did not reflect AusNet Services' actual operating environment, and had the effect of overestimating the cost of safety risk in AusNet

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<sup>60</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 12.

<sup>61</sup> AusNet Services, *AMS 10-24 Asset Renewal Planning Guideline*, 12 October 2015, pp. 27–28.

<sup>62</sup> AER, *Ausnet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-46.

Services' economic justification of forecast repex. We considered that the following equation reflected a more realistic approach to quantifying safety risk.<sup>63</sup>



We then sought to estimate the likelihood that a person would be in the vicinity of a transmission network asset when it fails (the HZO rate<sup>64</sup>) with regard to the actual physical characteristics and operating environment of AusNet Services transmission network. We concluded that an AusNet Services employee or member of the public was more likely to be in the immediate vicinity of any given station asset for the equivalent of only a few days in any year, or approximately one per cent of the time, rather than 100 per cent of the time as assumed by AusNet Services.<sup>65</sup>

In its revised proposal, AusNet Services did not adopt the AER's approach to quantifying safety risk. AusNet Services maintained that its existing approach to quantifying safety risks provided a reasonable outcome overall and identified a number criticisms of our draft decision, which are discussed below.

Firstly, AusNet Services submitted that adjusting the HZO rate assumption in isolation is not appropriate. AusNet Services considered that it is essential to conduct a comprehensive review of each assumption underlying the risk quantification methodology (including asset failure rates, explosive failure rates, and risk consequence) to ensure the resulting safety outcomes are acceptable.<sup>66</sup>

We agree with this point, but note that we did review each of the parameters used to estimate safety risk in coming to our draft decision. For example, in addition to our conclusion on the HZO rate, we noted concerns with AusNet Services asset failure rates and explosive failure rates, and sought further information to support these rates from AusNet Services.<sup>67</sup> We also concluded that AusNet Services' estimate of the risk consequence was likely to be conservative but reasonable.<sup>68</sup> Therefore, although the HZO rate assumption was the only parameter we adjusted in our draft decision, this

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<sup>63</sup> AER, *Ausnet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-47.

<sup>64</sup> EMCa has suggested that a more appropriate descriptor would be 'fatality rate', as in this analysis it stands for the number of fatalities that are expected to result, on average, from an explosive failure. Refer to EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 25.

<sup>65</sup> AER, *Ausnet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-48.

<sup>66</sup> AusNet Services, *Revised revenue proposal 2017-22*, 21 September 2016, p. 31.

<sup>67</sup> AER, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-46 and 6-62.

<sup>68</sup> AER, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-46 to 6-47.

adjustment was made in the context of having considered the reasonableness of all the parameters proposed by AusNet Services.

For this final decision, we sought advice from EMCa regarding the reasonableness of all parameters in the safety risk cost analysis.<sup>69</sup> EMCa identified a number of concerns with AusNet Services' modelling approaches and assumptions used to estimate all parameters in the safety risk cost analysis. Importantly, EMCa's findings in relation to each parameter suggest that AusNet Services' estimate appears to upwardly bias the overall estimate of safety risk cost.<sup>70</sup> This is contrary to AusNet Services' assertion that, while its assumed HZO rate of 100 per cent may be high, its approach to estimating other parameters is such that the overall approach is reasonable and balanced when all parameters are considered together.<sup>71</sup>

In relation to the risk consequence, asset failure rate, and explosive asset failure rate parameters, EMCa identified the following issues with AusNet Services' estimates and input assumptions:

- AusNet Services' estimate of the risk consequence:<sup>72</sup>
  - does not use the latest available Australian Government guidance<sup>73</sup> for the value of a statistical life, which EMCa considered would represent a reasonable basis for deriving the risk consequence cost
  - includes a loading factor to account for the cost of multiple fatalities or injuries, which EMCa considered was not justified and is better accounted for through the HZO rate parameter
  - includes rounding which accounts for 11 per cent of the total risk consequence value but has not been justified by AusNet Services.
- AusNet Services' derivation of forecast asset failure rates:
  - Mixes the concepts of failure rates and replacement rates, such that failure rate projections are actually based on replacement rates (both proactive and reactive). EMCa advised that using unadjusted replacement/disposal data as a proxy for failure data, without excluding assets replaced proactively for reasons other than very poor condition, is likely to bias towards overestimating the failure rate.<sup>74</sup>
  - Uses an 'aggressive' fixed beta of 3.5 as the shape parameter for the asset wear-out curve, which implies a very rapid increase in the probability of asset failure from one year to the next. AusNet Services has provided insufficient evidence to confirm that it has calibrated its asset failure curve

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<sup>69</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017.

<sup>70</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. i-ii.

<sup>71</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 49.

<sup>72</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. 28-30.

<sup>73</sup> Office of Best Practice Regulation, *Best practice regulation guidance note: Value of statistical life*, December 2014.

<sup>74</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. ii, 20 and 23.

against its own historical data or any other relevant data source to demonstrate that this shape represents a reasonable fit. EMCa considered that AusNet Services' analysis is likely to be biased towards earlier replacement due to the relatively high fixed beta, resulting in an unjustified high rate of increase in asset failure risk with age.<sup>75</sup>

- AusNet Services' estimates of forecast explosive failure rates:
  - are an order of magnitude higher than its own explosive failure history over the last 21 years and much higher than data from a large industry survey<sup>76</sup>
  - are not supported with sufficient information to confirm that AusNet Services has selected appropriate explosive failure to major failure ratios for the three at-risk asset classes.<sup>77</sup>

In addition to the issues relating to AusNet Services' estimates and inputs summarised above, EMCa also identified some concerns with AusNet Services' economic model, as follows:<sup>78</sup>

- AusNet Services' counterfactual 'do nothing' option assumes that it would not replace any of the relevant assets for 45 years. The high (and unrealistic) risk inherent in this scenario leads to a high 'residual value' of risk cost which dominates the overall risk cost calculation of this option, biasing the justification for risk mitigation.
- Conversely, the model does not account for any residual risk value in the replacement options.
- AusNet Services' modelling of replacement options should consider two states – normal operations and the assumed replacement project period. While AusNet Services acknowledged that these two states have different risk characteristics, its model does not account for this.

In summary, EMCa considered that, taking account of the concerns identified in relation to AusNet Services' modelling approaches and input assumptions, the actual safety risk cost is likely to be materially lower than AusNet Services' estimate. Therefore, to the extent that AusNet Services' safety risk cost drives asset replacement timing, its analysis tends to bias it towards premature replacement.<sup>79</sup>

In AusNet Services' revised proposal, AusNet Services' consultant GHD provided commentary on the reasonableness of some aspects of AusNet Services' safety risk quantification methodology. In relation to the risk consequence, asset failure rate, and explosive asset failure rate parameters discussed above, GHD concluded that:<sup>80</sup>

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<sup>75</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. 23 and 31.

<sup>76</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. 24-25 and 30.

<sup>77</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. 24 and 30.

<sup>78</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. ii and 33-35.

<sup>79</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. ii and 35.

<sup>80</sup> GHD, *Safety risk quantification report*, September 2016, pp. 7-8.

- the use of current condition and industry data on explosion probability is appropriate
- using an exponential curve to show that the probability of an asset failure increases as it ages is appropriate and consistent with observations in other industries
- the overall method used by AusNet Services for calculating the cost of a fatality is suitable, however, if public exposure is included the cost may need to be increased to take into account a higher disproportion factor for a public fatality as opposed to a worker fatality.

### **Conclusion on risk consequence and failure rate parameters**

Having considered AusNet Services' revised proposal, including the report from GHD, and the advice from EMCa, in modelling our alternative estimate of forecast capex we have not made any explicit adjustment to the risk consequence, asset failure rate, and explosive asset failure rate parameters proposed by AusNet Services.

On balance, we consider that AusNet Services' estimates for the risk consequence, asset failure rate, and explosive asset failure rate parameters are likely to contribute towards some overestimation of safety risk cost. EMCa identified a number of concerns regarding AusNet Services' approaches and assumptions for estimating values for these parameters, which we consider to be valid. However, we also consider that further research and analysis is required to identify and appropriately support more reasonable alternative approaches and estimates for these parameters. This position is consistent with our draft decision, in which we made no adjustment to these parameters, and is a conservative approach which ensures that our decision does not understate the true level of safety risk cost.

### **Conclusion on HZO rate parameter**

This section relates to our consideration of the HZO rate parameter, with particular regard to the following key questions:

- whether such a factor should be accounted for in quantifying the safety risk cost; and
- if so, what is a reasonable estimate of this parameter which contributes towards a more realistic estimate of safety risk cost.

In our draft decision, we amended AusNet Services' methodology for quantifying the cost of safety risk by including a factor to account for the likelihood that a person is in the vicinity of an explosive asset failure such that the risk consequence materialises.<sup>81</sup> Based on our understanding of the actual physical characteristics and operating environment of AusNet Services' transmission network, we concluded that an AusNet Services employee or member of the public was likely to be in the immediate vicinity of

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<sup>81</sup> AER, *Ausnet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-47.

any given station asset for approximately one per cent of the time, rather than 100 per cent of the time as assumed by AusNet Services.<sup>82</sup>

In its revised proposal, AusNet Services did not adopt our approach to quantifying safety risk using an explicit HZO rate. In summary, AusNet Services maintained its 'implicit' 100 per cent HZO rate and submitted that our alternative HZO rate assumption.<sup>83</sup>

- is based on average hazard zone occupancy over the duration of an assets' life and excludes end of life asset replacement projects, which are undertaken at the time when explosive failures are most likely
- does not take into account the presence of the general public within the hazard zone, which is significant given the major replacement projects proposed are located at CBD and metropolitan terminal stations
- does not accurately represent the operating and maintenance requirements of transmission assets and AusNet Services' work practices.

AusNet Services submitted that it would be inappropriate to assess its major replacement projects using a level of safety risk based on exposure and risk of the workforce and the general public on average over an asset's entire life. Rather, AusNet Services submitted that the risk level that it is appropriate to use for this assessment is the level of risk over the next five years, including that during the replacement project. If AusNet Services were not to consider the safety risk during brownfield replacement projects (where site occupancy is at its highest), brownfield replacements would likely be impossible as a result of the heightened safety risk.<sup>84</sup>

GHD supported AusNet Services' position, and concluded that it is appropriate to include decommissioning and replacement activities when considering site occupancy. Given the number of people on site during replacement projects and the proximity to live equipment of a similar age, more than one person is expected to be in an explosion hazard zone, such that the average occupancy during replacement activities is greater than 100 per cent.<sup>85</sup>

We agree with AusNet Services that it is required to consider and address the safety risks that exist during major asset replacement projects that it undertakes. This is consistent with AusNet Services' regulatory obligations to maintain a safe workplace, safe systems of work, a safe electricity supply and the safety of staff and the public.<sup>86</sup> However, we consider that this is not the risk that is driving the need to economically replace assets in the first instance. AusNet Services appears to conflate the risks that asset replacement projects are intended to address with the implementation risks of

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<sup>82</sup> AER, *Ausnet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-48.

<sup>83</sup> AusNet Services, *Revised revenue proposal 2017-22*, 21 September 2016, pp. 44-45.

<sup>84</sup> AusNet Services, *Revised revenue proposal 2017-22*, 21 September 2016, pp. 45-46.

<sup>85</sup> GHD, *Safety risk quantification report*, September 2016, pp. 7-8.

<sup>86</sup> AusNet Services, *Revised revenue proposal 2017-22*, 21 September 2016, p. 34.

undertaking those projects. Using implementation risks to justify asset replacement is circular logic – essentially AusNet Services has argued that because staff are needed on site in order to replace assets, the greater risk associated with this justifies the need to replace the assets.

In our view, it is the level of risk assessed in the normal course of operations that justifies the need for asset replacement and therefore the need to have staff on site to undertake that work, not the other way around. This is the level of risk that AusNet Services' economic models actually quantify – referred to by AusNet Services as the 'baseline risk'.<sup>87</sup> This 'baseline risk' increases over time as asset failure rates increase. Proactive replacement projects become economically justified when the annualised 'baseline risk' exceeds the project cost.<sup>88</sup> Our view is supported by advice from EMCa, which states that:<sup>89</sup>

We consider that the HZO rate during normal operations should be used in the first instance in the safety risk calculation as part of the options analysis to determine when asset replacement is economically justified.

That is not to say that safety risk costs arising in the course of asset replacement projects should be ignored. The safety risk cost associated with the hazard exposure during the replacement project is rightly recognised as a cost associated with project execution. Implementation risks and associated risk mitigation measures can affect a project's timing, scheduling and/or cost, but they do not provide quantifiable benefits that justify the replacement of assets in the first place. EMCa described the appropriate methodology for considering the increased risks associated with asset replacement projects in this way:<sup>90</sup>

In assessing a brownfields replacement option, the extra safety risk cost associated with the brownfields construction phase should be accounted for in determining what controls should be introduced during that phase, and the optimum timing. This is likely to be an iterative process.

EMCa also noted that, since the purpose of AusNet Services' analysis is to find the optimal timing for replacement, both to reduce risks to an acceptable level during normal operation and to provide for an acceptable risk level when the replacement does take place, AusNet Services should model the distinction between these two states.<sup>91</sup> We agree that this is another area for improvement in AusNet Services risk quantification methodology in future. However, for the purposes of this final decision, we are not required to determine the optimal timing for each individual project identified by AusNet Services. Rather, we must determine the forecast of total capex that is reasonably required to meet the capex objectives in the 2017–22 regulatory control

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<sup>87</sup> AusNet Services, *AMS 10-24 Asset Renewal Planning Guide - PUBLIC*, October 2015, p.17.

<sup>88</sup> AusNet Services, *AMS 10-24 Asset Renewal Planning Guide - PUBLIC*, October 2015, p.17.

<sup>89</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 33.

<sup>90</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 33.

<sup>91</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, pp. ii and 27.



period.<sup>92</sup> We are satisfied that applying an HZO rate consistent with the level of risk assessed in the normal course of operations is a reasonable input assumption to quantify safety risks and therefore the prudent volume of asset replacement expenditure required to achieve the capex objectives.<sup>93</sup> This conclusion is consistent with our draft decision.

In relation to the quantification of risks to the general public, AusNet Services submitted that while our draft decision acknowledged the need to minimise risks and hazards to the public we had not explicitly accounted for this in our safety risk valuation. Conversely, AusNet Services argued that its approach does account for the safety of the general public through its implicit 100 per cent HZO rate. AusNet Services submitted that the hazard zones for the majority of terminal stations at which the proposed major replacement projects are located extend beyond the boundaries of the terminal stations. The major replacement projects proposed are all located in metropolitan areas. The real potential for there to be multiple members of the general public located within the hazard zones of these sites should also be taken into account.<sup>94</sup>

Energy Safe Victoria also submitted that it is important to account for the risk to the public posed by the failure of an asset. Energy Safe Victoria submitted that the precautionary principle applies when addressing foreseeable events that impact on public safety, which gives more weight to the consequence of an event than the arguable probability of the event materialising.<sup>95</sup>

The Consumer Challenge Panel (Panel 5) submitted that it was unclear what information AusNet Services had used to assess the safety risk to the public on spaces neighbouring AusNet Services' property, and the extent to which this risk had been addressed in AusNet Services' proposal.<sup>96</sup>

In reaching this final decision, we have considered the nature of the risk that terminal assets present to the general public. The risk to the public from explosive asset failure is relevant only for a relatively small subset of assets at a specific subset of sites. There are also several mitigating factors which reduce the likelihood that members of the public could be affected by an explosive asset failure, including:

- For some sites, the potentially hazardous zone does not extend beyond the site boundary.
- Some assets are shielded by blast walls or by adjacent assets so as to effectively prevent or limit any impact on public areas.

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<sup>92</sup> NER, cl. 6A.6.7(c).

<sup>93</sup> NER, cl. 6A.6.7(c).

<sup>94</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 46.

<sup>95</sup> Energy Safe Victoria, *Submission on draft decision, AusNet Services' transmission revenue review 2017–2022*, 13 October 2016.

<sup>96</sup> CCP (sub-panel 5: Mark Henley and Ruth Lavery), *Transmission for the Generations II, Response to AER draft decision for AusNet Services transmission revenue review 2017-22*, September 2016, p. 12.

- Terminal stations are typically located away from general public areas in locations such as industrial zones or open space areas where foot traffic is low.
- The presence of high, secure (and at times duplicated) fencing at terminal station sites prevents public access and to some degree provides protective shielding against explosive debris.
- Public exposure to a hazard zone is also more likely to occur inside a vehicle, train or adjacent building, which provides further protective shielding against explosive debris.

We note that AusNet Services has not explicitly included public safety risk in its safety risk cost analysis.<sup>97</sup> AusNet Services' consultant GHD attempted to estimate a generalised public HZO rate, but recommended a more refined approach using site specific public impact factors.<sup>98</sup>

We are concerned to ensure that risks to the general public are appropriately considered and addressed. However, we consider that the risk to the public from explosive asset failures is relatively low compared to the already low risk to AusNet staff, and is not relevant for all substation sites. In the absence of a robust methodology to assess this risk on a site specific basis, we consider this risk cost is likely to be accounted for in the conservatism applied to the risk consequence, asset failure and explosive failure rate parameters of the safety risk cost calculation as noted above.

We consider that AusNet Services should, as it has undertaken to do, review all aspects of its approach to quantifying safety risk prior to the next regulatory review. This would include reviewing the most appropriate approach to quantifying, for relevant sites, the likely safety risks arising from public exposure to explosive asset failures. This is rightly a matter for AusNet Services and other transmission network service providers to consider in their specific contexts. For the purposes of this decision, we are satisfied that any risk to the public from explosive asset failures is likely to be sufficiently accounted for in the conservatism applied in estimating the various parameters of the safety risk cost calculation.

In relation to the need for the estimated HZO rate to reflect the operating and maintenance requirements of transmission assets and AusNet Services' work practices, AusNet Services submitted that our estimate of hazard zone occupancy was unrealistically low. Using the methodology we set out in our draft decision, AusNet Services provided alternative assumptions of the average frequency and duration of attendance at terminal station sites to undertake different categories of work as follows:

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<sup>97</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 46.

<sup>98</sup> GHD, *Safety risk quantification report*, September 2016, pp. 8-9.

**Table 6.5 AusNet Services' estimated average terminal station occupancy rates**

Category	AER's Assumption	AusNet Services' Response
<b>Operations</b>	Requires two people to be on site for 0.5 hours per year.	On average, 27 man hours per annum per terminal station are required for this purpose.
<b>Routine Inspection</b>	Requires two people to be on site twice a year for two hours.	As per AusNet Services' asset inspection procedures, over 112 man hours per annum per terminal station are required for oil sampling, non-invasive inspections, secondary asset inspections and general site inspections.
<b>Maintenance</b>	Requires six people to be on site once every five years for one week.	As per AusNet Services' terminal station asset maintenance procedures, over 843 man hours per annum per terminal station are required for the routine maintenance of circuit breakers, transformers, disconnectors, etc.
<b>Refurbishment</b>	Requires ten people to be on site once every fifty years for twelve weeks.	To complete the refurbishment work program proposed, over 475 man hours per annum per terminal station are required for the 2017-22 period. This is separate to the forecast major replacement projects.

Source: AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, Table 3.5, p. 47.

AusNet Services' assumptions suggest that an estimate of the HZO rate which reflects the operating environment of AusNet Services' transmission network terminal station sites during normal operations is 1 457 hours per year or approximately 17 per cent of the time in any year.

In our draft decision, we estimated that an HZO rate of approximately one per cent of the time in any year was a reasonable order of magnitude for this probability. However, we noted that as the asset manager AusNet Services would be better placed than us to consider what a reasonable estimate of site occupancy (and therefore the HZO rate) might be using our 'average occupancy' methodology.<sup>99</sup>

In its advice, EMCa considered that AusNet Services' estimated HZO rate for normal operations of 17 per cent is conservatively high.<sup>100</sup> EMCa further considered that the concept of an HZO rate could be extended by considering other factors that further reduce the likelihood that a fatality occurs, noting that just because a person is in a hazard zone, it is not certain that a fatality will occur if primary plant fails explosively.<sup>101</sup> These factors include:<sup>102</sup>

<sup>99</sup> AER, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-52.

<sup>100</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 27.

<sup>101</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 25.

<sup>102</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 26.

- the probability that a person in the hazard zone is hit by a projectile(s) from the explosive failure; and
- the probability that the person suffers fatal injuries from impact of the projectile(s) (as opposed to being not fatally injured or not injured).

EMCa considered that these factors combine to significantly reduce the likelihood of a fatality arising from an explosive failure, consistently with the lack of any historical evidence of fatalities or injuries having occurred from AusNet Services' recorded explosive failure history. In relation to the likelihood of a fatality occurring from an explosive failure, EMCa observed that:

- while AusNet Services has recorded 18 explosive plant failures in the last 21 years, none of those failures has resulted in fatality or injury
- so far as EMCa is aware, no fatality has been caused by an explosive failure of outdoor major electrical plant in a terminal station in Australia in the last 20 years.<sup>103</sup>

Having considered AusNet Services' revised proposal and EMCa's advice on estimating the HZO rate, for this decision we have adopted AusNet Services' estimate of the HZO for normal operations of 17 per cent to quantify safety risk cost for the relevant major station projects. This is because, as noted in our draft decision we consider AusNet Services is well placed to estimate the HZO rate based on its typical level of activity at substation sites for maintenance, operations, inspections and refurbishment work.

While we note that EMCa considers AusNet Services' estimate of 17 per cent to be conservative, and has identified other factors which further reduce the likelihood that a fatality occurs as a result of an explosive asset failure, we do not propose to estimate the impact of these factors for this final decision. In our view, this lends further conservatism to our decision, and further underscores that our alternative approach will not underestimate the true level of safety risk costs (including public safety risk). Nonetheless, AusNet Services should consider the relevance and impact of the additional factors identified by EMCa in refining and improving its safety risk quantification methodology, modelling, inputs and assumptions prior to the next revenue determination.

### *Conclusion*

In summary, we are satisfied that in order to reasonably estimate the safety risk cost associated with hazardous assets it is necessary to account for the level of exposure of persons to the hazard, cognisant of any risk controls that mitigate the level of exposure. In assuming that a fatality will result from every explosive asset failure, AusNet Services' methodology has the effect of considerably overstating the true level of safety risk, as demonstrated by the fact that AusNet Services has in fact

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<sup>103</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. 26.

experienced 18 explosive failures in the last 21 years without any resultant fatalities or injuries.

In determining our estimate of forecast capex, we have sought to ensure that the forecasting methodology and assumptions applied to forecast required levels of capex are realistic, and result in forecasts which reasonably reflect the efficient costs that a prudent operator would require to achieve the capex objectives.<sup>104</sup> In our view, applying an estimated HZO rate of 17 per cent in the safety risk estimation methodology as discussed above will result in an estimate of forecast capex which reasonably reflects the efficient costs that a prudent operator would require to maintain the safety of the transmission network.

We have applied our HZO rate assumption of 17 per cent to AusNet Services' economic models for the East Rowville, Fishermans Bend, Springvale and Templestowe terminal station projects. This reduces the level of quantified safety risk cost for each project, which in turn results in a minor reduction in the economically justified capex at the Fishermans Bend, Springvale and Templestowe terminal station sites. The level of forecast capex associated with the East Rowville terminal station site remains justified after making this adjustment to quantified safety risks at that site. This is because, although the reduction in the assumed HZO rate from 100 per cent to 17 per cent may appear substantial, the actual effect of this change depends upon the extent to which safety risk is a driver of forecast capex for each project. Overall, safety risk is not the most significant driver of AusNet Services' forecast capex.<sup>105</sup>

We have also applied our HZO rate assumption of 17 per cent to AusNet Services' economic justification for its forecast asset replacement program capex. In its revised proposal, AusNet Services made clear that the safety risk issue was relevant for a smaller subset of asset replacement programs than we had assumed through the sampling approach we adopted for reviewing these programs in our draft decision.<sup>106</sup> We have therefore applied our 17 per cent HZO rate assumption to the two programs identified by AusNet Services as being sensitive to quantified safety risk.<sup>107</sup> The level of expenditure proposed by AusNet Services for these programs remains economically justified under our alternative assumption.

We have quantified the effect of our decision on AusNet Services' approach to estimating safety risk in our revised estimate of forecast capex for the 2017–22 regulatory control period as set out in Table 6.4. However, we note that our constituent decision on capex provides for a forecast of *total* capex in the 2017–22 regulatory control period. While we examine individual expenditure categories, projects and programs in order to arrive at our alternative estimate of total capex, we do not approve or mandate their specific scope and timing. Individual projects and programs assessed during a regulatory determination are routinely (and indeed prudently and

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<sup>104</sup> NER, cl. 6A.6.7(c).

<sup>105</sup> EMCa, *Review of AusNet Services transmission safety risk cost*, April 2017, p. ii.

<sup>106</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 62-66.

<sup>107</sup> The circuit breaker and power transformer bushing replacement programs.

efficiently) deferred, re-scoped or otherwise amended in the course of a regulatory control period as circumstances dictate. AusNet Services is therefore able to prioritise expenditure, such as the replacement of assets which present a safety risk, within its portfolio of projects and programs as it considers necessary to meet its regulatory obligations and achieve the capex objectives of the NER.

#### **6.4.2.6 Application of demand forecasts**

We have updated AusNet Services' economic models to use AEMO's 2016 demand forecasts as detailed in Appendix A below. We have updated the demand forecasts for East Rowville, Fishermans Bend, Springvale and Templestowe terminal stations. For Springvale and Templestowe terminal stations this led to a reduction in the justified capex because AEMO's forecasts are lower than AusNet Services' forecasts. For Fishermans Bend and East Rowville terminal stations this led to an increase in justified capex because AEMO's forecasts are higher than AusNet Services' forecasts.

#### **6.4.2.7 Probability of coincident asset failures**

In its economic modelling for terminals station projects, AusNet Services calculates the supply risk cost as a function of the probability of various failure scenarios and the energy at risk (which is derived from the demand forecasts). This supply risk cost (along with the safety and the environmental risk costs) is then used to justify the costs of the replacement project at the terminal station. In its initial proposal, AusNet Services calculated the supply risk costs for the scenarios of one transformer failing (N-1) and for two transformers failing concurrently (N-2).

In its revised proposal, AusNet Services amended its economic models for the West Melbourne, Springvale and Templestowe terminal station projects to introduce calculations for the scenarios where 3 and 4 transformers fail concurrently (N-3 and N-4).<sup>108</sup> AusNet Services' economic model for its East Rowville terminal station project also included these failure scenarios.

One variable used in AusNet Services' economic models is the mean time to restore (MTTR), which is the mean time it takes to restore supply after the failure of a transformer. We identified an issue with the way AusNet Services calculated MTTR it used. It defined the MTTR as 0.2167 (2.6 months/12 months) for the first transformer failure and then 1 (12 months/12 months) for any higher order contingency. This value for higher order contingencies appeared too high, given that AusNet Services has spare transformers available and the usual time to replace a transformer is 4 to 6 weeks. Using this higher value of MTTR in its economic models for higher order contingencies led to a significant larger supply risk cost than using the value of 0.2167 for all contingencies.

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<sup>108</sup> We have not made any adjustments to the West Melbourne terminal station project because it is justified on other grounds.

We sought further information from AusNet Services regarding its calculation of the MTTR for these different scenarios. AusNet Services submitted that while it is confident in its modelling approach, it recognises that there are other plausible values for MTTR for higher order contingencies.<sup>109</sup> AusNet Services submitted that the condition of the assets at East Rowville, Springvale, and Templestowe terminal stations is such that the proposed projects remain prudent for the period. AusNet Services presented condition data showing that the assets to be replaced are of condition C4 and C5, with C5 being the worst condition score that AusNet Services uses.<sup>110</sup> The C4 condition score means that an asset still has 25% of life remaining. The majority of the assets to be replaced are rated as C4. Given the long life of these assets, we do not consider that it is necessarily prudent to replace this volume of C4 assets.

AusNet Services also submitted revised MTTR values based on new calculations. For the (N-1) contingency, AusNet Services calculated the MTTR is 0.234 (2.811 months/12 months). For higher order contingencies, AusNet Services calculated that the MTTR is 0.131 (0.234\*6.712 months/12 months). For these calculations AusNet Services has calculated the probability that they will have a spare transformer available at any given time as well as estimating that the time to replace a transformer is 1 month when a spare is available and 12 months when a new transformer must be procured.<sup>111</sup>

It is important to note that AusNet's revised MTTR values are mean times to replace the transformers, not mean time to restore supply at the terminal station. In an event of multiple simultaneous transformer failures, AusNet Services will employ a range of work arounds to restore supply more quickly than this 12 month estimate (in the situation where a new transformer must be procured). Using these MTTR values to calculate the supply risk assumes that AusNet Services does not restore supply until it is able to replace the failed transformers.

We are concerned that using these MTTR values which represent time to replace overstates the supply risk cost. We would expect that a business would restore supply much more quickly than 12 months and its economic modelling should reflect this. However, we do not currently have reliable industry wide data on the supply restoration times.

Therefore we have used AusNet Services' revised MTTR values of 0.2342 for (N-1) and 0.1310 for higher order contingencies in AusNet Services' economic models for the East Rowville, Springvale and Templestowe terminal station projects. Making this change to the MTTR lowers the justified capex for each of these projects. However, the

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<sup>109</sup> AusNet Services, *MTTR estimates and economic modelling approach for SVTS, ERTS and TSTS*, 14 February 2017, p. 1.

<sup>110</sup> AusNet Services, *MTTR estimates and economic modelling approach for SVTS, ERTS and TSTS*, 14 February 2017, pp. 1, 2-8.

<sup>111</sup> AusNet Services, *MTTR estimates and economic modelling approach for SVTS, ERTS and TSTS*, 14 February 2017, pp. 8-11.

East Rowville project remains justified by the economic modelling, and also taking into account other engineering issues such as potential transformer winding type failure risks. There are reductions for the Springvale and Templestowe projects.

#### 6.4.2.8 West Melbourne Terminal Station project

In our draft decision, we did not include AusNet Services' forecast capex of \$97.4 million for the West Melbourne Terminal Station (WMTS) project in our alternative estimate of total capex. As we did for other major terminal station projects at Springvale, Fishermans Bend and Templestowe, we considered that AusNet Services had overstated the quantifiable safety and reliability risk at West Melbourne such that the forecast capex requirement was also overstated. Our assessment of the WMTS project using updated and more realistic assumptions indicated that the economic value of avoided network risks was lower than estimated by AusNet Services, leading to a lower scope/volume of works that we were satisfied reasonably reflected the capex criteria.<sup>112</sup>

However, we also noted that AusNet Services' scope of works at WMTS is interrelated with the decommissioning of CitiPower's 22kV assets connected to WMTS. In our recent distribution determination for CitiPower, we included an amount of capex for CitiPower to decommission these 22kV assets.<sup>113</sup> AusNet Services submitted that the avoided costs associated with the 22kV asset decommissioning works are expected to provide savings of \$43 million over the two forthcoming regulatory control periods (including savings of \$17 million in the 2017–22 regulatory control period).<sup>114</sup> On that basis, we concluded that it is reasonable for AusNet Services to coordinate the scope and timing of its work program at WMTS with CitiPower, to fully realise the expected efficiencies related to the decommissioning of the 22kV assets. We therefore sought further information from AusNet Services as to the relevance of CitiPower's 22 kV decommissioning project on the proposed scope, timing and cost of works for the WMTS project.<sup>115</sup>

In its revised proposal, AusNet Services provided additional information regarding the WMTS project and its interrelationship with CitiPower's 22kV asset decommissioning works. This included the following key points:

- The WMTS rebuild is a committed project which is currently underway. Work has commenced on site, key tender processes are underway, and it is expected that approximately \$20 million (\$2016–17) in capex will have been incurred by the end of the 2014–17 regulatory control period.<sup>116</sup>

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<sup>112</sup> AER, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-57.

<sup>113</sup> AER, *Final decision - CitiPower distribution determination 2016-20 - Attachment 6*, May 2016.

<sup>114</sup> AER, *Final decision CitiPower distribution determination, attachment 6 - capital expenditure - May 2016*, p.6-46.

<sup>115</sup> AER, *AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-58.

<sup>116</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 58.



- AusNet Services has secured a lease on adjacent land from VicTrack to enable project delivery using air insulated switchgear rather than gas insulated switchgear (a more cost effective solution). However, this lease expires in 2019. The timing of the project is therefore a key factor in AusNet Services' ability to deliver the project efficiently and at the lowest cost.<sup>117</sup>
- If the WMTS rebuild is not completed by 2022, the project as currently designed will not be able to be delivered. CitiPower intends to shift 11.7MW of load from its 22kV network onto the 66kV assets at WMTS by summer 2018–19 and a further 43.6MW of load onto the 66kV assets by summer 2020–21. If the WMTS rebuild does not proceed as scheduled this increased load would:
  - require the project sequencing to be reassessed, increasing the duration, complexity and cost of the project;<sup>118</sup> and
  - impact AusNet Services' ability to take outages of the 66kV network assets without suffering reliability impacts.<sup>119</sup> Supply risks would be greater during the construction phase because asset replacements would have to be undertaken when the 66kV demand at WMTS is higher, requiring more complex plant outage management to avoid impacting the load supplied from WMTS.<sup>120</sup>
- Safe access is required to decommission CitiPower's 22kV assets at the WMTS site. Any further delay in the WMTS rebuild schedule would require further assessment to ensure that assets in the vicinity of CitiPower's 22kV assets did not present an unacceptably high safety risk.<sup>121</sup>

We have considered the additional information provided by AusNet Services to clarify the interrelationship between the WMTS rebuild project and CitiPower's 22kV asset decommissioning works. On balance, while noting the concerns we have identified with some aspects of AusNet Services' economic modelling approaches and assumptions in other sections of this decision, we are satisfied that the proposed capex for this project reasonably reflects the capex criteria.<sup>122</sup>

We consider that the benefits and savings provided by the integration of this project, in terms of both its scope and timing, with the decommissioning of CitiPower's 22kV assets at the WMTS site are substantial. This includes a saving to AusNet Services of \$43 million over the next ten years, and further savings accruing to CitiPower. Any significant change to the scope or timing of the project as proposed by AusNet Services is likely to prevent realisation of the full efficiencies and benefits provided by integrating the rebuild project with CitiPower's 22kV asset decommissioning project. We do not consider this to be in the long term interests of consumers. Therefore, as

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<sup>117</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 59.

<sup>118</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 59.

<sup>119</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 59.

<sup>120</sup> AusNet Services, *Follow-up to 5 December 2016 capex workshop*, 15 December 2016, p. 8.

<sup>121</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 59.

<sup>122</sup> NER, cl. 6A.6.7(c).

foreshadowed in our draft decision and for the reasons set out above, we have made no adjustment to AusNet Services' forecast capex in relation to the WMTS rebuild project.

#### **6.4.2.9 East Rowville Terminal Station project**

As a consequence of a failure of a 150MVA 220/66kV transformer at the Ringwood Terminal Station in March 2016, AusNet Services' revised proposal included additional capital expenditure of \$19.8 million (\$2016–17) to replace three of these transformers of the type that failed at the Ringwood Terminal Station at its East Rowville Terminal Station (ERTS). AusNet Services submitted that because the ERTS has just four transformers, its economic analysis shows that due to the downgraded condition of the transformers which are approaching 50 years of age and likelihood that multiple coincident failures are materially possible, the supply risk at this site justifies the replacement of these three transformers within the next regulatory period. AusNet Services also submitted that because the fault level at ERTS is also high, the likelihood of a failure is increased. At the time of submission of its revenue proposal in October 2015, AusNet Services stated that the ERTS project was planned to be undertaken in the 2022–27 regulatory control period. AusNet Services submitted that the ERTS project only arose due to the implications of an unforeseeable fault event which occurred between submission of its revenue proposal and our Draft Decision.<sup>123</sup>

The ERTS supplies electricity to the outer south-eastern corridor of Melbourne in a region supplied by the distribution networks United Energy and AusNet Electricity Services. AusNet Services proposes to replace three 220/66 kV transformers, two 220 kV circuit breakers and three 66 kV circuit breakers. AusNet Services submitted that the forecast completion date for the project is the end of 2019.<sup>124</sup>

##### *Project assessment*

We have reviewed AusNet Services' economic model used to quantify the risks and costs of its proposed ERTS project. Similar to our review of other major capex projects proposed by AusNet Services, we identified the following issues regarding the reasonableness of AusNet Services' economic modelling of the proposed ERTS project:

- the over estimation of the cost of safety risk and subsequent overstatement of the economic benefit of safety risk
- substitution of AusNet Services' demand forecasts with AEMO's 2016 demand forecasts as we consider they provide a more realistic expectation of demand than AusNet Services' 2015 demand forecasts; and
- coincident transformer failures. AusNet Services acknowledged our concerns in respect to its mean time to restore (MTTR) supply estimates in its modelling for

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<sup>123</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 77.

<sup>124</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, pp. 77-78.

multiple transformer failure contingencies and provided revised values of MTTR in its economic model for the ERTS.<sup>125</sup>

Further details of each of these issues are discussed in this attachment in our review of the other major projects in AusNet Services' proposed capex program.

We amended AusNet Services' ERTS economic model to reflect our concerns with respect to AusNet Services' estimation of safety risk, demand forecasts and coincident transformer failures. Although the impact of these amendments to AusNet Services' ERTS economic model reduces the time horizon for its proposed capex, the economic model shows that the project remains justified during the 2017–22 regulatory control period.

The CCP raised concerns that AusNet Services has used the progress of a revenue review to propose expenditure for the ERTS. The CCP considered that AusNet Services' revised proposal should not provide a basis for a final attempt to bid up the capex allowance. The CCP considered that the appropriate response of AusNet Services' management should be to revise expenditure priorities within the available budget and to efficiently allocate funds to deal with the highest priority maintenance and capex expenditures. The CCP argued that expenditure on East Rowville should be considered against other competing priorities and funds allocated accordingly.<sup>126</sup>

We acknowledge the concerns raised by the CCP and agree that in principle management of energy businesses should revise expenditure priorities within the available budget and allocate funds to deal with the highest priority maintenance and capex expenditures. However, we also acknowledge that the failure of the transformer at the Ringwood Terminal Station in March 2016 occurred after AusNet Services submitted its revenue proposal in October 2015. Further, at the time of submission of its revenue proposal in October 2015, AusNet Services stated that the ERTS project was planned to be undertaken in the 2022–27 regulatory control period. AusNet Services submitted that the ERTS project only arose due to the implications of an unforeseeable fault event which occurred between submission of its revenue proposal and our Draft Decision. On this basis we consider that it was not unreasonable for AusNet Services to propose expenditure for the ERTS in its revised revenue proposal. As proposed by the CCP, we reviewed AusNet Services' proposed capex for the ERTS in the same level of detail as we did other capex forecasts by AusNet Services for the 2017–22 regulatory control period.<sup>127</sup>

In summary, we consider that AusNet Services' proposed capex for the ERTS project for the 2017–22 regulatory control period reasonably reflects the capex criteria.

#### **6.4.2.10 Network health indicators**

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<sup>125</sup> AusNet Services, *MTTR estimates and economic modelling approach for SVTS, ERTS and TSTS*, 14 February 2017.

<sup>126</sup> CCP, *Submission to the AER, AusNet Services 2017–22 revised revenue proposal*, October 2016, pp. 32-33.

<sup>127</sup> CCP, *Submission to the AER, AusNet Services 2017–22 revised revenue proposal*, October 2016, p. 32.

AusNet Services' proposed capex must be consistent with the amount of capex it considers will be required to maintain the quality, reliability and security of supply of prescribed transmission services.<sup>128</sup>

### ***Draft decision***

In our draft decision, in considering this obligation we had regard to network health indicators to gauge the likely health or condition of AusNet Services' network assets when considering the total forecast capex.<sup>129</sup> In respect to AusNet Services' estimated risk in relation to major projects and some of its proposed repx programs, our analysis showed that AusNet Services overestimated network risks from an asset failure. As a result, we considered that AusNet Services has overestimated overall network risk and therefore expenditure required to achieve the capex objectives.<sup>130</sup> We also considered the likely health of AusNet Services' network assets and its implications for forecast capital expenditure in terms of achieving the capex objectives.<sup>131</sup>

### ***AusNet Services' revised proposal***

In its revised proposal, AusNet Services submitted that our findings that there are a material number of substation assets in service beyond their mean economic lives implies that AusNet Services' is not unduly conservative as it does not lead to unwarranted asset replacements. AusNet Services further submitted that despite this, we have proceeded to apply a material reduction to AusNet Services' asset replacement program which targets replacement of this legacy equipment. AusNet Services considered that if our draft decision were implemented it would expect an increase in the mean economic lives of substation assets and the number of assets in service beyond their mean economic lives.<sup>132</sup>

AusNet Services submitted that we have not considered the implications of further increasing the age profile of its substation assets in our draft decision and the subsequent impact on the safety, reliability and security of electricity supply. AusNet Services estimated that project deferrals due to safety valuation implied by our draft decision would result in about 7.1 per cent of assets at Springvale Terminal Station and 4.5 per cent of assets at West Melbourne Terminal Station failing before they were replaced in the 2022–27 regulatory control period.<sup>133</sup>

AusNet Services also commented that we requested, and received, detailed oil testing results for several transformers included in its proposed replacement program and

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<sup>128</sup> NER, 6A.6.7(3)

<sup>129</sup> AER, *Draft decision - AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-59-66.

<sup>130</sup> AER, *Draft decision - AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-61.

<sup>131</sup> AER, *Draft decision - AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, pp. 6-61-66.

<sup>132</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 29.

<sup>133</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 29.

noted that our draft decision did not discuss any conclusions we may have drawn from this information.<sup>134</sup>

### ***AER position***

While we noted in our draft decision that, based on information provided by AusNet Services, there are a material number of substation assets (substation switchbays, substation power transformers and substation reactive plant) in service beyond their mean economic lives, we also found that historical trends of AusNet Services' asset failure performance suggests that past expenditure has been sufficient to maintain the quality, reliability and security of supply of its prescribed transmission services. Further, the reference mean economic life of an asset in our analysis was determined by AusNet Services. It is possible that AusNet Services has taken a conservative approach to the derivation of an asset's mean economic life, thereby underestimating the assets actual economic life. This argument is supported by the fact that these substation assets are still in service presumably because they are functioning effectively and reliably. Further, our analysis of AusNet Services' asset age profile found that, for the majority of transmission assets, the number of assets in service beyond their expected mean economic life was relatively immaterial.<sup>135</sup>

Notwithstanding our view on the proportion of AusNet Services' assets in service beyond their actual economic lives, our review of AusNet Services' proposed revised capex program supported our findings in our draft decision that AusNet Services' quantification of safety and reliability risks largely explain why we are not satisfied that AusNet Services' proposed total forecast capex meets the capex criteria. As part of our review of AusNet Services' proposed revised capex program we did consider the implications of further increasing the age profile of its substation assets and subsequent impact on the safety, reliability and security of electricity supply.

Our purpose in obtaining transformer oil testing data from AusNet Services was to test AusNet's condition assessment practices. In particular, we were concerned with how AusNet was mapping its condition assessment of various types of equipment onto its C1 to C5 discrete condition scale and then associating each of the C1 to C5 condition points to a probability of failure. AusNet Services' oil transformer data showed that the C1 to C5 condition scale was coarse and likely to overstate actual deterioration because the assessed condition of the equipment is required to align with one of the discrete C1 to C5 points. Further there was a tendency for AusNet Services to move individual equipment to the higher discrete condition point. That is, equipment with a notional condition of around 3.3 would be moved to the C4 point. Such a bias will overstate failure probabilities and therefore the volume of replacement assets used in the economic analysis of AusNet Services' capex projects. Also, each of the C1 to C5 condition points was associated with a failure rate curve that is essentially a Weibull

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<sup>134</sup> AusNet Services, *Revised revenue proposal 2017–22*, 21 September 2016, p. 29.

<sup>135</sup> AER, *Draft decision - AusNet Services transmission determination 2017-18 to 2021-22: Attachment 6 - Capital expenditure*, July 2016, p. 6-64.

function<sup>136</sup> with the shape parameter arbitrarily set to 3.5 with the scaling factor set by moving the curve (calibrating) to align with the equipment failures that occurred in one year. That is, the approach adopted by AusNet Services is not a line of best fit approach (least squares) but rather a one point fit approach. We consider that this approach does not provide the best unbiased estimator of the time series of equipment failure events. On the basis of our evaluation of AusNet Services' transformer oil testing data and derivation of equipment failure rates, we consider that this adds weight to our conclusion that AusNet Services is likely to have overstated forecast asset failure rates.

### 6.4.3 Forecast non-network capex

The non-network capex category for AusNet Services includes expenditure on information and communications technology (ICT), buildings and property, motor vehicles, and tools and equipment.

In our draft decision we accepted that AusNet Services' forecast capex for buildings and property, motor vehicles and tools and equipment reasonably reflected the efficient costs that a prudent operator would require to meet the capex criteria.<sup>137</sup> However, we did not accept AusNet Services' forecast capex for ICT.<sup>138</sup>

#### 6.4.3.1 Information and communications technology capex

##### *Draft decision*

In our draft decision we considered that AusNet Services did not provide sufficient information for all of the transmission specific ICT capex projects. It was our view that although transmission specific ICT projects are mentioned briefly in AusNet Services' ICT Strategy and in the spreadsheet providing the project breakdown, as well as in its response to our information request for further information, no project justification or business cases were provided for a number of projects. In the absence of any project justifications it was not clear why the capex associated with these projects was required to meet the capex objectives.<sup>139</sup> We considered that AusNet Services had sufficiently justified \$11.7 million of its proposed \$17.3 million for transmission specific ICT capex projects. In our draft decision, we stated that if AusNet Services provided further information on these projects in its revised proposal, we would consider that

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<sup>136</sup> The Weibull distribution is used in reliability engineering and failure analysis for modelling reliability data, such as calculating an assets mean time to failure.

<sup>137</sup> NER, cl. 6.5.7(c)(1).

<sup>138</sup> AER, *Draft Decision - AusNet Services transmission determination 2017–18 to 2021-22 – Attachment 6*, July 2016, pp. 6-67 to 6-73.

<sup>139</sup> NER, cl. 6A.6.7(a). AER, *Draft Decision - AusNet Services transmission determination 2017–18 to 2021-22 – Attachment 6*, July 2016, pp. 6-70 to 6-72.

information and assess whether the expenditure is necessary to achieve the capex objectives in the NER.<sup>140</sup>

### *AusNet Services' revised proposal*

In its revised proposal, AusNet Services provided additional information on its transmission specific ICT capex programs.<sup>141</sup> AusNet Services acknowledged that, whilst it had previously provided project justifications for a range of forecast projects which provide key details pertaining to the planned portfolio of work, this information did not include project justifications for the projects excluded from our substitute estimate of forecast capex. AusNet Services submitted that in providing this information, it intended to demonstrate the type of analysis supporting the projects included in its IT capex forecast and did not provide supporting documentation for every project.<sup>142</sup>

AusNet Services considered the capex associated with the projects is required to achieve the capex objectives and has therefore provided project justifications for these projects as a supporting document to its revised proposal.<sup>143</sup>

### *Final decision*

We have reviewed the documentation submitted by AusNet Services in its revised revenue proposal detailing the justification for the transmission specific ICT capex projects excluded from our estimate of prudent and efficient ICT capex in our draft decision. On the basis of the additional information provided by AusNet Services, we consider that AusNet Services has justified that the expenditure for these projects is necessary to achieve the capex objectives of the NER. We therefore accept that AusNet Services' revised proposal for forecast ICT capex of \$78.8 million (\$2016-17, excluding overheads) reasonably reflects the efficient costs for ICT capex that a prudent operator would require to achieve the capex objectives.

## **6.4.4 Forecast capitalised overheads**

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

In its revised proposal, AusNet Services applied the AER's approach to forecasting capitalised overheads but made an adjustment to reflect its revised capital expenditure

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<sup>140</sup> AER, *Draft Decision - AusNet Services transmission determination 2017–18 to 2021-22 – Attachment 6*, July 2016, pp. 6-71 to 6-72.

<sup>141</sup> AusNet Services, *Revised Revenue proposal 2017-22, Appendix 3H: Selected ICT project justifications (Confidential)*, 21 September 2016.

<sup>142</sup> AusNet Services, *Revised revenue proposal 2017-22*, 21 September 2016, p.78.

<sup>143</sup> AusNet Services, *Revised Revenue proposal 2017-22, Appendix 3H: Selected ICT project justifications (Confidential)*, 21 September 2016.

forecast.<sup>144</sup> As a result of a \$31.5 million (\$2016–17) reduction in AusNet Services' revised proposal direct capex that attract overheads, we consider a reduction of \$0.7 million (\$2016–17) reasonably reflect the capex criteria.

## 6.4.5 Interrelationships

There are a number of interrelationships between AusNet Services' total forecast capex for the 2017–22 regulatory control period and other components of its transmission determination as shown in 6. We considered these interrelationships in coming to our final decision on total forecast capex.

**Table 6.6 Interrelationships between total forecast capex and other components**

Other component	Interrelationships with total forecast capex
Total forecast opex	<p>There are elements of AusNet Services' total forecast opex that are specifically related to its total forecast capex. These include the forecast labour price growth that we included in our opex forecast in Attachment 7. This is because the price of labour affects both total forecast capex and total forecast opex.</p> <p>More generally, we note our total opex forecast will provide AusNet Services with sufficient opex to maintain the reliability and safety of its network. Although we do not approve opex on specific categories of opex such as maintenance, the total opex we approve will in part influence the repex AusNet Services needs to spend during the 2017–22 period.</p>
Forecast demand	<p>Forecast demand is related to AusNet Services' total forecast capex. The need and timing of asset replacement is impacted on forecast demand as this affects the risk of unserved energy as a result of asset failure. Hence, a key driver of replacement related capex is maximum demand and its effect on network utilisation and reliability.</p>
Capital Expenditure Sharing Scheme (CESS)	<p>The CESS is related to AusNet Services' total forecast capex. In particular, the effective application of the CESS is contingent on the approved total forecast capex being efficient, and that it reasonably reflects the capex criteria. As we note in the capex criteria table below, this is because any efficiency gains or losses are measured against the approved total forecast capex. In addition, we are 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 AusNet Services' regulatory asset base. In particular, the CESS will ensure that AusNet Services bears at least 30 per cent of any overspend against the capex allowance. Similarly, if AusNet Services can fulfil their objectives without spending the full capex allowance, it will be able to retain 30 per cent of the benefit of this. In addition, if an over-spend is found to be inefficient through the ex post review, AusNet Services risks having to bear the entire overspend.</p>
Service Target Performance Incentive Scheme (STPIS)	<p>The STPIS is interrelated to AusNet Services' 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 2017–22 regulatory control period. This is because such expenditure should be offset by rewards provided through the application of the STPIS.</p> <p>Further, the forecast capex should be sufficient to allow AusNet Services to maintain performance at the targets set under the STPIS. The capex allowance should not be set such that there is an expectation that it will lead to AusNet Services systematically under or over performing against its targets.</p>

<sup>144</sup> AusNet Services, *Revised revenue proposal 2017-22*, 21 September 2016, p.79.



Other component	Interrelationships with total forecast capex
Contingent project	<p>A contingent project is interrelated to AusNet Services' total forecast capex. This is because an amount of expenditure that should be included as a contingent project should not be included as part of AusNet Services' total forecast capex for the 2017–22 regulatory control period.</p> <p>AusNet Services proposed a contingent project but has subsequently advised that its contingent project proposal is no longer required since it lodged its revenue proposal.</p>

Source: AER analysis

## 6.4.6 Consideration of the capex factors

Table 6.7 summarises how we have taken into account the capex factors in assessing AusNet Services' total capex forecast. Where relevant, we also had regard to the capex factors in assessing the forecast capex associated with repx and non-network capex (see 6.4.2 and 6.4.3).

**Table 6.7 AER consideration of the capex factors**

Capex factor	AER consideration
The most recent annual benchmarking report and benchmarking capex that would be incurred by an efficient distributor over the relevant regulatory control period	We had regard to our most recent benchmarking report in assessing AusNet Services' proposed total forecast for the 2017–22 regulatory control period. This can be seen in the metrics we used in our assessment of AusNet Services' capex performance.
The actual and expected capex of AusNet Services during any preceding regulatory control periods	<p>We had regard to AusNet Services' actual and expected capex during the 2013–17 regulatory control period and preceding regulatory control periods in assessing its proposed total forecast.</p> <p>This can be seen in our assessment of AusNet Services' capex performance. It can also be seen in our assessment of the forecast capex associated with the capex drivers and programs that underlie AusNet Services' total forecast capex.</p> <p>For non-network capex, we rely in part on trend analysis to arrive at an estimate that meets the capex criteria.</p>
The extent to which the capex forecast includes expenditure to address concerns of electricity consumers as identified by AusNet Services in the course of its engagement with electricity consumers	We had regard to the extent to which AusNet Services' proposed total forecast capex includes expenditure to address consumer concerns that AusNet Services identified. AusNet Services has undertaken engagement with its customers and has relied on the adoption of the value of customer reliability in its economic analysis to reflect customer preferences in developing its forecast capex.
The relative prices of operating and capital inputs	We had regard to the relative prices of operating and capital inputs in assessing AusNet Services' proposed real cost escalation factors. In particular, we have accepted AusNet Services' proposed cost escalation for labour.
The substitution possibilities between operating and capital expenditure	We had regard to the substitution possibilities between opex and capex. We 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 AusNet Services' total forecast capex and total forecast opex in Table 6.6 above.

Capex factor	AER consideration
Whether the capex forecast is consistent with any incentive scheme or schemes that apply to AusNet Services	We had regard to whether AusNet Services' proposed total forecast capex is consistent with the CESS and the STPIS. See our discussion about the interrelationships between AusNet Services' total forecast capex and the application of the CESS and the STPIS in Table 6.6 above.
The extent to which the capex forecast is referable to arrangements with a person other than the service provider that do not reflect arm's length terms	We had regard to whether any part of AusNet Services' proposed total forecast capex or our alternative estimate is referable to arrangements with a person other than AusNet Services that do not reflect arm's length terms. Based on the information provided by AusNet Service's we are satisfied that the capex forecast is based on arrangements that reflect arm's length terms.
Whether the capex forecast includes an amount relating to a project that should more appropriately be included as a contingent project	We had regard to whether any amount of AusNet Services' 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 that should more appropriately be included as a contingent project.
The most recent National Transmission Network Development Plan (NTNDP), and any submissions made by AEMO, in accordance with the Rules, on the forecast of AusNet Services' required capex	Given the planning arrangements in Victoria, AusNet Services' capex forecast does not included augex related capex and so we have not had regard to the most recent NTNDP.
The extent to which AusNet Services has considered and made provision for efficient and prudent non-network alternatives	We had regard to the extent to which AusNet Services made provision for efficient and prudent non-network alternatives as part of our assessment. AusNet Services submitted that it considered that there were no viable alternatives to replacement capex.
Any relevant project assessment conclusions report required under clause 5.6.6 of the NER	There are no relevant project assessment conclusions reports relevant to AusNet Services to which we have had regard.
Any other factor the AER considers relevant and which the AER has notified AusNet Services in writing, prior to the submission of its revenue proposal, is a capex factor	We did not identify any other capex factor that we consider relevant.

Source: AER analysis

### 6.4.7 Summary of submissions on AusNet Services' revised capex proposal

Table 6.8 provides a summary of stakeholder submissions on AusNet Services' revised capex proposal and our response.

**Table 6.8 Submissions on AusNet Services' revised capex proposal and our response**

Stakeholder	Issue	Our response
Consumer	Noted AusNet Services' approach of	We agree that quantifying the risk costs

Stakeholder	Issue	Our response
Challenge Panel (Panel 5) - Submission on draft decision <sup>145</sup>	<p>'embedding' safety risk into all capex expenditure considerations by making safety risk a core assessment criterion for new capex. The CCP was comfortable with this approach, conceptually. However, the key application issues are about the weighting of safety risk, with other capex replacement assessment criteria and the development of 'agreed' elements of safety risk.</p> <p>Submitted that there is a point at which significant additional safety expenditure produces small amounts of safety gain and consequently is not in the best interests of consumers. The question of how much extra safety expenditure produces safety gain and consumer benefit is the critical judgement call for the AER as well as for AusNet Services.</p> <p>In considering the 'proportionality test', the CCP suggested that the full level of safety related capex expenditure proposed by AusNet Services would not lead to proportional safety benefits and so is not in the best interests of consumers. The CCP supported the AER's draft decision to reduce AusNet Services safety driven capex, recognising that further data and discussion would follow AusNet Services' revised proposal</p> <p>Submitted that a 100 per cent occupancy rate is an unrealistic estimate of hazard zone risk. While not in a position to proffer a percentage figure to form a definitive view, between one and 100, the CCP expect AusNet Services to have historical data to help inform an alternative view.</p>	<p>associated with asset failure is appropriate to ensure that asset replacement decisions are justified in the context of all relevant costs and benefits. However, it is important that the methodologies, inputs and assumptions used to quantify these risk costs are reasonable.</p> <p>Consistent with our draft decision, for this final decision we have arrived at an estimate of forecast capex which we consider is economically justified and reflects a realistic expectation of prudent and efficient costs. In doing so we have amended AusNet Services' methodology for quantifying safety risk, resulting in a lower estimate of safety risk cost and therefore a reduced level of capex that is justified by the benefits of safety risk cost reduction.</p> <p>For this final decision, our estimate of forecast capex reflects an estimated HZO rate of 17 per cent. This rate is derived from AusNet Services' estimates of terminal station site occupation during normal operations.</p>
Consumer Challenge Panel (Panel 5) - Submission on revised proposal <sup>146</sup>	<p>Submitted that the NEO specifically states that safety is one of a group of factors impacting on the long-term interests of consumers, these factors being: price, quality, safety, reliability, and security of supply of electricity. Safety is an important objective of Australian electricity industry regulations, but not the primary objective.</p> <p>The CCP considered that the role of the regulator is to provide adequate revenue to enable an efficient business to meet its safety responsibilities. The role of the business is to meet legislative and other safety obligations, and to seek continual improvement in reducing risk, within a given budget.</p> <p>The CCP submitted that AusNet Services had</p>	<p>Safety-related capex is subject to the same assessment under the capex criteria as any other claimed capex. This means that the need for rigorous consideration of both the proposed methodology and quantitative inputs applies no differently in this setting than it does for capex driven by other factors. We consider that our alternative estimate of forecast capex reasonably reflects the capex criteria and is required to achieve the capex objectives, including maintaining the safety of the transmission system.</p>

<sup>145</sup> CCP (sub-panel 5), *Transmission for the Generations II, Response to AER draft decision for AusNet Services transmission revenue review 2017-22*, September 2016

<sup>146</sup> CCP (sub-panel 5), *Transmission for the Generations III, Response to revised revenue proposal by AusNet Services for transmission revenue review 2017-22*, October 2016.

Stakeholder	Issue	Our response
	<p>considered safety purely from the perspective of the TNSP, but not considered the safety impacts for consumers from rising electricity costs. The CCP considered there are significant safety risks for consumers who are disconnected due to an inability to pay.</p> <p>The CCP did not accept AusNet Services' argument that the hazard zone occupancy rate could be greater than 100 per cent at certain times. The CCP supported the draft decision's addition of the hazard zone occupancy rate, as being a factor of safety risk cost, but considered the HZO rate must be no greater than 100 per cent. The CCP submitted that the upper bound of the range of likely values would be correlated to an eight hour per day, five day working week, or approximately 23.8 per cent.</p> <p>In relation to the East Rowville project, the CCP submitted that it was unfortunate that this capex was not included in the initial revenue proposal so that it could be assessed for prudence as a package along with all other capex. The CCP expected the AER to undertake as much analysis on this expenditure as it has previously undertaken on all other expenditure.</p> <p>In relation to demand forecasts, the CCP submitted that it was sceptical of any merit in AusNet Services' rejection, even partial rejection, of AEMO forecasts. The CCP encouraged the AER to closely consider any divergence from AEMO forecasts as the CCP recognise AEMO's expertise in this area.</p>	<p>As noted above, for this final decision our estimate of forecast capex reflects an estimated HZO rate of 17 per cent.</p> <p>We have assessed the forecast capex for the East Rowville terminal station in the same manner as other elements of AusNet Services' forecast capex. This is discussed further in section 6.4.2.9 of this decision.</p> <p>In this final decision, we have applied AEMO's 2016 transmission connection point demand forecasts as discussed in appendix A.</p>
Energy Safe Victoria <sup>147</sup>	<p>The ESV submitted that it is important that cognisance is taken of the risk to the public posed by an asset failure.</p> <p>The ESV submitted that the draft decision appeared to insufficiently consider that assets approaching or at the end of their design life present a greater risk of failure than at mid-life. The risk profile is not linear throughout the asset life cycle.</p> <p>The ESV noted the possibility for the catastrophic failure of one asset to cause collateral damage to adjacent assets, such that the impact is not always limited to the initial asset.</p>	<p>We have considered the public safety risks posed by asset failures in this decision, as discussed in section 6.4.2.5.</p> <p>AusNet Services' forecast asset failure rates are modelled using an asset wear out curve, and therefore account for this fact. While we have identified some concerns with AusNet Services' approach to forecasting asset failure rates and explosive failure rates, we have made no adjustment to AusNet Services' forecast failure rates in this decision.</p> <p>AusNet Services' risk quantification methodology quantifies the risk of collateral asset damage separately to the safety risk posed by explosive asset failures. We have made no adjustment to AusNet Services' estimation of collateral asset damage risk.</p>

<sup>147</sup> Energy Safe Victoria, *Submission on draft decision, AusNet Services' transmission revenue review 2017–2022*, 13 October 2016.

## A Demand

AusNet Services' economic evaluations of its proposed terminal station rebuild projects include an assessment of maximum demand forecasts at these terminal stations, in terms of load at risk under unplanned outage conditions. The Australian Energy Market Operator (AEMO) plans and procures the augmentation of the transmission network in Victoria, which is owned and operated by AusNet Services. Because of this, AEMO is responsible for preparing maximum demand forecasts for the transmission network in Victoria and so AusNet Services does not produce its own maximum demand forecasts.

In our draft decision, we were not satisfied that AusNet Services' terminal station demand forecasts reflect a realistic expectation of demand required to achieve the capex objectives. We considered that AEMO's 2015 demand forecasts reflect a realistic expectation of demand.<sup>148</sup> Our decision took into account the following:

- AusNet Services' initial demand forecasts were based on a combination of AEMO and the Victorian electricity distributors' 2014 forecasts. We considered that applying a single demand forecasting methodology to forecast terminal station demand would result in forecasts that reflect realistic expectations of demand. Therefore, we considered that AEMO's terminal station demand forecasts reflect a realistic expectation of demand for AusNet Services' network because it is based on a consistent and well established forecasting methodology.<sup>149</sup>
- Applying AEMO's terminal station demand forecasts would ensure consistency between replacement planning by AusNet Services and network augmentation planning by AEMO in Victoria. This would ensure that network assets are replaced or upgraded on a consistent basis across the transmission network.<sup>150</sup>
- AusNet Services' forecasts were based on the most recent forecasts available at the time of developing its revenue proposal. We expected that AusNet Services would consider the impact of updated 2015 demand forecasts from AEMO and DNSP in the context of its revised proposal.<sup>151</sup>

### A.1 Revised proposal

In its revised proposal, AusNet Services submitted revised demand forecasts for the Fisherman's Bend, Springvale, Templestowe and West Melbourne Terminal Stations.

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<sup>148</sup> AER, Draft Decision, *AusNet Services transmission determination 2017–18 to 2021–22, Attachment 6 –Capital expenditure*, July 2016, p.6-76.

<sup>149</sup> AER, Draft Decision, *AusNet Services transmission determination 2017–18 to 2021–22, Attachment 6 –Capital expenditure*, July 2016, pp. 6-76,6- 78.

<sup>150</sup> AER, Draft Decision, *AusNet Services transmission determination 2017–18 to 2021–22, Attachment 6 –Capital expenditure*, July 2016, p. 6-78.

<sup>151</sup> AER, *Draft Decision, AusNet Services transmission determination 2017–18 to 2021–22, Attachment 6 –Capital expenditure*, July 2016, pp. 6-78-79.

These forecasts were based on AEMO's 2016 demand forecasts and the Victorian distributors' 2015 demand forecasts (the DNSPs' forecasts).

AusNet Services did not revise its initial demand forecasts for the Heywood and Ringwood terminal stations as we did not make any adjustments to these projects in our draft decision.<sup>152</sup> AusNet Services also submitted an additional demand forecast for the East Rowville terminal station, where AusNet Services proposed an additional repex project.

Where AusNet Services submitted revised demand forecasts, those forecasts are based on taking a 50:50 average of AEMO's 2016 and the DNSPs' 2015 demand forecasts at the terminal station level. AusNet Services submitted the averaging approach is applied where both forecasts perform strongly against the following three forecasting principles:<sup>153</sup>

- Is the forecast the most up-to-date forecast published by the Victorian DNSP or by AEMO?
- Have known DNSP or large load customer plans been adequately reflected in the forecast?
- Does the forecast appear realistic given the trend in weather adjusted historical demand at the connection point?

AusNet Services stated that where one of AEMO or DNSPs' forecasts is deficient against one of these three principles, AusNet Services has used the other forecast.<sup>154</sup> For West Melbourne terminal station, AusNet Services only used the DNSPs' forecasts.<sup>155</sup>

AusNet Services' revised demand forecasts are lower than its initial forecasts, which were based on a 50:50 average of the 2014 DNSP and 2014 AEMO demand forecasts. The main driver of AusNet Services' lower demand forecasts is the reduction in forecasts by AEMO and the DNSPs in their latest updates. Both AEMO in its 2016 forecasts and the DNSPs in their 2015 forecasts reduced the level of demand at each terminal station by the same degree.

However, at Ringwood, Springvale, Templestowe, West Melbourne and East Rowville, AEMO's demand forecasts have opposite trends to the DNSPs' forecasts. AEMO's 2016 forecasts show mostly downward or flat demand trends at these terminal stations; whereas, the DNSPs forecast increasing demand at these terminal stations.

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<sup>152</sup> AusNet Services, *Response to IR#22*, 14 November 2016, p. 12. AER, *Draft Decision for AusNet Services transmission determination 2017–18 to 2021–2022*, Attachment 6 –Capital Expenditure, July 2016, p. 55.

<sup>153</sup> AusNet Services, *Revised Transmission Revenue Proposal*, September 2016, p. 72.

<sup>154</sup> AusNet Services, *Revised Transmission Revenue Proposal*, September 2016, p. 72.

<sup>155</sup> AusNet Services, *Revised Transmission Revenue Proposal*, September 2016, p. 71.

In a submission to us, AusNet Services referred to the difference in forecasts between AEMO's 2015 and 2016 forecasts.<sup>156</sup> AusNet Services considered an attribute of reliable forecast models is stability. Based on the difference between AEMO's 2015 and 2016 forecasts, AusNet Services considered AEMO's forecasts to be unstable.<sup>157</sup>

However, AusNet Services further submitted that:<sup>158</sup>

However, in this case, given the significant difference between the DNSP and AEMO forecast, AusNet Services considers it prudent to assign some probability that AEMO's forecast may be closer to the expected actual outcome. This is despite the above misgiving regarding AEMO's forecasts.

## A.2 AER position

We are not satisfied that the revised demand forecasts proposed by AusNet Services, in its revised revenue proposal, reflect a realistic expectation of demand required to achieve the capex objectives.<sup>159</sup> For the reasons set out below, we consider that AEMO's 2016 demand forecasts reflect a realistic expectation of demand:

- AEMO's 2016 connection point forecasts are based on a consistent forecasting methodology. Whereas, the DNSPs' demand forecasts are based on an aggregation of individual DNSPs' methodologies at the terminal station level. These different DNSP forecasts are combined to form a forecast of total load at a specific connection point, meaning that the load at a particular connection point is forecast using different methodologies.
- We consider aggregating individual DNSPs' forecasts is a flawed methodology because this results in inconsistent forecasting methodologies being used at each connection point. This may result in different investment decisions that are driven by differences in methodology rather than the underlying drivers of demand.
- In comparison, AEMO applies one consistent methodology to develop the connection point forecasts. AEMO's methodology is reasonable and is based on a solid foundation that is consistent with the AER's assessment principles.<sup>160</sup>
- As AEMO is the transmission planner for Victoria, the augmentation on AusNet Services' network is planned based on AEMO's demand forecasts. Using AEMO's demand forecast for the repex planning will mean that augmentation and replacement are planned using consistent demand forecasts.

We have used AEMO's 2016 demand forecasts (both summer and winter) in AusNet Services' economic models for its major station projects.<sup>161</sup> For Springvale and

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<sup>156</sup> AusNet Services, *Response to AER information request IR#22*, 14 November 2016, p.12.

<sup>157</sup> AusNet Services, *Response to AER information request IR#22*, 14 November 2016, p.12.

<sup>158</sup> AusNet Services, *Response to AER information request IR#22*, 14 November 2016, p.13.

<sup>159</sup> NER, clause 6A.6.6(a)(1), and clause 6A.6.7(a)(1).

<sup>160</sup> We considered AEMO's forecasting methodology in detail when we reviewed the Victorian DNSPs demand forecasts for the 2016-20 regulatory period. See Dr Darryl Biggar, *Maximum demand forecasts: Response to CitiPower and Powercor Revised Regulatory Proposal*, February 2016, p. 20.

Templestowe terminal stations this led to a reduction in the justified capex because AEMO's demand forecasts are lower than AusNet Services' forecasts. For Fishermans Bend and East Rowville terminal stations this led to an increase in justified capex because AEMO's forecasts are higher than AusNet Services' forecasts.

The CCP submitted that AEMO has expertise in forecasting which should not be discounted and was sceptical of AusNet Services' partial rejection of AEMO's forecasts.<sup>162</sup>

AusNet Services raised a few specific criticisms with AEMO's forecasts which we have considered.

- Firstly, AusNet Services submitted that AEMO's forecasts are unstable because AEMO's 2015 forecasts are different to its 2016 forecasts.<sup>163</sup> We have found that the variability in AEMO's 2015 and 2016 forecasts is the same as the DNSPs' 2014 and 2015 forecasts. Therefore, it appears that instability is not a problem unique to AEMO's forecasts and not a reason to favour the DNSPs' forecasts over AEMO's forecasts. Further, AEMO continually updates and improves its methodology and data over time. Therefore, the difference in AEMO's 2015 and 2016 forecasts should not be perceived as "instability" but a likely reflection of the continual improvement made to the forecasting methodology and data overtime.
- Second, AusNet Services submitted that AEMO's 2016 forecast for the Springvale Terminal Station is also lower than AEMO's 2015 forecast.<sup>164</sup> AusNet Services considered United Energy's forecast for the Springvale Terminal Station is more accurate, as its forecast is derived based on local knowledge which AEMO would not possess.<sup>165</sup> We have asked AEMO to comment on this. AEMO explained that its baseline demand forecast for the Springvale Terminal Station was lower than the DNSPs' forecast. This baseline demand forecast is then adjusted for rooftop PV. The increase in rooftop PV between 2015 and 2016 resulted in a lower forecast in 2016.<sup>166</sup>
- Third, AusNet Services submitted that AEMO's forecasts do not reflect large customer plans, particularly at West Melbourne terminal station where AEMO did not include planned load transfer from CitiPower's 22kV network decommission.<sup>167</sup> We sought information from AEMO about this. AEMO stated that its forecast for the

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<sup>161</sup> We have updated the forecasts for East Rowville, Fishermans Ben, Springvale and Templestowe terminal stations. We have not updated the forecasts for Heywood and Ringwood terminal stations as we accepted the expenditure for these projects at the draft decision stage. We have also not updated the demand forecast for West Melbourne terminal station because we have accepted the expenditure for this project for other reasons.

<sup>162</sup> Consumer Challenge Panel (Panel 5), *Transmission for the Generations III: Response to Revised revenue proposal by AusNet Services*, October 2016, p. 33.

<sup>163</sup> AusNet Services, *Response to AER information request IR#22*, 14 November 2016, p. 12.

<sup>164</sup> AusNet Services, *Response to AER information request IR#22*, 14 November 2016, pp. 12–13.

<sup>165</sup> AusNet Services, *Response to AER information request IR#22*, 14 November 2016, p. 13.

<sup>166</sup> AEMO to AER, *email response to AER follow up questions about AEMO's 2016 demand forecast for AusNet Services Transmission*, 31 January 2017.

<sup>167</sup> AusNet Service, *Transmission Revised Revenue Proposal*, September 2016, p.71.



West Melbourne terminal station incorporates the planned load transfer. Further information supplied to AEMO by CitiPower after the publication of AEMO's 2016 forecasts did indicate some change to the timing and magnitude of the transfers at the West Melbourne Terminal Station (22kV). Compared to the difference between the 2015 DNSP forecast and AEMO's 2016 forecast, these changes are not considered material.

## B Contingent projects

AusNet Services initially proposed a contingent project to replace the synchronous condensers at the Brooklyn and Templestowe terminal stations.<sup>168</sup> However, on 7 April 2016, AusNet Services submitted that the proposed contingent project was no longer required based on advice from AEMO.<sup>169</sup> Based on the advice received from AEMO and AusNet Services, we are satisfied that the proposed contingent project to replace the Brooklyn and Templestowe synchronous condensers is not required to be undertaken to meet the capex objectives.<sup>170</sup> We have therefore not approved any contingent projects for AusNet Services in the 2017–22 regulatory control period.

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<sup>168</sup> AusNet Services, *Transmission Revenue Review 2017–2022 Appendix 4G; Proposed Contingent Project*, 27 October 2015.

<sup>169</sup> AusNet Services, *Transmission Revenue Reset: Update on Synchronous Condensers*, 7 April 2016.

<sup>170</sup> NER, cl. 6A.8.1(b)(1).

## C Ex post review – 2014-15 capex

We are required to provide a statement on whether roll forward of the regulatory asset base from the previous period contributes to the achievement of the capital expenditure incentive objective.<sup>171</sup> The capital expenditure incentive objective is to ensure that where the regulatory asset base is subject to adjustment in accordance with the NER, only expenditure that reasonably reflects the capex criteria is included in any increase in value of the regulatory asset base.<sup>172</sup>

The NER requires that the last two years of the previous regulatory control period (for the purposes of this decision, the 2014–17 regulatory control period) are excluded from the ex-post assessment of past capex.<sup>173</sup> Further, the NER prescribes that the review period does not include the regulatory year in which the first Capital Expenditure Incentive Guideline was published (2013–14) or any regulatory year that precedes that regulatory year.<sup>174</sup> Accordingly, our ex-post assessment only applies to the 2014–15 regulatory year.

We may exclude capex from being rolled into the RAB in three circumstances:<sup>175</sup>

1. Where the TNSP has spent more than its capex allowance
2. Where the TNSP has incurred capex that represents a margin paid by the TNSP, where the margin refers to arrangements that do not reflect arm's length terms; and
3. Where the TNSP capex includes expenditure that should have been classified as opex as part of a TNSP's capitalisation policy.

### C.1 Position

We are satisfied that AusNet Services capital expenditure in the 2014–15 regulatory year should be rolled into the RAB.

### C.2 AER approach

We have conducted our assessment of past capex consistent with the approach set out in our Capital Expenditure Incentive Guideline (the Guideline). In our Guideline we outlined a two stage process for undertaking an ex-post assessment of capital expenditure:<sup>176</sup>

- Stage one - initial consideration of actual capex performance;

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<sup>171</sup> NER, cl. 6A.14.2(b).

<sup>172</sup> NER, cl. 6A.5A(a).

<sup>173</sup> NER, cl. S6A.2.2A(a).

<sup>174</sup> NER, cl. 11.59.4(a).

<sup>175</sup> NER, cl. S6A.2.2A.

<sup>176</sup> AER, *Capital Expenditure Incentive Guideline*, November 2013, pp. 19-22.

- Stage two - detailed assessment of drivers of capex and management and planning tools and practices.

The first stage considers whether the TNSP has overspent against its allowance and past capex performance. In accordance with our Guideline, we would only proceed to a more detailed assessment (stage two) if a TNSP had overspent against its allowance, the overspend was significant, and its capex performance in the period of our ex-post assessment suggests that levels of capex may not be efficient or do not compare favourably to other TNSPs.

### C.3 AER assessment

We have reviewed AusNet Services' capex performance for the 2014–15 regulatory year. This assessment has considered AusNet Services' out-turn capex relative to the regulatory allowance given the incentive properties of the regulatory regime for a TNSP to minimise costs.

AusNet Services incurred capex below its forecast regulatory allowance in the 2014–15 regulatory year. Therefore, the overspending requirement for an efficiency review of past capex is not satisfied.<sup>177</sup> Accordingly, this supports the view that this expenditure is consistent with the capital expenditure incentive objective.

Under the NER, we are able to exclude capex only where a TNSP has overspent its allowance. AusNet Services underspent its allowance for 2014–15. However, this does not necessarily mean that the expenditure was prudent and efficient. AusNet Services provided an explanation for the main variances by capex category level during the 2014-17 regulatory control period.<sup>178</sup> AusNet Services submitted that the West Melbourne Terminal Station rebuild, which although it commenced in 2013, will not incur substantial expenditure until 2016 as AusNet Services deferred and re-scoped the project following recent changes which it claims will result in significant savings for consumers.<sup>179</sup>

AusNet Services also submitted that during the 2014-17 regulatory control period the focus of its major stations replacement program shifted to its CBD stations, while substantial activity still occurred on metropolitan stations. AusNet Services further submitted that significant reductions in forecast demand between 2013 and 2014, combined with the reduction in AEMO's VCR in 2014, resulted in updates to the economic timing of uncommitted major projects. AusNet Services submitted that this resulted in major project deferrals which consequently resulted in a decline in forecast expenditure for this category over the 2017-22 regulatory control period.<sup>180</sup>

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<sup>177</sup> NER, cl. S6.2.2A(c).

<sup>178</sup> AusNet Services, *Revenue Proposal 2017-22*, 30 October 2015, pp. 84-85.

<sup>179</sup> AusNet Services, *Revenue Proposal 2017-22*, 30 October 2015, p. 84.

<sup>180</sup> AusNet Services, *Revenue Proposal 2017-22*, 30 October 2015, p. 84.