

# Draft Decision

## Transgrid Transmission Determination 2023 to 2028

(1 July 2023 to 30 June 2028)

### Attachment 5 Capital expenditure

September 2022

© Commonwealth of Australia 2022

This work is copyright. In addition to any use permitted under the *Copyright Act 1968* all material contained within this work is provided under a Creative Commons Attributions 3.0 Australia licence with the exception of:

- the Commonwealth Coat of Arms
- the ACCC and AER logos
- any illustration diagram, photograph or graphic over which the Australian Competition and Consumer Commission does not hold copyright but which may be part of or contained within this publication.

The details of the relevant licence conditions are available on the Creative Commons website as is the full legal code for the CC BY 3.0 AU licence.

Inquiries about this publication should be addressed to:

Australian Energy Regulator  
GPO Box 3131  
Canberra ACT 2601  
Tel: 1300 585 165

AER reference: 202187

## Note

This attachment forms part of the AER’s draft decision on Transgrid’s 2023–28 transmission determination. It should be read with all other parts of the draft decision.

The draft decision includes the following documents:

Overview

Attachment 1 – Maximum allowed revenue

Attachment 2 – Regulatory asset base

Attachment 3 – Rate of return

Attachment 4 – Regulatory depreciation

Attachment 5 – Capital expenditure

Attachment 6 – Operating expenditure

Attachment 7 – Corporate income tax

Attachment 8 – Efficiency benefit sharing scheme

Attachment 9 – Capital expenditure sharing scheme

Attachment 10 – Service target performance incentive scheme

Attachment 11 – Demand management innovation allowance mechanism

Attachment 12 – Pricing methodology

Attachment 13 – Pass through events

## Contents

<b>Note</b> .....	<b>iii</b>
<b>5 Capital expenditure</b> .....	<b>1</b>
5.1 Draft decision.....	1
5.2 Assessment approach .....	3
5.3 Transgrid’s proposal .....	4
5.4 Reasons for draft decision .....	7
<b>A Capex driver assessment</b> .....	<b>15</b>
A.1 Repex .....	15
A.2 Augex .....	24
A.3 ICT capex .....	32
A.4 Other non-network capex.....	39
A.5 Capitalised overheads .....	41
A.6 Modelling Adjustments.....	42
<b>B Contingent projects</b> .....	<b>44</b>
B.1 Draft decision – Standard contingent projects.....	44
<b>C Projects undergoing a RIT-T</b> .....	<b>54</b>
C.1 AER Position .....	54
C.2 Transgrid’s proposal to include indicative costs for these projects .....	54
C.3 Considerations for assessing these projects .....	56
<b>D Ex-post review</b> .....	<b>63</b>
D.1 Position.....	63
D.2 AER approach .....	63
D.3 AER assessment .....	64
<b>Shortened forms</b> .....	<b>66</b>

## 5 Capital expenditure

Capital expenditure (capex) refers to the investment made in the transmission network to provide prescribed transmission services. This investment mostly relates to assets with long lives (30–50 years is typical) and these costs are recovered over several regulatory control periods. On an annual basis, the financing (return of capital) and depreciation (return on capital) costs associated with these assets are recovered as part of the building blocks that form Transgrid's total revenue requirement.<sup>1</sup>

Under the regulatory framework, Transgrid must include a total forecast of the capex that it considers is required to meet or manage expected demand, maintain the safety, reliability, quality and security of its network, or comply with all applicable regulations (the capex objectives).

Transgrid proposed \$1,350.2 million (\$2022–23) in forecast base/net capex it considers is required to maintain the safety, reliability and security of energy supply on its network in the 2023–28 regulatory control period.<sup>2</sup> Forecast base/net capex is capex that excludes deferred capex for Project EnergyConnect (PEC). With deferred capex for PEC included, Transgrid's forecast is \$1,883.0 million. This forecast capex is primarily for the replacement of assets that are reaching the end of their life, and infrastructure that supports the delivery of electricity transmission services.

We must decide whether we are satisfied that Transgrid's forecast reasonably reflects prudent and efficient costs to maintain the safety, reliability and security of the network, and a realistic expectation of future demand and cost inputs (the capex criteria). We must make our decision in a manner that will, or is likely to, deliver efficient outcomes that benefit consumers in the long term (as required under the National Electricity Objective (NEO)).

If we are not satisfied, we must set out the reasons for this decision and a substitute estimate of the total capex for the 2023–28 period that we are satisfied reasonably reflects the capex criteria, taking into account the capex factors.

This attachment sets out our draft decision on Transgrid's forecast capex. The appendices to this attachment provide more detail on our assessment by capex driver.

### 5.1 Draft decision

Our draft decision is to not accept Transgrid's forecast capex of \$1,883.0 million (including deferred capex of \$532.8 million for PEC). Our substitute forecast is \$1,729.3 million which is 8% below Transgrid's forecast.

We have used the latest available actual and forecast inflation inputs for 2021–22 and 2022–23, which were not available at the time of Transgrid's proposal. Accordingly, we have applied 3.5% inflation for 2021–22 and 7.8% inflation for 2022–23. This is materially higher than Transgrid's inflation inputs of 2.75% and 2.25% for 2021–22 and 2022–23, respectively.

---

<sup>1</sup> NER, cl. 6A.5.4(a).

<sup>2</sup> The base/net total capex forecast in Transgrid's regulatory proposal is \$1369 million but it did not include its proposed capex for property leases of \$3.6 million. The \$1350.2 million includes property leases capex and is net of asset disposals (\$22 million).

These inflation updates have increased our alternative estimate by \$69.5 million. Therefore, our inflation updates significantly mask the magnitude of the difference between our alternative estimate of total capex and Transgrid’s proposal. If we use the same inflation numbers when comparing with Transgrid’s proposal, our alternative estimate becomes 12% lower.

We consider this forecast will provide for a prudent and efficient service provider in Transgrid’s circumstances to maintain the safety, reliability and security of electricity supply on the transmission network. Table 5.1 sets out our draft decision on Transgrid’s forecast capex.

**Table 5.1 AER’s draft decision on Transgrid’s total net capex forecast (\$ million, \$2022–23)**

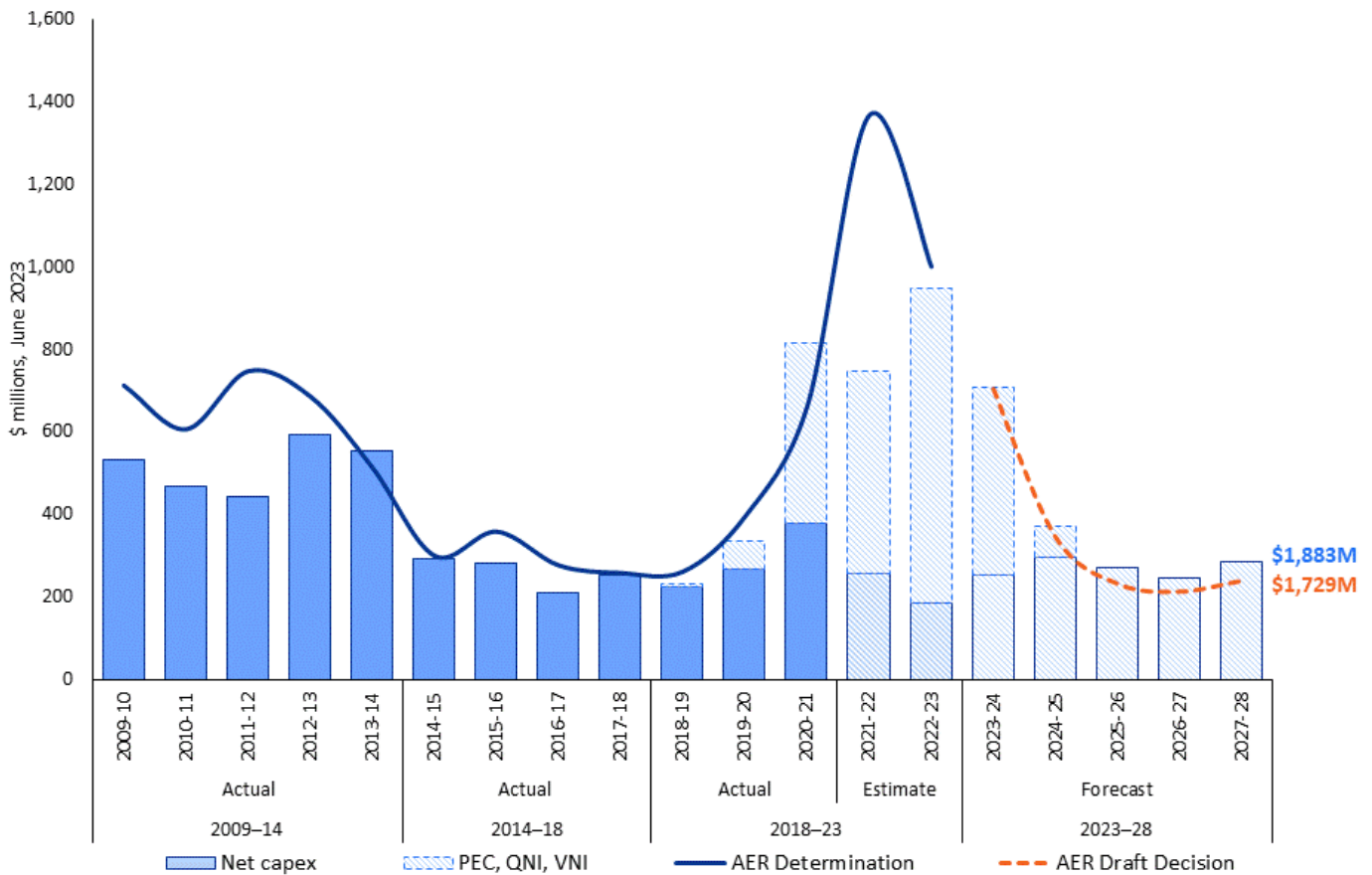
	2023-24	2024-25	2025-26	2026-27	2027-28	Total
Transgrid's proposal	708.9	373.0	271.5	245.5	284.0	1,883.0
AER's draft decision	704.5	344.7	230.8	211.4	237.9	1,729.3
Difference (\$)	-4.4	-28.3	-40.6	-34.2	-46.2	-153.7
Difference (%)	-1%	-8%	-15%	-14%	-16%	-8%

Source: AER analysis and Transgrid’s proposal.

Note: Figures include \$3.6 million additional expenditure for leases, which was originally omitted in Transgrid’s initial proposal.

Figure 5.1 shows Transgrid’s historical and forecast capex, our previous determinations, and our draft decision for the 2023–28 period. For the current period (2018–23), we have separated out the base/net capex from the capex for large Integrated System Plan (ISP) projects for PEC, the Queensland-NSW interconnector minor upgrade (QNI), and the Victoria-NSW interconnector (VNI).

**Figure 5.1 Transgrid’s historical and forecast capex (\$ million, \$2022–23)**



Source: AER analysis of Transgrid's proposal, RINs, and responses to information requests. Capex is net of asset disposals.

Our draft decision is also to not accept seven of the eight contingent projects proposed by Transgrid in its regulatory proposal. Based on the information before us, for those proposed contingent projects we have not accepted, we found that:

- there was a very high probability that these would not occur in the 2023–28 period; and/or
- the proposed triggers were highly unlikely to occur.

We have accepted the contingent project related to managing increased fault levels in Southern NSW because convincing evidence was provided to support the probability of the contingent project occurring over the 2023–28 period. Further, after additional engagement with us, Transgrid provided updated triggers for this contingent project on 8 July 2022 which we consider to be workable.

## 5.2 Assessment approach

The National Electricity Rules (NER) set out the regulatory framework we apply when assessing capital expenditure forecasts. The AER must decide whether we are satisfied that a forecast reasonably reflects prudent and efficient costs and a realistic expectation of future demand and cost inputs.

We provide guidance on our assessment approach in several documents, including the following which are of relevance to this draft decision:

- Expenditure Forecast Assessment Guidelines<sup>3</sup>
- Regulatory Investment Test for Distribution and Transmission (RIT-D and RIT-T) Guidelines<sup>4</sup>
- Asset Replacement Industry Note<sup>5</sup>
- Information and Communication Technologies (ICT) Guidance Note.<sup>6</sup>

We also had regard to the guiding principles in the AER’s *Better Resets Handbook – Towards consumer centric proposals* which encourages networks to develop high quality, well-justified proposals that genuinely reflect consumers’ preferences.<sup>7</sup>

Our draft decision has been based on the information before us. Information we had regard to includes:

- Transgrid’s initial regulatory proposal
- Transgrid’s responses to our information requests
- stakeholder comments in response to our Issues Paper and Transgrid’s initial regulatory proposal<sup>8</sup>
- our assessment of the advice from our consultant, Energy Market Consulting associates (EMCa), on certain aspects of Transgrid’s capex proposal.<sup>9</sup>

### 5.3 Transgrid’s proposal

Figure 5.2 depicts Transgrid’s historical trend, its proposed forecast capex for the 2023–28 period and our draft decision. Figure 5.2 also includes the effect of:

- Transgrid’s eight proposed contingent projects, if triggered, which totals \$1,176 million
- the four major projects subject to a RIT-T, which Transgrid states it may submit in its revised proposal. We note that Transgrid has revised its estimate for these projects

---

<sup>3</sup> [www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/expenditure-forecast-assessment-guideline-2013](http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/expenditure-forecast-assessment-guideline-2013).

<sup>4</sup> [www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rit-t-and-rit-d-application-guidelines-minor-amendments-2017](http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rit-t-and-rit-d-application-guidelines-minor-amendments-2017).

<sup>5</sup> [www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning](http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning).

<sup>6</sup> [www.aer.gov.au/communication/aer-publishes-guidance-on-non-network-ict-capital-expenditure-assessment-approach](http://www.aer.gov.au/communication/aer-publishes-guidance-on-non-network-ict-capital-expenditure-assessment-approach).

<sup>7</sup> [www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/better-resets-handbook-towards-consumer-centric-network-proposals](http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/better-resets-handbook-towards-consumer-centric-network-proposals)

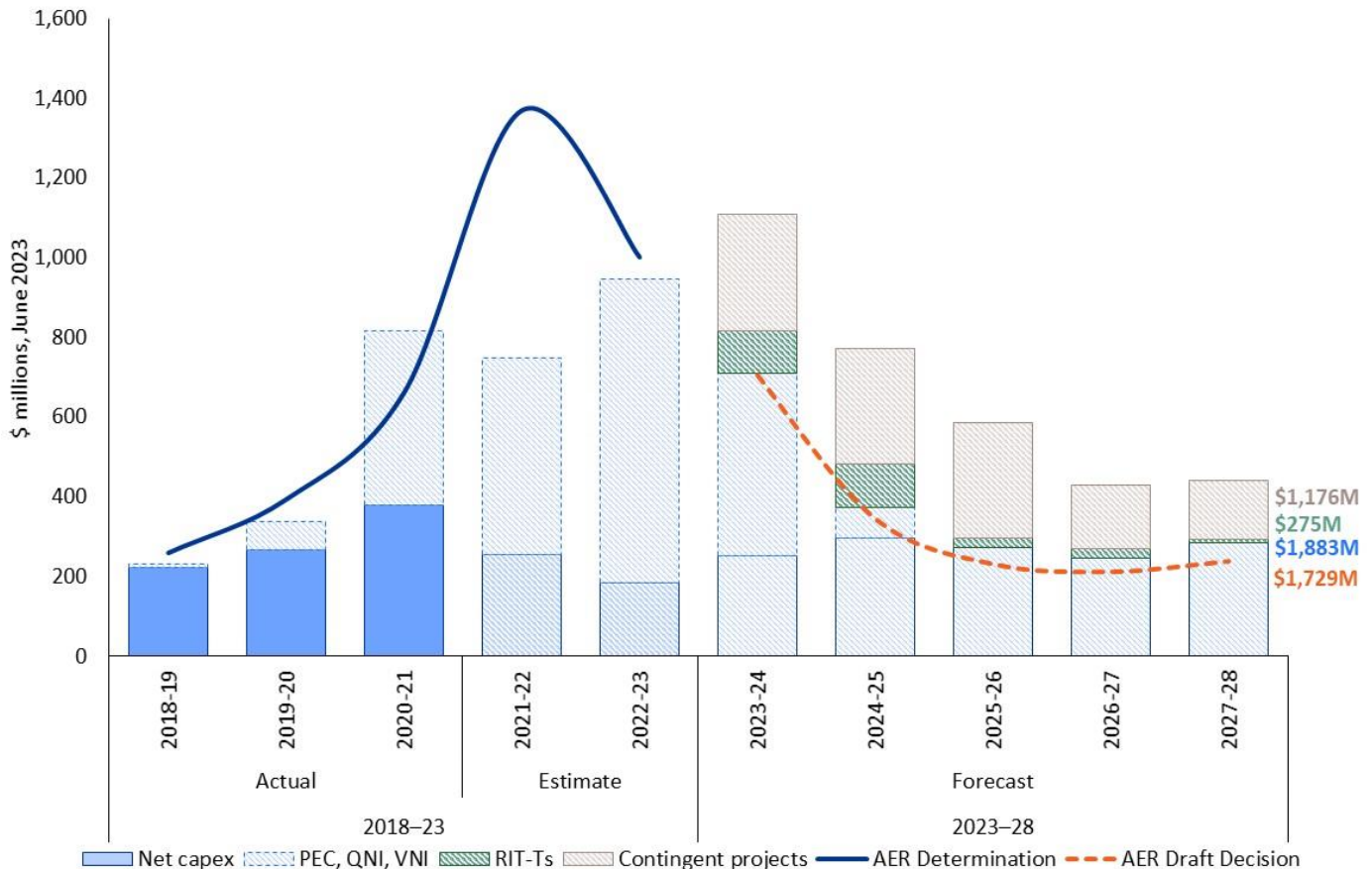
<sup>8</sup> [www.aer.gov.au/networks-pipelines/determinations-access-arrangements/transgrid-determination-2023%E2%80%9328/proposal#step-81321](http://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/transgrid-determination-2023%E2%80%9328/proposal#step-81321)

<sup>9</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022; EMCa, *Review of the RIT-T project: Improving stability in South-Western NSW*, August 2022, EMCa, *Review of the RIT-T project: Managing risk on Line 86*, August 2022, EMCa, *Review of the RIT-T project: Supply to NW slopes*, August 2022.



during the RIT-T process, with the latest estimate being \$275 million.<sup>10</sup> In its regulatory proposal, Transgrid’s indicative estimate was \$742 million for the cost of these projects.<sup>11</sup>

**Figure 5.2 Transgrid’s proposed capex including contingent projects (\$ million, \$2022–23)**



Source: AER analysis of Transgrid’s proposal, RINs, and responses to information requests. Capex is net of asset disposals.

Notes: Transgrid proposed \$1,879.6 million for capex in 2023–28 but omitted \$3.6 million for property lease capex from its initial proposal. Therefore, the total proposed capex is \$1,883 million, which comprises \$1,350.2 million for base capex and \$532.8 million for PEC.

### Additional expenditure in the revised proposal

Transgrid provided a letter to the AER on 10 February 2022 to clarify that it had excluded four major projects currently undergoing a RIT-T from its 2023–28 capex forecast. Instead, these were proposed as contingent projects. Transgrid noted the addition of the indicative cost of the projects “...would increase [its] capex forecast by \$741.9 million to \$2,110.4 million, which is \$764.8 million or 56.8% higher than our [Transgrid’s] estimated capex for the 2018–23 period.”<sup>12</sup>

Since submission of Transgrid’s regulatory proposal, these four major projects have progressed through the RIT-T process, and now have an updated total estimate of

<sup>10</sup> Transgrid, *Response to information request 018 – update*, August 2022.

<sup>11</sup> Transgrid, *2023–28 Revenue Proposal*, January 2022, p. 164.

<sup>12</sup> Transgrid, *Clarification letter to AER*, 10 February 2022, p. 5.

\$275 million.<sup>13</sup> Transgrid has indicated it would submit these projects in its revised proposal as capex if a network solution is selected as the preferred option.<sup>14</sup>

Transgrid also noted in its 2023–28 proposal that it may submit new additional expenditure in its revised proposal. This includes possible capex for COVID-19 impacts, network readiness for 100% renewable generation, and technology and innovation.<sup>15</sup> Since submission of its regulatory proposal, Transgrid has discussed the new additional expenditure with its Transgrid Advisory Council (TAC). We understand the new additional expenditure is likely to be material.

Later in this attachment, we discuss the AER’s treatment of new additional expenditure items that Transgrid may submit in its revised proposal.

### **Transgrid’s total planned capex in the next 5 years**

Transgrid also has several major planned capex investments over the next 5 years. Figure 5.3 shows Transgrid’s planned capex investment in the next 5 years which is estimated at approximately \$14 billion. As can be seen, Transgrid’s forecast capex of \$1.9 billion in its regulatory proposal (excluding standard contingent projects) is a much smaller proportion of its total planned capex over the 2023–28 period. We note the same observation made by the AER’s Consumer Challenge Panel (CCP25) and our consultant, EMCa, that there is a high degree of uncertainty associated with these major capex investments that are outside of the reset process.

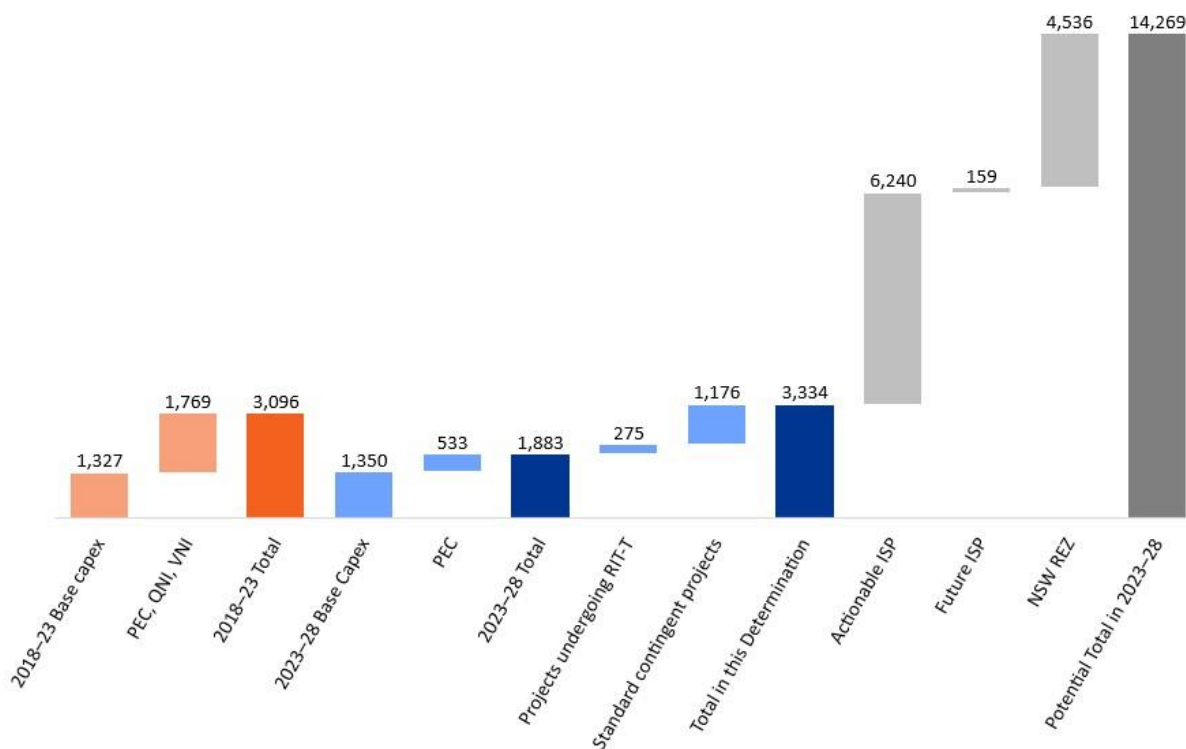
---

<sup>13</sup> Transgrid, *Response to information request 018 – update*, August 2022.

<sup>14</sup> Transgrid, *Clarification letter to AER*, 10 February 2022, p. 5.

<sup>15</sup> Transgrid, *2023–28 Revenue proposal*, January 2022, p. 4 and 6.

**Figure 5.3 Transgrid’s total planned capex in the next 5 years**



Source: AER analysis, capex is net of asset disposals. REZ refers to Renewable Energy Zones.

## 5.4 Reasons for draft decision

We undertook a top-down and bottom-up review of Transgrid’s capex proposal. Based on the information before us, we are not satisfied that Transgrid’s total capex forecast is prudent and efficient. We are therefore required to set out a substitute estimate. We are satisfied that our substitute estimate represents a total capex forecast that reasonably reflects the capex criteria and forms part of an overall transmission determination that contributes to achieving the NEO to the greatest degree.

The section below outlines findings from our top-down and bottom-up review. In light of new additional expenditure likely to be submitted in the revised proposal, we also set out how the AER would treat that expenditure.

### 5.4.1 Top-down perspective

Typically, we undertake a top-down review to test whether a regulated business’ capex proposal as a whole could be prudent and efficient. We do this using a number of high-level metrics and information. Having regard to the results from our top-down review, we then determine the degree to which a targeted bottom-up review is required.

In this case, we are not satisfied based on the information before us that, at the top-down level, Transgrid’s capex proposal as a whole is prudent and efficient. We, therefore, undertook a thorough bottom-up review of Transgrid’s proposal.

From a top-down perspective, there is a lack of clarity on what Transgrid is actually proposing as its capex forecast for the 2023–28 period. Transgrid has indicated that the

projects undergoing a RIT-T are likely to be submitted in its revised proposal. Once these projects are included in the forecast, Transgrid's forecast is between 20.8% to 55.6% higher than its actual/estimated capex in the current period.<sup>16</sup> The step up is a range of possible values given the uncertainty on the inclusion and the cost of the projects subject to the RIT-T, in Transgrid's total forecast. We have also not been provided with evidence to justify that step up. More generally, we consider the lack of transparency of the capex forecast has limited the ability of stakeholders to engage with the proposal. This in turn has reduced our confidence in the prudence and efficiency of the forecast at the top-down level.

Our concerns about the prudence and efficiency of Transgrid's forecast capex are compounded by stakeholder submissions in response to our Issues Paper and Transgrid's initial proposal.<sup>17</sup> We note that, in submissions received, consumer representatives and CCP25 did not support Transgrid's forecast capex. Instead, submissions raised concerns about the lack of genuine consumer engagement on Transgrid's capex proposal.<sup>18</sup> Of the four submissions we received, only one (Neoen Australia) supported Transgrid's capex proposal.<sup>19</sup>

Other top-down findings suggest that Transgrid's forecast capex is more than required for it to maintain its network over the 2023–28 period. Top-down testing of Transgrid's network performance revealed that its network performance is improving, suggesting forecast capex lower than actual/estimated capex in the current period may be sufficient for Transgrid to maintain its network. Also, our consultant, EMCa, while noting the improvements in Transgrid's governance and management framework since the previous review, found issues with the application of the framework which is likely to result in an overstated forecast.

We discuss some of the top-down testing outcomes below.

#### **5.4.1.1 A comparison of Transgrid's forecast total capex and at the category level against historical spend**

Transgrid notes that its forecast total capex is broadly in line with actual/estimated current period spend. However, given the uncertainty as to what Transgrid is actually proposing as its forecast capex for the 2023–28 period, a comparison between Transgrid's forecast capex and its actual/estimated capex in the 2018–23 period is not a meaningful top-down test of Transgrid's forecast. This issue was also raised by EMCa.

At a category level, on augmentation capex (augex), as the capex profiles of the 2023–28 period and the 2018–23 period are very different, we do not consider it meaningful to use historical trend as a reasonable top-down test for Transgrid's forecast augex. For instance, Transgrid's current period spend is largely driven by two major projects, Powering Sydney's Future and Stockdill. These projects will be completed in the current period and represent 90% of the 2018–23 period's augex spend. In contrast, in the 2023–28 period, the augex

---

<sup>16</sup> The step up range reflects the fact that the projects undergoing a RIT-T have been estimated at \$275 million (Transgrid's latest estimate) to \$742 million (Transgrid's estimate in its regulatory proposal).

<sup>17</sup> AER, *Issues Paper – Transgrid electricity transmission revenue proposal, 1 July 2023 to 30 June 2028*, March 2022.

<sup>18</sup> CCP25, *Advice to the AER on Transgrid's 2023–28 Revenue Proposal*, May 2022; Public Interest Advocacy Centre, *Submission on Transgrid's 2023–2028 Revenue Proposal*, May 2022, p. 2; Energy Users Association of Australia, *Submission to Transgrid's 2023–28 Revenue Determination*, May 2022.

<sup>19</sup> Neoen, *Submission on Transgrid's 2023–2028 Revenue Proposal*, May 2022.

forecast is made up of several smaller projects, with only one major project representing 28% of the forecast.

On replacement capex (repex), Transgrid notes that its forecast repex is 3.6% higher than the actual/estimated 2018–23 period spend.<sup>20</sup> However, transmission replacement projects tend to have a lumpier investment profile than the ongoing replacement programs more typical of distribution businesses. This is because transmission businesses invest in a higher proportion of large projects than distribution businesses, who invest in comparatively more low-cost, high-volume replacement programs. To test and better understand Transgrid’s forecast repex, we have considered the results of top-down testing of Transgrid’s network performance, which is discussed further below.

#### **5.4.1.2 Top-down performance measures indicate that Transgrid’s network performance is improving**

Top-down indicators reveal that Transgrid’s network performance is improving over time compared against itself and its peers. We commend Transgrid on achieving this improvement, but this result may also suggest that less capex investment in the forecast period is required for Transgrid to maintain its network. Appendix A.1 provides more detail around how we have examined the metrics. In summary, the results indicate that:

- Transgrid’s assets are on average the second youngest of the transmission businesses in the National Electricity Market (NEM) after Powerlink Queensland. They are also second youngest in most of the Regulatory Information Notice (RIN) asset categories
- Transgrid’s assets have the lowest average outage rate among the transmission businesses over the last 5 years. In relative terms, its transformers performance has been around the average, and performance for all other assets has been better than average
- Transgrid’s average outage rate has improved substantially in recent years. This suggests that it has invested enough repex over the last two regulatory control periods to improve, rather than maintain, service levels.

#### **5.4.1.3 Concerns with the application of the governance and asset management framework**

We engaged EMCa to review certain aspects of Transgrid’s capex proposal, these being: Transgrid’s governance and asset management framework, Transgrid’s forecast augex and ICT as well as the projects subject to a RIT-T.

On Transgrid’s governance and asset management, EMCa found that Transgrid has an effective governance and asset management system — an improvement from the previous revenue reset. However, EMCa found evidence of some application issues related to its portfolio optimisation, prioritisation and risk framework. Taken together, these are likely to have resulted in an overstatement of capex requirements. Some of EMCa’s key findings are that:

---

<sup>20</sup> Transgrid, *2023–28 Revenue Proposal*, January 2022, p. 101.

- there is a significant risk of project deferrals when the impact of contingent projects and major non-reset related projects are considered alongside its proposal capex program. Given Transgrid’s deferral of augex in the current period,<sup>21</sup> there is a reasonable likelihood that Transgrid may re-prioritise its portfolio which will result in some projects and programs being deferred beyond the end of the 2023–28 period. EMCa notes that:<sup>22</sup>

“We are of the view that a proportion of the proposed capex may similarly be deferred from the next [regulatory control period] if Transgrid again faces delivery challenges and, again, the obvious candidates from Transgrid’s perspective would be the proposed ‘market benefit’ projects since it could defer these without risk of breaching compliance obligations.”

- related to the first point, there is little evidence of a deliverability risk assessment being carried out as a part of Transgrid’s regulatory proposal. A prudent network service provider would typically demonstrate that its entire capex portfolio is deliverable especially when faced with multiple major projects outside of the reset process. EMCa therefore considers that there are likely to be changes to the assessment and prioritisation of the proposed capex program. We have observed similar re-prioritisation from Transgrid of its capex program in the 2018–23 period.
- Transgrid’s application of parameters such as disproportionality factors may lead to an overstatement of benefits in its cost benefit analysis. For instance, Transgrid applies disproportionality factors to non-safety related consequences such as for property damage and environmental risk. This is inconsistent with the standard approach as set out in the UK Health and Safety Executive on which the Australian Standard AS5577 was based, and the AER’s Asset Replacement Industry Note,<sup>23</sup> which state that the use of disproportionality factors is not intended for application to non-safety and health-related risks.
- while Transgrid did attempt to reduce its capex forecast using various top-down methods, this was primarily from re-categorisation and not through total capex portfolio optimisation. In discussing the differences in the indicative capex forecast (pre-lodgement) and the capex forecast in the regulatory proposal:<sup>24</sup>

“...the large reductions [in the regulatory proposal] resulted largely from moving some projects out of the base proposal, to be presented separately as ‘contingent projects’ and ‘major projects undergoing a RIT-T’, plus some prudence and prioritisation of capex projects in the base proposal. This movement of capex between classifications understates the level of capex that Transgrid is proposing to recover as part of its regulated activities.”

- the assessment of prudence and efficiency is hindered by the lack of transparency and incompleteness of its regulatory proposal. This includes not submitting forecasts in its

---

<sup>21</sup> See AER, *Draft Decision - Transgrid 2023–28 - Attachment 9 - Capital Expenditure Sharing Scheme*, September 2022.

<sup>22</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 29.

<sup>23</sup> AER, *Industry practice application note Asset replacement planning*, January 2019.

<sup>24</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 26-8.



regulatory proposal for significant planned projects and material cost escalation from consideration in the draft determination.

#### 5.4.1.4 Stakeholder submissions on Transgrid’s capex proposal

Submissions from CCP25 and consumer representatives in response to the AER’s Issues Paper and Transgrid’s initial proposal expressed concerns about Transgrid’s capex proposal. Neoen’s submission supported Transgrid’s proposed capex in southwest NSW.<sup>25</sup>

CCP25 noted Transgrid’s capex proposal did not appear to reflect consumers’ preferences, and the degree of uncertainty placed on consumers.<sup>26</sup>

“...we are concerned about the very high level of uncertainty in the proposed capital program. Twelve significant projects that could potentially add \$1.9B to the capital program have been excluded from the capital forecasts.

Despite affordability featuring as the key priority of customers, we have observed limited evidence of an aggressive focus on lowering transmission prices.”

Public Interest Advocacy Centre (PIAC) noted that the appointed members of the TAC do not reflect the views of consumer advocates, with an imbalance in the different interest groups of the TAC, in particular:<sup>27</sup>

“Transgrid temporarily expanded its Advisory Council membership to engage in the development of its proposal. While diversity can add value and richness to engagement, Transgrid appeared only to appoint new members who supported expanding Transgrid’s Regulated Asset Base and were exposed to little or none of the cost of doing so. Transgrid did not balance these appointments with new members who had interest in managing the cost or other impacts of transmission expenditure.”

Energy Users Association of Australia (EUAA) noted the uncertainty in Transgrid’s proposal, highlighting that:<sup>28</sup>

“...both capex and opex that was originally included in the revenue proposal does not accurately reflect what many believed will be the future likely cost to consumers, given the significant number of contingent projects likely to be incorporated over the 2023–2028 period. Therefore, the headline “savings” outlined by Transgrid must be seen as somewhat unreliable given they exclude what can reasonably be considered as certain future increases [in] both capex and opex associated with contingent projects.”

#### 5.4.2 Bottom-up perspective

Our bottom-up assessment revealed an overall lack of justification for Transgrid’s forecast. Our assessment found that Transgrid’s forecast for repex, augex, ICT capex and other non-

---

<sup>25</sup> Neoen, *Submission on Transgrid’s 2023–2028 Revenue Proposal*, May 2022.

<sup>26</sup> CCP25, *Advice to the AER on Transgrid’s 2023–28 Revenue Proposal*, May 2022, p. 1.

<sup>27</sup> PIAC, *Submission on Transgrid 2023–2028 Revenue Proposal*, 15 May 2022, p. 2.

<sup>28</sup> EUAA, *Submission to Transgrid’s 2023–28 Revenue Determination*, May 2022, p. 4.

network capex are not prudent and efficient. Table 5.2 outlines the capex amounts by driver that we have included in our substitute estimate.

Our substitute estimate of \$1,729.3 million (\$2022–23) does not include expenditure for the four projects undergoing a RIT-T as Transgrid did not submit a forecast but instead provided an indicative cost for these in its regulatory proposal. In anticipation of these projects being submitted in the revised proposal, EMCa undertook a critical review of these projects, raising several issues which are set out in Appendix C. We expect Transgrid to respond to EMCa's concerns in its revised proposal if these projects are submitted.

Table 5.3 summarises, and Appendix A details, the reasons for not accepting Transgrid's forecast, by capex driver. This reflects the way we have assessed Transgrid's total capex forecast. Our findings on each capex driver are part of our broader analysis and should not be considered in isolation. We do not approve an amount of forecast expenditure for each individual capex driver. However, we use our findings on the different capex drivers to assess a regulated business' proposal as a whole and arrive at a substitute estimate for total capex where necessary. Our decision on total capex does not limit a regulated business' actual spending.

**Table 5.2 Capex driver assessment (\$ million, \$2022–23)**

Driver	Transgrid's proposal	AER's draft decision	Difference (\$m)	Difference (%)
Replex	797.6	634.7	-162.9	-20%
Augex	253.6	225.6	-28.1	-11%
ICT capex	86.9	72.9	-14.0	-16%
Other non-network capex	75.0	70.9	-4.1	-5%
Capitalised overheads	159.0	144.9	-14.1	-9%
Project EnergyConnect	532.8	532.8	0.0	0%
<b>Gross capex</b>	<b>1,905.0</b>	<b>1,681.8</b>	<b>-223.2</b>	<b>-12%</b>
less asset disposals	22.0	22.0	0.0	0%
Modelling adjustments		69.5	69.5	
<b>Net capex</b>	<b>1,883.0</b>	<b>1,729.3</b>	<b>-153.7</b>	<b>-8%</b>

Source: Transgrid's capex model and AER analysis

Note: Numbers may not sum due to rounding. Modelling adjustments relate to updates to the consumer price index (CPI) and real cost escalation assumptions.

**Table 5.3 Summary of our findings and reasons, by capex driver**

Issue	Findings and reasons
<b>Replex</b>	<p>Our main concerns are that several risk assumptions appear overstated and not supported by historical observations. We found that:</p> <ul style="list-style-type: none"> <li>The inclusion of inappropriate disproportionality factors is driving projects where investments may not be required to meet safety obligations.</li> <li>Overstated or inappropriate risks lead to a bias toward capital-intensive solutions.</li> </ul>



	<ul style="list-style-type: none"> <li>Some projects are lacking credible options that we would expect to see, which means that the most efficient solutions are not considered.</li> </ul>
<b>Augex</b>	<p>Taking into account advice from our consultant, EMCa, we identified concerns which indicate that the total forecast augex is overstated. We are not satisfied that all of Transgrid's proposed augex projects combined will be required in the 2023–28 period. We had regard to:</p> <ul style="list-style-type: none"> <li>Transgrid not providing evidence of its ability to deliver these augex projects, especially in light of its significant total capex program in the 2023–28 period which includes the NSW Renewable Energy Zone (REZ) and ISP projects</li> <li>Transgrid's current practice of deferring several of its augex projects in the 2018–23 period</li> <li>lack of consideration of non-network solutions as a feasible option.</li> </ul>
<b>Projects subject to a RIT-T</b>	We did not include the four major projects undergoing a RIT-T as contingent projects or as part of the total capex forecast. This is because these projects do not satisfy the requirements of a contingent project (for instance, trigger events were not proposed) and Transgrid did not include an ex-ante forecast for these projects in its regulatory proposal.
<b>ICT capex</b>	Transgrid has not provided sufficient evidence for the proposed significant uplift in ICT capex, especially considering the consequent increase in forecast operating expenditure (opex) associated with Software-as-a-Service (SaaS) moving from capex to opex due to a change in accounting treatment. Further, the material increase in total expenditure (totex) is not consistent with expected efficiencies that should have resulted from Transgrid's transition to cloud computing services. EMCa's top-down and bottom-up review reinforces the concerns about the prudence and efficiency of Transgrid's forecast ICT capex.
<b>Other Non-network capex</b>	We identified proposed capex for two programs in fleet and property categories that go beyond the requirements of the capex objectives to maintain service levels.
<b>Capitalised overheads</b>	We consider Transgrid's approach is a suitable method to forecast capitalised overheads, with some minor exceptions. We have also adjusted forecast capitalised overheads to account for changes to total capex, based on our standard adjustment approach.
<b>Modelling adjustments</b>	Modelling adjustments reflect the latest inflation data in roll forward model (RFM) and updated labour real cost escalators are in line with our opex alternative estimate (Attachment 6 – Operating expenditure). In our final decision, we will update inflation to reflect actual inflation for 2022–23.
<b>Asset disposals</b>	We have accepted Transgrid's asset disposal forecast.

### 5.4.3 New additional expenditure in the revised proposal

Transgrid has indicated in its initial proposal, as well as at post-submission TAC meetings, that it is likely to submit new additional expenditure in its revised proposal. This is expected to be a material addition.

We recognise that in the time period between a proposal being submitted, and the draft decision being published, there may be changes in circumstances beyond the control of Transgrid that may result in a change in forecast expenditure. For instance, there may be updated information that may mean changes to the scope and cost of proposed projects. In those circumstances, the AER will take into account the change and would expect the business to engage with consumers on the proposed change.

However, the AER would look unfavourably on a business submitting changes in its revised proposal that it could have foreseen at the initial proposal stage. This would be inconsistent with the guiding principles of a well-justified and consumer-supported regulatory proposal, as set out in the AER's *Better Resets Handbook*.<sup>29</sup> In particular, we would be concerned that all

<sup>29</sup> [www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/better-resets-handbook-towards-consumer-centric-network-proposals](http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/better-resets-handbook-towards-consumer-centric-network-proposals)

stakeholders have not been given sufficient time to review the material change and may be deprived of the opportunity to meaningfully engage on it, especially if this substantially alters the regulatory proposal. We would also be concerned that these changes may not have been informed by consumers' needs and preferences.

We expect Transgrid to consider any further submissions it anticipates making in respect of its revised proposal with these points in mind, and in particular to demonstrate that it has genuinely engaged with consumers on any proposed changes to its regulatory proposal. In this regard, the AER will be especially interested in consumers' views on the extent to which Transgrid has sought to inform, and have regard to, consumers' views about any changes to its regulatory proposal.

## A Capex driver assessment

This appendix sets out our assessment by capex driver for:

- Repex (A.1)
- Augex (A.2)
- ICT capex (A.3)
- Non-network capex (A.4)
- Capitalised overheads (A.5)
- Modelling adjustments (A.6).

### A.1 Repex

Repex must be set at a level that allows a network service provider (NSP) prudent and efficient costs to meet the capex objectives. Replacement can occur for a variety of reasons, including when:

- an asset fails while in service or presents a real risk of imminent failure
- a condition assessment determines that it is likely to fail soon or degrade in performance, such that it does not meet its service requirement and replacement is the most economic option<sup>30</sup>
- the asset does not meet the relevant jurisdictional safety regulations and can no longer be safely operated on the network
- the risk of using the asset exceeds the benefit of continuing to operate it on the network.

Most network assets will remain in efficient use for far longer than a single five-year regulatory control period (many network assets have economic lives of 50 years or more). As a result, a NSP will only need to replace a portion of its network assets in each regulatory control period.

#### A.1.1 AER draft decision

We include \$634.7 million for repex in our substitute estimate of capex for the 2023–28 period. This is \$162.9 million or 20% lower than Transgrid’s forecast of \$797.6 million. Our draft decision position is mainly due to concerns that several risk assumptions appear to be overstated and not supported by historical observations. Our alternative forecast is largely based on modifying key risk assumptions. Our substitute inputs are based on values and principles which are set out in our Asset Replacement Industry Note and are consistent with industry accepted practice.

---

<sup>30</sup> A condition assessment may relate to the assessment of a single asset or a population of similar assets. High value/low-volume assets are more likely to be monitored on an individual basis, while low-value/high-volume assets are more likely to be considered from an asset category-wide perspective.

### A.1.2 Transgrid’s proposal

Transgrid has included \$797.6 million for forecast repex in its 2023–28 proposal. It noted that the key investment drivers are:<sup>31</sup>

- replacement of assets that are deteriorated or obsolete
- upgrades to meet new cyber and physical security obligations
- more frequent extreme climate-driven natural hazard events.

Transgrid’s 2023–28 forecast by repex sub-category is:<sup>32</sup>

- \$334.5 million for transmission lines, representing 42% of repex
  - key projects include tower and pole replacements; safety upgrades; and low span compliance
- \$263.4 million for digital infrastructure, representing 33% of repex
  - key projects include protection systems replacement; substation property refurbishments; and SCADA and control systems replacements
- \$199.7 million for substations, representing 25% of repex
  - key projects include gantry steelwork refurbishment; and replacement of switchbay assets and transformers.

#### A.1.2.1 Managing risk on Line 86—contingent project

Transgrid proposed Line 86 as a contingent project rather than forecast repex. Transgrid states that this is because of project cost uncertainties—at the time of submission, Line 86 was undergoing a RIT-T. We will assess Line 86 if Transgrid submits this project in its revised proposal.

We discuss the Line 86 contingent project in more detail in Appendix C.

### A.1.3 Reasons for draft decision

Transgrid provided business cases for most of its forecast repex in its proposal. Following our information requests, it provided cost-benefit models and other supporting information, such as asset condition reports. While there remain some gaps in the data, Transgrid has provided sufficient information for us to adequately assess its proposal.

We commend Transgrid’s use of risk-based options analysis and a top-down challenge to forecast its repex, although we have concerns about some elements of its methodology. Our principal concerns about Transgrid’s repex forecast are that several risk assumptions are likely overstated and not supported by historical observations, such as:

- the inclusion of inappropriate disproportionality factors is driving projects where investments may not be required to meet safety obligations.
  - For example, Transgrid applies a disproportionality factor of 6 to quantify environmental risk. Consistent with industry practice, a disproportionality factor is required only when assessing human safety.

---

<sup>31</sup> Transgrid, *2023–28 Revenue proposal*, January 2022, p. 101.

<sup>32</sup> Transgrid, *2023–28 Revenue proposal*, January 2022, pp. 102–108.

- overstated or inappropriate risks lead to a bias toward capital-intensive solutions.
  - For example, Transgrid’s bushfire probability and consequence assumptions lead to forecast bushfire risks that are not supported by observed history. Some of Transgrid’s models assume that only a full replacement of assets will reduce this risk to reasonable levels.
- some projects lack credible options that we would expect to see, which means that the most efficient solutions are not considered.
  - We would expect more consideration of middle-ground options, such as those that include a blend of replacement, refurbishment, and condition monitoring techniques. In the absence of a more optimum solution, many of Transgrid’s business cases tend to favour full replacement options.

Further to the above concerns, Transgrid includes financial, reputational, and operational risks in its cost-benefit analyses. It is not clear why some of these risks should be borne by consumers or how these operating expenditure (opex) savings are being realised, including if they are accounted for in the opex forecast. We invite Transgrid to provide further justification for including these risks in its economic modelling.

Transgrid’s economic analysis finds that the highest-cost option is justified for many projects. When we adjust some of these risk assumptions, we find that the costs of Transgrid’s preferred option outweighs the benefits for many projects. For other projects, we find that lower-cost options are likely to be more efficient.

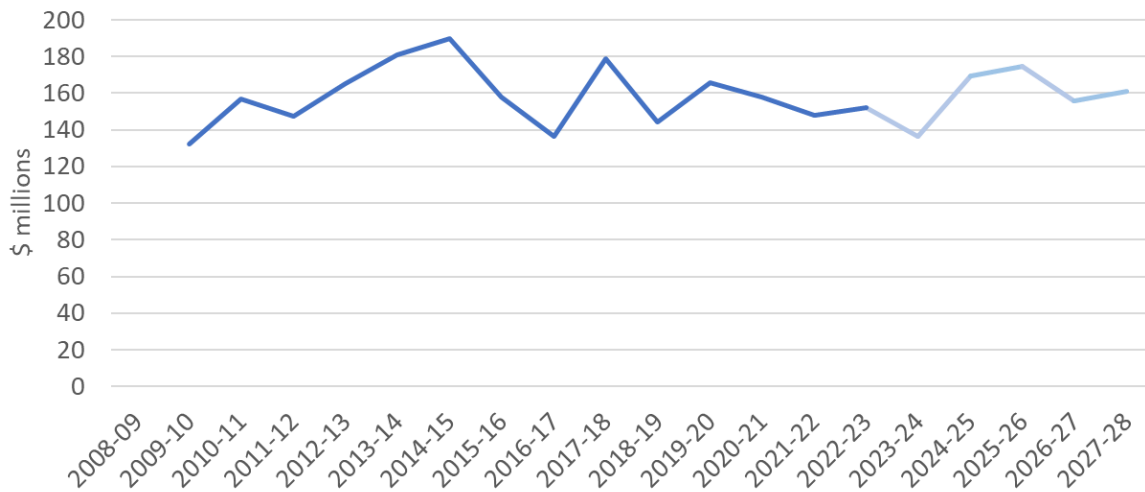
For its revised proposal, we expect that Transgrid will reappraise its risk assumptions so that its forecast risk is consistent with observed history. We also expect Transgrid to consider whether there are alternative credible options that may be more efficient than those it has presented in its proposal. Finally, Transgrid should update its models with the latest economic indicators (such as the discount rate and cost escalators) to ensure that expected capital costs are reflected in the cost-benefit analyses.

#### **A.1.3.1 Repex trends**

Figure A.1 shows Transgrid’s actual and proposed repex. Transgrid’s forecast of \$797.6 million is \$30.1 million or 4% higher than current period repex and broadly in line with the long-term trend. Transgrid notes that, in response to the TAC, it made a top-down reduction to its repex forecast to bring it into line with current period spend.<sup>33</sup>

---

<sup>33</sup> Transgrid, *Response to information request 036 (part 1)*, June 2022, p. 4.

**Figure A.1 Transgrid’s actual and proposed repex 2009–28 (\$ million, \$2022–23)**

Source: Transgrid RIN data. Excludes Line 86.

Transgrid’s forecast capex is:

- 13% higher than the 2018–23 period actual/estimated repex for transmission lines
- slightly lower than the 2018–23 period actual/estimated repex for digital infrastructure and substations.

Although Figure A.1 shows a relatively stable repex over time, it can be difficult to rely on repex trends for transmission businesses because the high cost/low volume nature of the asset replacements can result in ‘lumpy’ or variable levels of repex over time. For this reason, we also look at other performance indicators for Transgrid compared with its peers and to itself over time.<sup>34</sup>

#### (a) Asset lives

This measure is an indicator of the overall health of the network and therefore the level of repex that may be expected over the short to medium term.

- Transgrid’s assets are on average the second youngest of the transmission businesses after Powerlink Queensland. They are second youngest in four out of six RIN asset categories and third youngest in two categories.

#### (b) Asset availability

This measure is an indicator of asset-level reliability and overall network health. Availability looks at the time where an asset cannot perform its function, irrespective of whether a disruption to customer supply occurs.

- Transgrid’s assets have had the best performance on average among the transmission businesses over the last five years. Its transformers performance has been around the average and performance for all other assets has been better than average.

<sup>34</sup> RIN data from the transmission network service providers.

- Transgrid’s availability has improved substantially in recent years. This suggests that it has invested enough repex over the last two regulatory control periods to improve, rather than maintain, service levels.

### A.1.3.2 Bottom-up assessment

Table A.1 shows Transgrid’s proposed repex and the amount included in our substitute estimate of total capex for the 2023–28 period.

**Table A.1 Repex included in the draft decision (\$ million, \$2022–23)**

Repex subcategory	Transgrid's proposal	AER's draft decision	Difference (\$m)	Difference (%)
Transmission Lines	334.5	267.8	-66.7	-20%
Digital Infrastructure	263.4	210.5	-52.9	-20%
Substations	199.7	156.4	-43.3	-22%
<b>Total repex</b>	<b>797.6</b>	<b>634.7</b>	<b>-162.9</b>	<b>-20%</b>

Source: Transgrid and AER analysis. Excludes Line 86.

### A.1.3.3 Transmission lines

We reviewed Transgrid’s key transmission lines projects,<sup>35</sup> and found evidence of the systemic issues found across the repex portfolio. For example, we found that Transgrid overestimates environmental risk costs. Some projects do not consider credible options that are likely to be more efficient than the options considered.

#### (a) Asbestos remediation

Transgrid proposed \$29.8 million to remediate towers containing asbestos.<sup>36</sup> We include in our substitute estimate \$19.7 million for this project (a 34% reduction).

Transgrid’s preferred option is to remediate all 1,604 structures that are rated as medium and low risk (high risk structures were remediated in the current period). This contrasts with a 2019 GHD report commissioned by Transgrid, which recommended remediating only the medium-risk structures and maintaining all low-risk structures in good condition.

Transgrid stated that it has not assessed 370 of the 1,072 structures that it classifies as medium risk, and that upon inspection “there is a possibility that these structures exhibit a risk profile classified as medium/low risk.”<sup>37</sup>

We assume that the condition profile of the towers that have not been assessed is the same as the towers that have been assessed. Taking this approach, we estimate that a total of 912 structures should be classified as medium risk and 692 as low risk (or 57% medium risk and 43% low risk based on current available information).

We include repex to remediate all medium risk structures and to inspect the low and unknown risk structures over the 2023–28 period. Like Transgrid’s alternative option in its

<sup>35</sup> We did a bottom-up assessment of projects totalling \$200.8 million or 60% of transmission lines repex.

<sup>36</sup> Many older towers have paint containing asbestos to improve fire resilience.

<sup>37</sup> Transgrid, *Response to information request 026*, May 2022, p. 1.

business case, we have allowed funding to address any additional structures that have, or will progress, from low to medium risk since 2019.

**(b) Low Spans – Main Grid and 132kV**

Transgrid proposed \$30.3 million for two separate projects to remediate low spans on its main grid (\$17.6 million) and 132kV (\$12.7 million) lines. We include in our substitute estimate \$13.6 million for these projects (a 55% reduction).

Low spans refer to conductors with a clearance below the minimum specified Australian standards. A low span could create a safety risk for workers or the public passing underneath.

According to Australian Standards (AS/NZS 7000), lines that do not comply with minimum clearance heights (low spans) are required to be remediated. We consider that AS/NZS 7000 only applies to normal operating conditions and not N-1 conditions.<sup>38</sup>

We asked Transgrid to identify lines that may not comply with the minimum standard under normal conditions (rather than N-1 conditions), and the costs to remediate. Transgrid confirmed that under normal conditions, there are 39 low spans on the main grid and 29 low spans on the 132kV line and the remediation costs for these is \$11.3 million and \$2.3 million, respectively.<sup>39</sup> We accept Transgrid’s revised estimate which is the basis for our substitute estimate.

**(c) Public safety enhancements**

Transgrid proposed \$17.1 million to replace all tower climbing deterrents that do not meet Transgrid’s latest standard. We include in our substitute estimate \$6.4 million for this project (a 63% reduction).

Transgrid evaluated only one option, which is to replace all 3,577 deterrents that do not meet its latest design standards regardless of their risk rating. Although the option has a negative net present value (NPV) and does not pass a quantitative as low as reasonably practicable (ALARP) test, Transgrid justifies the project based on a qualitative ALARP test.<sup>40</sup> In Transgrid’s view, any option that only targets high and medium risk deterrents will not reduce the risk to ALARP and therefore won’t meet mandatory safety requirements.

We do not accept Transgrid’s position, because:

- ALARP is an objective, quantitative test of whether costs are grossly disproportionate to the benefits of safety risk reduction. We therefore disagree that Transgrid’s qualitative ALARP test justifies an investment that has a negative NPV (including when safety disproportionality factors are considered).

---

<sup>38</sup> Non-compliance under N-1 conditions poses a very low safety risk, given the probability and duration of such events.

<sup>39</sup> Transgrid, *Response to information request 036 (part 2)*, July 2022, pp. 1–2.

<sup>40</sup> ALARP means "as low as reasonably practicable" and describes the level to which risks must be controlled. "Reasonably practicable" involves weighing a risk against the trouble, time and money needed to control it.



- In one of its responses, Transgrid quotes industry standard (AS5577):<sup>41</sup>

“Low and Negligible risks are considered Tolerable, High risks are Intolerable and Intermediate risks are Tolerable if ALARP.”

By this definition, Transgrid’s low-risk deterrents, and medium-risk deterrents that pass a quantitative ALARP test, are tolerable and are not required under safety legislation to be remediated.

We include repex to replace all 797 high and medium risk deterrents. We consider this option is prudent and reduces safety risk as low as reasonably practicable.

#### **(d) Line 94U refurbishment**

Transgrid proposed \$18.3 million to replace all 138 wooden poles along Line 94U. We include in our substitute estimate \$16.2 million (a 12% reduction).

We are concerned that the implied unit rate for replacing wooden poles is too high relative to recent years. Transgrid has not justified these unit rates nor quantified any efficiency of scale impacts (as it has for other projects) on the cost of the preferred option.

Transgrid has also overestimated environmental risk costs and included reputational risk. After we adjust for these risks, Transgrid’s preferred option remains NPV positive. We therefore accept the option to replace all wooden poles along Line 94U, but have substituted the proposed unit rates with historical unit rates. We invite Transgrid to provide further evidence to support its forecast higher unit rates in its revised proposal.

#### **(e) Line 11 – Sydney South to Dapto**

Transgrid proposed \$56.4 million to replace all towers and conductors across Line 11. We include in our substitute estimate \$29.4 million (a 48% reduction).

Transgrid identifies that both towers and conductors on Line 11 have corrosion-related defects. It has evaluated three options: targeted replacement of high-risk structures; replacing all structures; and replacing all structures and conductors. Transgrid’s preferred option is to replace all structures and conductors based on having the highest NPV.

We have several concerns with Transgrid’s NPV assessment, including:

- Environmental risk is overstated, making up 90% of the total risk costs. Transgrid uses a disproportionality factor of 6, which has a significant impact on the outcome of the NPV analysis.
- Transgrid has not adequately explored credible options. For example:
  - The model shows that replacing conductors results in a significant environmental risk reduction relative to replacing structures only. However, Transgrid has not explored any options to replace some or all conductors while replacing only high-risk towers.
  - Transgrid’s targeted structure replacement option equates to 40% of the preferred full replacement cost, yet only reduces approximately 30% of the environmental

---

<sup>41</sup> Transgrid, *Response to information request 026*, May 2022, p. 10.

risk. We expect a targeted option will result in a proportionately greater risk reduction than a ‘do everything’ option.

When we adjust environmental risk and remove reputational risk, none of Transgrid’s options are economically viable. In our alternative estimate, we have assessed our own credible option that targets high-risk towers and most of the conductors. Our option substantially reduces risks at a much lower cost than Transgrid’s preferred option and is NPV positive.

#### **A.1.3.4 Digital infrastructure**

Transgrid’s forecast digital infrastructure repex includes automation, protection, control and communications systems and other electronic systems, such as security and fire protection.

We have several concerns with Transgrid’s modelling assumptions for secondary systems, which we discuss below.

We have also reduced forecast repex for Transgrid’s palisade gates program by \$3.3 million. This reduction is due to additional information provided by Transgrid, which shows that 38% of the sites it proposed for remediation are not economically justified.<sup>42</sup>

##### **(a) Secondary systems**

Transgrid proposed \$145.4 million for 24 secondary systems renewal projects, ranging in cost from \$0.7 million to \$19.3 million. For eight of these projects (adding up to \$105.1 million), Transgrid proposes to replace all secondary system assets at the site, including those systems that are currently in relatively good condition. We include in our substitute estimate \$99.7 million (a 31% reduction).

We have several concerns with Transgrid’s NPV assessment, notably:

- A disproportionality factor of 6 for safety risk is not appropriate. A disproportionality factor of 6 is typically used for assessing safety risk to members of the public, and a disproportionality factor of 3 for workers. Asset failures in substations are highly unlikely to expose members of the public to safety risks.
- Environmental risks are overstated—substation architecture and containment infrastructure minimise risk of environmental consequences outside of the substation. Transgrid also applies a disproportionality factor of 6 to environmental risk.
- The ‘other’ benefits of Transgrid’s ‘replace all’ option are overstated and not likely to be fully realised. Furthermore, Transgrid includes these benefits from the year following replacement (e.g. emergency call-out and corrective opex savings), but these are not reflected in Transgrid’s opex forecast.

We have adjusted Transgrid’s safety and environmental risks and other benefits assumptions in the NPV model. We have also included a ‘margin of error’ adjustment whereby if the NPV of the preferred option is only slightly negative (relative to the cost of the option), we have included the project in our substitute estimate. After these adjustments, we assess that 16 of the 24 projects are economical.

---

<sup>42</sup> Transgrid, 2023–28 Revenue proposal - OER N2562, Appendix B.

### A.1.3.5 Substations

Key programs in Transgrid’s forecast substations repex include transformers, circuit breakers and steelwork remediation. We find that the risk assumptions in Transgrid’s NPV calculations are overstated and support repex solutions that are higher than efficient costs. However, we note that Transgrid made a top-down reduction to its steelwork remediation program. We are satisfied that the amount included in Transgrid’s forecast for its steelwork remediation program reasonably reflects efficient costs.

#### (a) Transformers

Transgrid proposed \$64.4 million for transformers repex. We include in our substitute estimate \$24.9 million (a 61% reduction).

Transgrid proposes to replace all 11 transformers that it has identified for intervention. We are not satisfied that the forecast reasonably reflects prudent and efficient costs. Relevantly, Transgrid has historically refurbished (rather than replaced) about 90% of its transformers. Transformer refurbishment is far cheaper than replacement (about one-tenth of the cost) and maintains the reliability of the transformer in most cases (prolonging its service life for 15 years or more). Transgrid has not adequately demonstrated why its forecast should differ substantially from its historical practices.

We have the following concerns with Transgrid’s transformer repex forecast:

- Transgrid provided condition reports, which indicate that most of its transformers can be returned to service with minor refurbishment (for less than \$1 million in many cases).
- In some cases, Transgrid’s proposed replacement approach is overly risk averse and is not required to maintain current risk or service levels. For example, certain solutions proposed by Transgrid provide permanent N-2 capability for the purpose of avoiding a ‘one-off’ construction risk.
- Transgrid uses its Health Index Formula to calculate the probability of failure.<sup>43</sup> For transformer age, the formula uses manufacturing year rather than commissioning year. This may lead to a poorer health score (noting that transformers do not degrade prior to installation and taking on sufficient load). Furthermore, age has the highest weighting in the formula, whereas we expect observed condition factors to be more relevant to probability of failure (oil and electrical test results should be the key indicators of transformer health).
- Transgrid overstates unserved energy by assuming a repair time of 10 weeks for subsequent transformer failures (i.e. N-2 events), whereas service can usually be restored (e.g. by mobilising a spare transformer) well before permanent repairs are completed.
- Probability and consequence of failure risks appear to be overstated and not supported by evidence. For example, on 18 June 2022 Transgrid experienced a catastrophic transformer failure at its Yallah Substation, causing explosions and starting an oil fire. News reports state that Transgrid was able to contain the fire, damage to assets beyond

---

<sup>43</sup> Transgrid, *Substation Health Index Methodology Rev 0*, December 2021, p. 14.

the transformer were limited and there was no unserved energy resulting from this incident.<sup>44</sup>

For our substitute estimate, we have taken a top-down approach that assumes Transgrid will refurbish 70% and replace 30% of its transformers in the 2023–28 period. This is based on historical observations (around 90% being refurbished) with a margin of error built in, having regard to Transgrid’s proposal documents, information request responses and asset condition reports. This will allow Transgrid to prioritise which transformers to replace based on asset condition and other site factors.

### **(b) Circuit Breaker Replacement Program**

Transgrid proposed \$36.9 million to replace 130 circuit breakers across its network. We include in our substitute estimate \$29.3 million (a 21% reduction).

Transgrid has calculated the NPV at an individual circuit breaker level. This is a more astute NPV calculation approach that differs from its standard approach of considering multiple assets in its NPV calculations. Whilst we are satisfied with the approach taken, we think the level of assumed environmental and reputational risks applied are not justified.

Our alternative approach is to adjust the environmental disproportionality factor and remove reputational risk in Transgrid’s NPV calculations. This results in the replacement of 108 out of the proposed 130 circuit breakers being prudent in the forecast period.

## **A.2 Augex**

Augmentation is typically triggered by the need to build or upgrade the network to address changes in demand and network utilisation. However, it can also be triggered by the need to upgrade the network to comply with quality, safety, reliability and security of supply requirements.

### **A.2.1 AER draft decision**

We include \$225.6 million for augex in our substitute estimate of capex for the 2023–28 period. This is \$28.0 million (11%) lower than Transgrid’s forecast of \$253.6 million. Our draft decision position is mainly due to our, and our consultant, EMCa’s, findings that the total forecast augex is overstated. We are not satisfied that delivery of all of Transgrid’s proposed augex projects is likely in the 2023–28 period because:

- Transgrid did not provide evidence of its ability to deliver these augex projects especially in light of its significant total capex program in the 2023–28 period, which includes the NSW REZ, and ISP projects. This concern is compounded when considering Transgrid’s current practice of deferring several of its augex projects in the current period
- Transgrid’s lack of consideration of non-network solutions as a feasible option.

Our alternative forecast is based on a review of the six projects identified by EMCa as having particular delivery risk, and concluding that there is high probability that the optimal timing for five of these projects is beyond the 2023–28 period.

---

<sup>44</sup> See [www.abc.net.au/news/2022-06-19/wollongong-transformer-destroyed-by-catastrophic-fire/101165640](http://www.abc.net.au/news/2022-06-19/wollongong-transformer-destroyed-by-catastrophic-fire/101165640), accessed 6 July 2022.

## A.2.2 Transgrid’s proposal

Transgrid forecast \$253.6 million in its augex forecast. It is also included \$532.8 million in deferred capex for PEC which is classified as augex. Transgrid indicated that it would propose its contingent projects undergoing a RIT-T as mostly augex in its revised proposal.<sup>45</sup>

Transgrid classified \$253.6 million of forecast augex into the following four categories:

- Major projects
- Strategic property
- Base augex which have been classified as compliance, demand or economic benefits driven
- Connections.

Transgrid applied the following three-step approach to forecasting the majority of its augex:<sup>46</sup>

1. Identify network constraints using demand forecasts and power system simulation
2. Calculate the expected risk of unserved energy, the inability to connect new load or not meet compliance obligations. In the case of economic benefits projects, it considered the lost opportunity cost of constraining generation which leads to higher energy costs
3. Compare the avoided risk cost or economic benefits against the cost of the credible options using an economic cost-benefit evaluation.

## A.2.3 Reasons for decision

The sections below discuss the following factors we have had regard to in assessing overall augex:

- historical trend and composition of augex
- evidence of deliverability
- review of forecasting methodology
- specific project review.

These factors include a mixture of top down and bottom-up analysis.

### A.2.3.1 Historical trend and composition of augex

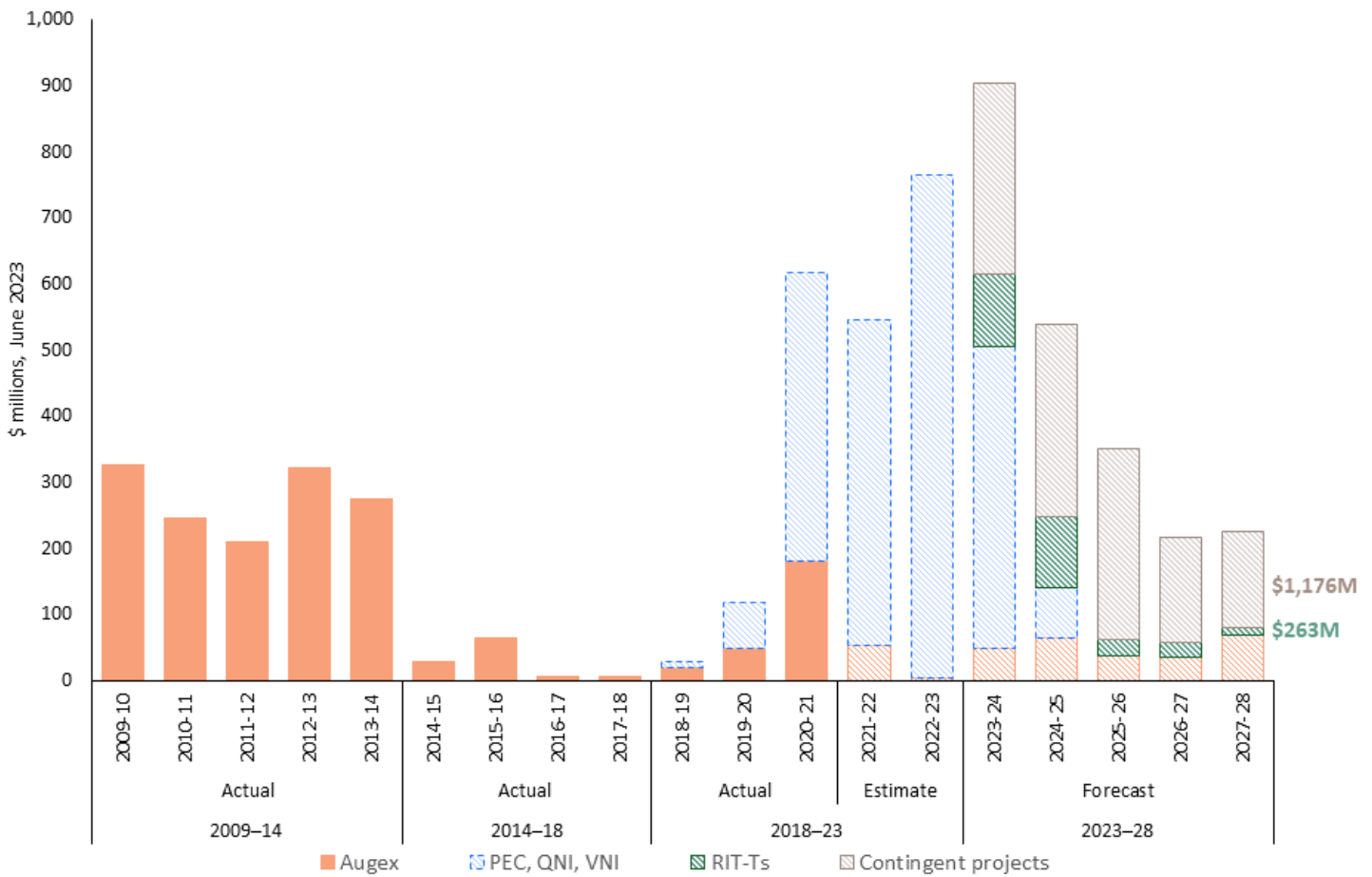
Transgrid’s long term augex trend shifts significantly from one regulatory control period to the next. Due to this volatility, we do not consider comparing total augex between periods is a good measure of forecast augex requirements.

---

<sup>45</sup> Transgrid, *Clarification letter to AER*, 10 February 2022, p. 5.

<sup>46</sup> Transgrid, *2023–28 Revenue proposal*, January 2022, p. 110.

**Figure A.2 Transgrid’s augex from 2009–10 to 2027–28**



Source: Transgrid and AER analysis.

Note: RIT-T capex excludes \$12 million for “managing risk on Line 86” because this is a repex project, not augex.

Figure A.2 above shows Transgrid’s augex from 2009–28. Although Transgrid noted that its \$256.3 million augex forecast is 16% below current period augex, we consider this is not a meaningful comparison as augex is volatile from one regulatory control period to the next. This is particularly relevant as Transgrid expects to potentially undertake more capex than has been included in its proposed augex as part of contingent projects. In particular, ISP-related capex that Transgrid has identified as potentially incurring in the 2023–28 period totals approximately \$6.4 billion.

We also note that the type of augex projects forecast by Transgrid has shifted materially from the current period to the forecast period. Table A.2 below compares the different type of augex projects between the current and forecast periods.

**Table A.2 Transgrid’s augex by driver 2018–28**

Augex by driver	2018–23	Augex by driver	2023–28
Compliance	2.7	Compliance	36.9
Demand	8.0	Demand	85.2



<i>Economic Benefits</i>	4.2	<i>Economic Benefits</i>	39.6
<b>Base augex total</b>	<b>14.8</b>	<b>Base augex total</b>	<b>161.6</b>
Connections	14.7	Connections	2.9
Powering Sydney's Future	235.2	Strategic property and Supply to Western Sydney	89.2
Stockdill Dr Switching station	40.7		
<b>Total</b>	<b>305.4</b>	<b>Total</b>	<b>253.6</b>

Source: Transgrid and AER analysis.

As Table A.2 shows, in the 2018–23 period, augex was mostly comprised of two major projects, Powering Sydney's Future and Stockdill switching station. Base augex comprised of compliance, demand or economic benefits driven projects accounted for only 4.8% of Transgrid's augex. This compares to the composition in the 2023–28 period, with base augex accounting for 63.7% of forecast augex, with major projects for strategic property and supply to Western Sydney accounting for the remainder of the forecast. We therefore do not consider it meaningful to compare Transgrid's historical spend as a top-down check when assessing Transgrid's forecast augex.

In addition to understanding the composition of augex that Transgrid has undertaken in the current period compared to the forecast period, we also consider it is useful to identify the projects Transgrid expected to undertake but chose to defer.

In response to our information request, Transgrid identified 22 deferred projects with a total value of \$74.4 million. For the majority of the projects, the reason for deferral was "project has lower benefits compared to other projects and hence was prioritised due to market benefit".<sup>47</sup> This indicates that within Transgrid's augex portfolio there is significant scope for deferrals, in particular where a project is driven by market benefits.

### A.2.3.2 Deliverability

EMCa considers Transgrid has not adequately demonstrated a deliverability assessment. A deliverability assessment is particularly important in the context of Transgrid's augex forecast considering the significant amount of demand uncertainty. We agree with EMCa that a prudent and efficient operator would provide supporting evidence of its deliverability capability of its forecast augex.

This is particularly the case in light of Transgrid's expectation of a significant increase in capital projects related to NSW REZ developments, ISP projects and contingent projects that could result in a historically high and uncertain levels of capex. EMCa considers that as delivery risks emerge for individual projects, there may be a material change to the selection of preferred options and timing in which Transgrid would undertake its capex.<sup>48</sup>

<sup>47</sup> Transgrid, *Response to information request 015 – Q10 response.xlsx*, 10 May 2022.

<sup>48</sup> EMCa, *Review of aspects of Transgrid's 2023–28 revenue proposal*, August 2022, p. 42.

We agree with EMCa’s analysis and placed weight on Transgrid’s current period actions in delivering its augex program. In particular, Transgrid has shown in the current period that it is willing to defer or not undertake projects which had lower market benefits as well as respond to revised demand forecasts. Further, we concur with EMCa that there is a wider scope for non-network solutions to be applied as evidenced by the recent outcomes of Transgrid RIT-Ts which identified network solutions could be deferred in favour of non-network solutions. The lack of consideration of these non-network options means that we are not convinced that Transgrid’s forecast augex is prudent and efficient.

### **A.2.3.3 Forecasting methodology**

EMCa identified improvements to Transgrid’s forecasting methods compared to previous determinations. Assessing the overarching forecasting method provides insights into which areas of an individual project that may warrant further assessment.

We are broadly satisfied with Transgrid’s demand forecasting methodology which is a key input into Transgrid’s cost benefit analysis. However, we have identified issues with Transgrid’s NPV methodology, which may have potential to distort options analysis and the prudent timing of investment.

#### **(a) Demand forecasting**

We are satisfied with Transgrid’s demand forecast methodology.

We engaged EMCa to undertake an assessment of Transgrid’s forecasting methodology. EMCa considers a reasonable level of rigour was applied to the development of the demand forecast for the following reasons:

- there were high level checks for consistency and clarity of bulk supply point forecasts
- thorough due diligence procedures to accepting distribution network service provider (DNSP) forecasts
- Transgrid engaged GHD for independent review of the assumptions being spot loads and suitability of spots loads of DNSP forecasts.<sup>49</sup>

However, EMCa identified that there was still uncertainty around the timing and magnitude for certain large spot loads being proposed for connection to Transgrid’s network. EMCa noted that a number of projects were deferred or cancelled in direct response to changed assumptions surrounding new connection of loads.<sup>50</sup>

Based on EMCa’s analysis, we are satisfied with Transgrid’s approach to demand forecasting. However, as noted by EMCa, the uncertainty of some projects where the need is particularly sensitive to demand assumptions increases the potential for such projects to be deferred. We discuss these potential projects in more detail in section A.2.3.4.

#### **(b) NPV modelling and options analysis**

We consider there are several issues with Transgrid’s NPV analysis which can in some circumstances overstate the benefits, understate the costs and not adequately take

---

<sup>49</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 43.

<sup>50</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 44.



uncertainty into account. This has the effect of biasing the preferred option towards network solutions rather than non-network solutions and the timing of when to undertake network investments. Although accounting for these issues, which reduces the NPV, does not necessarily shift an individual project from being prudent to not prudent, it does increase the likelihood that not all projects would be required for prudent capex. This is because more projects will be sensitive to lower-than-expected demand forecasts which may result in deferral.

This is consistent with EMCa’s analysis which found the following issues:

- The inclusion of time varying discount rates is not appropriate. Transgrid included three different weighted average cost of capital (WACC) scenarios as part of its low, base and high scenarios. However, the discount rate is not linked to the project itself. Applying a varying discount rate along with varying costs and benefits would distort the impact of genuine uncertainties associated with the project. Applying different discount rates can also distort the comparison of costs and benefits between long-term capital intensive and more short term less capital-intensive solutions.<sup>51</sup>
- Transgrid has included the terminal value in its NPV analysis. This reflects good practice if there is an expectation a project will continue to derive benefits beyond the modelling period. However, EMCa has identified that Transgrid has not established such expectations of future benefits. In some cases, EMCa identified that the benefits towards the end of the modelling period were negligible or insufficient to justify a terminal value. Further, EMCa identified instances where terminal value was incorrectly applied, for example, the original capital cost of land was assumed as a terminal benefit despite ongoing need for the land. There were also cases where the terminal value was applied as a negative cost which had the effect of underreporting the present value of costs. This has the effect of distorting optimum timing analysis.<sup>52</sup>
- Transgrid’s weighted scenarios may not be appropriate. Transgrid has included scenarios with ‘all low’ and ‘all high’ parameter values. These low and high scenarios account for 25% each of the NPV with the remaining 50% attributed to the base parameters. However, the combined probability of an all low or all high parameters is unlikely to be 25%. In circumstances where there may be an outlier under a high scenario, it could potentially bias up the weighted average. EMCa considered sensitivity analysis which modelled various cost and benefit parameters and compared it to the probability of such an outcome occurring would provide greater insights into project risk than Transgrid’s which focussed on 1 weighted NPV result.<sup>53</sup>

EMCa also considered that Transgrid’s cost estimation process was reasonable. However, EMCa noted as Transgrid intends to revisit its cost escalations in its revised proposal and had not considered the implications of supply related risks it identified in its proposal.<sup>54</sup> Any

---

<sup>51</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 36.

<sup>52</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 36.

<sup>53</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 37

<sup>54</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 40.

change in market conditions from these two issues may change the option selection, timing and the viability of some projects.<sup>55</sup>

#### **A.2.3.4 Project review**

We engaged EMCa to undertake a bottom-up assessment of each of Transgrid’s proposed augex projects. As noted above, EMCa identified several issues with Transgrid’s NPV methodology. EMCa, in its individual project by project assessment, after adjusting for the issues identified above, found most projects were still prudent and efficient.

However, EMCa considered overall augex was overstated and that it is likely Transgrid may defer some projects due to the uncertainty and deliverability constraints.

In the section below, we discuss each project EMCa has identified as a likely candidate for deferral. We have reviewed this analysis and in conjunction with our own analysis, determined a substitute capex forecast that does not include five of the six projects discussed below.

##### **(a) Economic benefit-driven projects**

EMCa identified the following three economic benefit driven projects as projects that could be deferred:

- Manage multiple contingencies in Sydney Northwest Area, \$10.1 million in 2028.
- Manage multiple contingencies in the Bayswater to Sydney Area, \$4.7 million by 2027
- Manage multiple contingencies in the North West NSW area, \$2.7 million by 2026.

EMCa found that the net benefits of these three economic benefit driven projects are particularly susceptible to unfavourable movements in the input assumptions of demand and generation growth. In particular, if any of the lower bound assumptions were to materialise, then the projects would no longer be economically justified. Further, as these projects are not compliance driven, it increases the chance of these projects being deferred. As noted above, projects where economic benefits are the main driver are the most common reason for Transgrid deferring its current period augex.<sup>56</sup>

We also note that our analysis indicates that the optimal timing under a base case scenario for the Sydney Northwest Area to maximise NPV is 2030 rather than 2028.

##### **(b) Maintain voltage in Alpine area**

Transgrid forecast \$2.1 million in 2023–28 for the maintain voltage in Alpine area project with an expected total cost of \$22.4 million by 2030 to address compliance issues.

Transgrid identified voltage limitations if expected spot loads eventuate. EMCa found that although Transgrid has selected the appropriate network solution if a network solution is required, there is material uncertainty with this project with potential for a non-network solution to address the issues.<sup>57</sup>

---

<sup>55</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 39.

<sup>56</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 66.

<sup>57</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 54.

We agree with EMCa’s analysis. We also note that given that \$2.1 million out of a total cost of \$22.4 million has been included in Transgrid’s 2023–28 augex forecast, and any sort of reduction in forecast spot loads would result in the \$2.1 million being deferred to beyond the 2023–28 period. We have not included this project in our substitute capex forecast.

**(c) Supply to far west NSW network**

Transgrid forecast \$8.4 million for this demand driven augex project to meet proposed new mining loads in the Broken Hill area. EMCa considered Transgrid established a prima facie case for taking corrective action to avoid likely non-compliance if the proposed mining loads proceed. EMCa was satisfied that the busbar voltage lower limit would likely be exceeded by a small amount in Transgrid’s base case. However, if one or more of the expected loads were to be delayed, then this project could be deferred to beyond the 2023–28 period.<sup>58</sup>

Further analysis by EMCa identified that Broken Hill Supply Reinforcement is a related project that was undergoing a RIT-T at the time Transgrid submitted its proposal. Transgrid’s business case noted that if similar reactive support is installed to address Broken Hill Supply Reinforcement and associated projects, it could provide a solution to meet Transgrid’s requirements.<sup>59</sup> Transgrid has subsequently published its Project Assessment Conclusions Report (PACR) for a new back up supply at Broken Hill and identified a non-network solution to address the issue. EMCa considers this is an indication that the supply to far west NSW project is no longer required.<sup>60</sup> This process also demonstrates that non-network solutions can be viable to address Transgrid’s constraints and that these solutions may have not been adequately considered as part of Transgrid’s proposal.

**(d) Maintain voltage in the Beryl Area**

We have included this project in our substitute capex forecast, although EMCa identified this project as a deferral candidate.

For this project, Transgrid conducted power system studies which identified voltage constraints and reactive margin shortfall issues in the Beryl area based on the latest demand forecasts. This could lead to interruption of supply loads under (N-1) contingency conditions.<sup>61</sup>

EMCa identified that although this project has a strong positive NPV, it is sensitive to demand growth. EMCa considered the issues identified in the sections above indicates that if any of the assumptions were to be unfavourable, it would bring the NPV much closer to the lower band scenario which had a negative NPV. EMCa considered there was potential for this project to be delayed by a year or two if load growth is lower than expected or if a non-network solution were identified.

We agree with EMCa’s analysis. We consider this project has the attributes to be more uncertain than some of the other demand driven augex projects. However, we have included this project in our substitute capex forecast because, on balance, this project is less likely to

---

<sup>58</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 58.

<sup>59</sup> Transgrid, *Options evaluation report – Strengthening Far West NSW Network*, September 2021, p. 7.

<sup>60</sup> EMCa, *Review of aspects of Transgrid’s 2023–28 revenue proposal*, August 2022, p. 59.

<sup>61</sup> Transgrid, *2023–28 Revenue proposal – Augex overview paper*, January 2022, p. 32.

be deferred beyond the 2023–28 period than the other projects EMCa has identified as deferral candidates. In particular, we note that even if this project were to be delayed by a year, the majority of the capex would still be undertaken in the forecast period.

While we have included this project in our capex substitute, if there are exogenous factors that result in a material change in Transgrid’s revised proposal augex forecast or a material change in market conditions, we may review how this project should be reflected in our final decision capex forecast.

## **A.3 ICT capex**

Information and communications technology (ICT) refers to all devices, applications and systems that support business operation. ICT expenditure is categorised broadly as either replacement of existing infrastructure for reasons due to end of life, technical obsolescence or added capability of the new system, or the acquisition of new assets for a business need.

### **A.3.1 AER draft decision**

We include \$72.9 million for ICT capex in our substitute estimate of capex for the 2023–28 period. This is \$14.0 million (16%) lower than Transgrid’s forecast of \$86.9 million.

### **A.3.2 Transgrid’s proposal**

Transgrid proposed \$86.9 million for ICT capex, which is \$22.2 million (34%) higher than actual/expected capex of \$64.7 million in the 2018–23 period. As detailed below, we do not consider this comparison is on a like-for-like basis given recent guidance for the accounting treatment for cloud-computing arrangements for ICT.

### **A.3.3 Reasons for decision**

#### **A.3.3.1 Assessment approach**

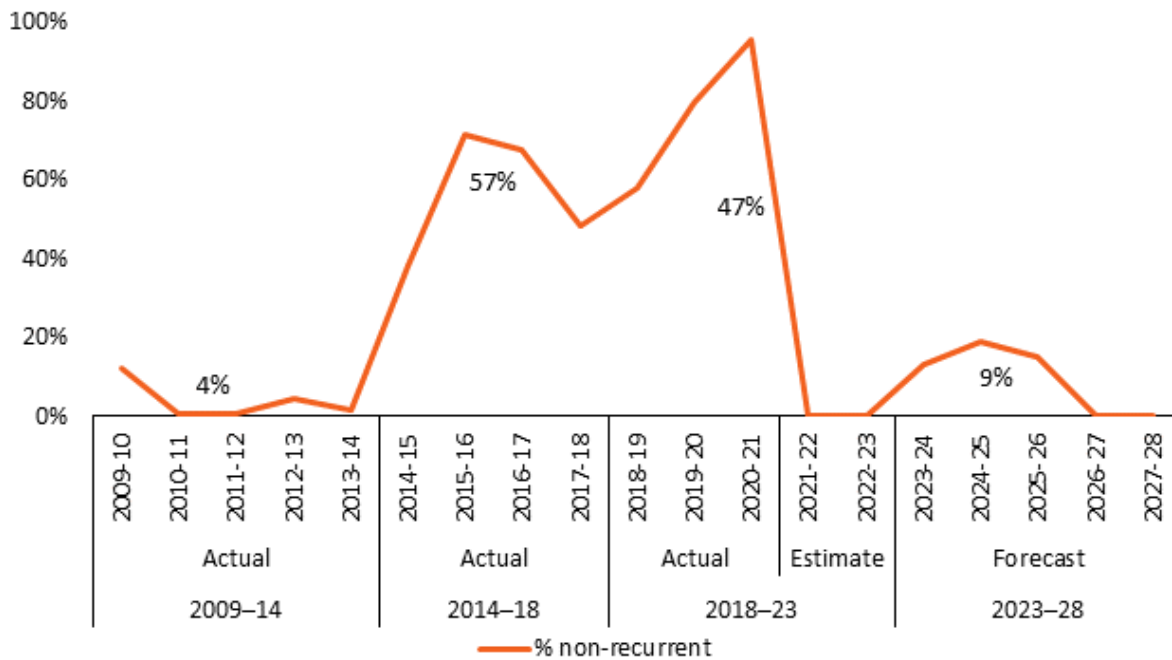
In assessing Transgrid’s ICT capex, we applied our standard approach as set out in our ICT Guidance Note.<sup>62</sup> Our ICT assessment approach involves splitting the expenditure into recurrent and non-recurrent. For recurrent expenditure, we have regard to trend analysis, benchmarking and bottom-up analysis of business cases and other supporting information. For non-recurrent expenditure, we have regard to business cases and other supporting information.

Transgrid’s proposed ICT capex forecast is 91% (\$77.2 million) recurrent and 9% (\$9.7 million) non-recurrent. Between 2014–15 and 2020–21, Transgrid incurred a higher proportion of non-recurrent expenditure as shown in Figure A.3.

---

<sup>62</sup> See [www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/non-network-ict-capex-assessment-review/implementation](http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/non-network-ict-capex-assessment-review/implementation).

**Figure A.3 Transgrid’s proportion of non-recurrent ICT capex out of the total ICT capex from 2009–28**



Source: AER analysis of Transgrid’s RIN.

Note: Data labels represent the average percentage of non-recurrent expenditure over the relevant regulatory control period.

Given the higher proportion of Transgrid’s non-recurrent ICT capex, we observe a decline in the five-year moving average (used to smooth the profile) of recurrent ICT capex followed by a sharp increase in 2023–28, as shown in Figure A.4. Averaging the 2009–23 recurrent capex, we find an indicative amount of \$44–53 million is expected for the forecast.<sup>63</sup> Adding the proposed \$9.7 million non-recurrent ICT capex yields an indicative total ICT capex of \$54–63 million.

We note that arriving at such a range for the alternative forecast made it appropriate for us to undertake further analysis in our assessment of sufficient capex for Transgrid to satisfy the capex objectives. We therefore sanity checked this alternative forecast against other information we had before us. Therefore, in this case and to account for the variability in recurrent/non-recurrent and the impacts of the Software-as-a-Service (SaaS) reclassification (discussed below),<sup>64</sup> we have examined the sum of Transgrid’s recurrent and non-recurrent revealed capex costs over the last three regulatory control periods. This is discussed and presented further in section A.3.3.2.

<sup>63</sup> The range accounts for including and excluding SaaS-related costs from capex. \$53 million if SaaS costs are included in capex, or \$44 million if excluded from capex (instead, included in opex).

<sup>64</sup> From Transgrid’s response to information request 033, we observe that the SaaS reclassification results in negative recurrent ICT capex for 2019–20 and 2020–21 because the recurrent SaaS costs are greater than the total recurrent ICT capex.

**Figure A.4 Transgrid’s historical and forecast recurrent ICT capex**

Source: AER analysis of Transgrid’s RIN.

### A.3.3.2 Understanding the underlying trend on a like-for-like basis

A key part of our assessment of Transgrid’s proposed ICT capex forecast was understanding the impact of recent changes to accounting treatment on the capex profile. In April 2021, the International Financial Reporting Standards Interpretations Committee released guidance on the accounting standards relating to cloud computing, or SaaS, arrangements. The impact of this guidance is that the accounting treatment for the majority of SaaS costs is as opex, rather than capex as it had historically been treated. Based on this accounting guidance, Transgrid has therefore treated SaaS costs as opex for its 2023–28 forecast.

We issued several information requests to understand the ICT capex trends on a like-for-like basis; that is, with historical SaaS costs in opex as aligned with the 2023–28 forecast.<sup>65</sup>

Figure A.5 below shows the difference between how Transgrid’s proposal presented the ICT capex profile compared with how we have considered the ICT capex on a like-for-like basis. Transgrid’s proposal presented SaaS differently across 2018–23:

- 2018–19 to 2020–21 included \$26 million for SaaS in capex
- 2021–22 and 2022–23 included \$29 million for SaaS in opex, as shown by the decline of capex at the end of the regulatory period in Figure A.5.

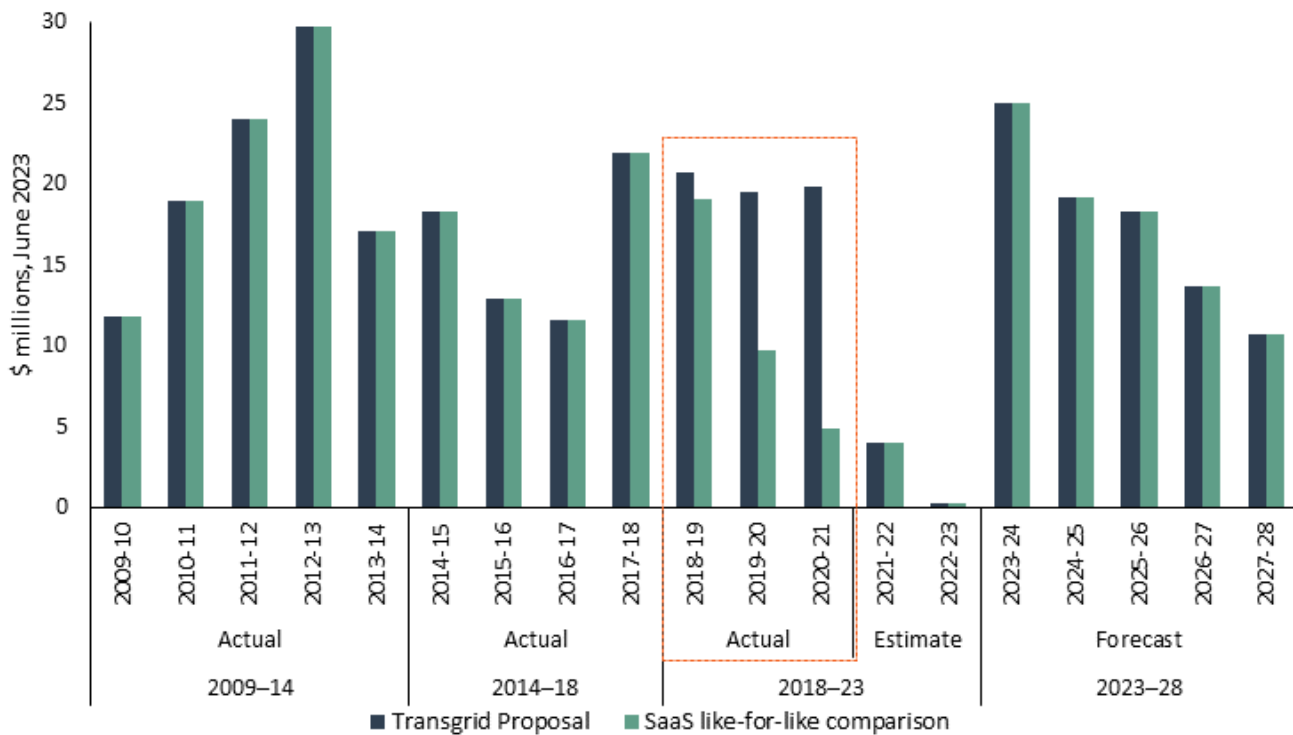
To compare the historical and forecast capex on a like-for-like basis (with SaaS in opex), we have removed the \$26 million Transgrid incurred for SaaS costs in the three years between 2018–19 and 2020–21.<sup>66</sup>

<sup>65</sup> Transgrid, *Responses to information requests 005, 014, 027 and 033*.

<sup>66</sup> Transgrid, *Response to information request 033*, July 2022.



**Figure A.5 Comparison of Transgrid’s ICT capex profile on a like-for-like basis**



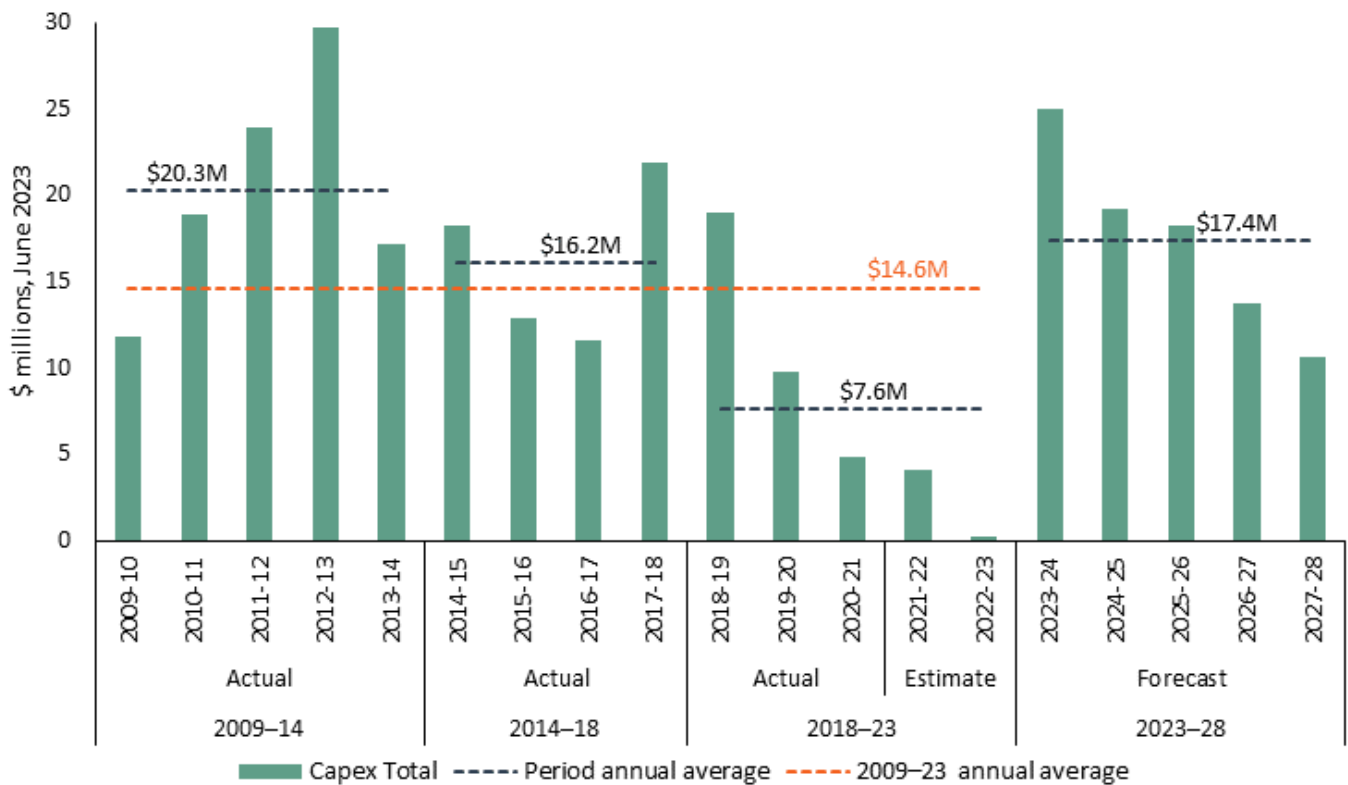
Source: AER analysis

Figure A.6 illustrates Transgrid’s ICT capex over time, with annual averages for each regulatory control period. We observe a significant step-up (129%) for 2023–28 compared to the ICT capex Transgrid expects to incur in 2018–23. We do not consider Transgrid has sufficiently justified a step-up of this magnitude, especially considering the consequent increase in forecast opex associated with SaaS moving from capex to opex.<sup>67</sup> Further, the proposed 34% forecast increase in totex (capex + opex) is not consistent with the expected efficiencies of transitioning to cloud computing services.

Given the effects of the SaaS accounting treatment in 2018–23, we do not consider a comparison to the most recent 2018–23 period alone is necessarily representative of Transgrid’s likely future requirements. Therefore, we have considered a longer trending horizon in this instance. Transgrid’s ICT capex forecast is 129% higher than 2018–23 actual/estimated capex and 19% higher than the longer-term 2009–23 capex. From the information provided by Transgrid, there is no clear reason why Transgrid’s forecast should be higher than longer-term trend, especially considering the peak ICT capex in 2009–14 included in this trend comparison, which raises the annual average of the historical ICT capex.

<sup>67</sup> AER, *Draft decision – Transgrid 2023–28 – Attachment 6 – Operating expenditure*, September 2022, p. 12.

**Figure A.6 Transgrid's historical and forecast total ICT capex profile**



Source: AER analysis.

Note: The comparison of historical and forecast capex is on a like-for-like basis, excluding SaaS-related costs from capex.

### A.3.3.3 EMCa's review

We engaged EMCa to review the prudence and efficiency of the proposed ICT capex forecast. EMCa assessed the forecast from top-down and bottom-up perspectives, and considered totex (capex + opex) trends to differentiate the changes in the allocation of SaaS between opex and capex. EMCa found that Transgrid has not demonstrated the proposed ICT capex is prudent and efficient, and EMCa considered the forecast is likely overstated by \$15 million (or 17%) using a top-down sense check.

From a top-down perspective, EMCa found that Transgrid:<sup>68</sup>

- proposed a significant uplift in totex<sup>69</sup>, which does not seem consistent with efficiencies that should have resulted from Transgrid's transition to the cloud-based computing (i.e. capex to opex)

<sup>68</sup> EMCa, *Review of aspects of Transgrid's 2023–28 revenue proposal*, August 2022, pp. 68–70, 74–75, 92–93.

<sup>69</sup> Transgrid forecasts an increase in both capex and opex for ICT, despite the shift of SaaS-related costs from capex to opex.



- has provided limited evidence of portfolio prioritisation and deliverability of its forecast ICT capex portfolio. Transgrid's information focuses on how the 2018–23 active projects are monitored and prioritised, which has no bearing on the proposed forecast<sup>70</sup>
- did not evidence the realised 'cashable'<sup>71</sup> benefits from the 2018–23 ICT investments and has not reflected the 2023–28 benefits elsewhere in the proposal as reduced future costs. This is part of our ICT assessment approach that sets out our expectations and good practices for ICT investment.<sup>72</sup> CCP25 recommended further engagement on an IT benefits realisation framework and for Transgrid to be more transparent and present customers with a longer-term ICT and data analytics plan for optimising investment and reducing future risks<sup>73</sup>
- appears to be waiting for the 2023–28 period to continue ICT investments and is spending to the 2018–23 'allowance', rather than investing based on identified need, and by doing so increasing the expenditure required in 2023–28.

From its bottom-up review of Transgrid's proposed eight ICT packages presented in Table A.3, EMCa found that:<sup>74</sup>

- Transgrid has generally identified adequate needs for taking action and generally selected the appropriate approach given the options considered, but once it undertakes more detailed options analysis, Transgrid will likely find that it requires less capex to meet those needs because in some cases it will find better alternatives than are apparent at this stage
- Transgrid has not adequately demonstrated that it has prioritised its work to ensure that only the work that is prudently and efficiently required in 2023–28 is proposed. A prudent operator would continue making investments in the current regulatory control period rather than wait for the commencement of the next period, as appears to be the case for several ICT packages, such as cyber security, employee enablement and bespoke applications
- in some cases, Transgrid has not adequately considered alternative options and some of these alternatives could be cloud-computing options due to the increased availability and feasibility
- the proposed expenditure for improving its project management software should be self-funding due to the benefits Transgrid describes it will gain from the investment.

**Table A.3 Summary of EMCa's review of Transgrid's eight ICT packages**

ICT package	EMCa's assessment
<b>Application Maintenance</b>	Transgrid will likely require less capex than it has forecast, primarily because of the likely potential for deferring maintenance by 1–2 years. EMCa considers the contributing factors for deferral include the imminence of cloud solutions replacing

<sup>70</sup> Transgrid, *Response to information request 010 – Q9*, April 2022.

<sup>71</sup> Benefits realised in terms of cost savings or revenue earned.

<sup>72</sup> AER, *Non-network ICT capex assessment approach*, November 2019.

<sup>73</sup> CCP25, *Advice to the AER on Transgrid's 2023–28 Revenue Proposal*, May 2022, p. 17.

<sup>74</sup> EMCa, *Review of aspects of Transgrid's 2023–28 revenue proposal*, August 2022, pp. 68, 77, 92–93.

<b>(\$18.3 million)</b>	on-premises upgrades and that this package has relatively low importance to other packages. Further, Transgrid states it is typically able to prudently extend replacement/refresh of applications beyond end-of-life — EMCa did not find compelling information that this will not continue. Transgrid’s options analysis formally considered one ‘base case’ option, which is to continue its business-as-usual approach for application maintenance. Transgrid did not explore further the option for ‘other alternatives’, which EMCa considers could have been more rigorously examined considering the likelihoods of other alternatives being preferable to the proposed base case.
<b>Bespoke Applications</b> <b>(\$17.5 million)</b>	Transgrid expects to incur \$0.4 million for this package in 2018–23. EMCa noted its concern with the prudence of undertaking minimal expenditure in 2018–23 and now the need for investment occurs as the next regulatory control period commences. Like the Application Maintenance package, EMCa observes the low interdependency/importance of the Bespoke Applications package with other packages, indicating the timing of this expenditure is not influenced by the timing of other projects. Notwithstanding its concerns with deferral and the lack of visibility of Transgrid’s capacity to deliver all the work in 2023–28, EMCa found that out of the four options considered, Transgrid has likely selected the appropriate option (based on the available information).
<b>Infrastructure and Network</b> <b>(\$17.8 million)</b>	EMCa considers the risk-based approach to maintaining/refreshing the corporate data network assets and infrastructure is appropriate, but the assumptions underpinning the NPV analysis are likely conservative regarding the opportunities for cloud-migration and the required capex is, therefore, likely to be lower.
<b>Employee enablement</b> <b>(\$12.2 million)</b>	Transgrid expects to incur \$1.9 million in 2018–23 for this package. Again, EMCa emphasises the concern with undertaking minimal expenditure in 2018–23 to propose a substantial increase in 2023–28 and considers this is not consistent with the actions of a prudent operator investing on identified need instead of regulatory cycles. This increases the capex in FY2024 to \$5 million with an annual average of \$1.8 million for the remaining years, suggesting the delay in investment has increased the forecast by \$3.2 million.
<b>Data and Decisioning</b> <b>(\$6.3 million)</b>	EMCa considers Transgrid has likely selected the appropriate option out of the four options considered to introduce a new data governance approach to meet the requirements of the Critical Infrastructure Bill and to replace legacy systems. This package has high interdependency with the Cyber Security package and, in EMCa’s view, the packages appear complementary rather than duplicative. EMCa noted its reservations with the opaqueness of the cost-benefit analysis and the quantification of benefits but considered the two components of work are likely required in 2023–28.
<b>Cyber Security</b> <b>(\$11.9 million)</b>	This package includes capex for new legislative and likely regulatory obligations for achieving cyber security maturity levels in 2023–28. Transgrid also proposed \$18.6 million for an opex step change for cyber security. <sup>75</sup> EMCa found that Transgrid has likely identified the appropriate activities for achieving the required maturity level and, while the costs may be slightly overstated, the cost estimates are broadly consistent with the inherent +/-25% accuracy at this stage of development. EMCa observes the deferral of some cyber security work to 2023–28 and highlights the

<sup>75</sup> AER, *Draft decision – Transgrid 2023–28 – Attachment 6 – Operating expenditure*, September 2022, pp. 21–23.

	proposed forecast capex and opex could have been reduced had Transgrid continued to invest in 2018–23 knowing the threat landscape and maturity level requirements to be achieved.
<b>Operational Evolution</b> <b>(\$1.9 million)</b>	Transgrid proposed to update its project management system due to limitations with the current system in managing major and minor projects. The preferred option of replacing the existing project management system and expanding capabilities with inventory, asset and workforce management optimisation. Transgrid quantified two broad categories of financial benefits (totalling \$13.2 million) it would gain from this investment: (1) avoiding the cost inefficiencies in the base case (business as usual) for processing monthly forecasts and reports, estimated at \$7.2 million; (2) several benefits associated with optimisation capabilities estimated at \$6 million over three years. A third benefit category that was not quantified involved reducing cost overruns for large projects. EMCa considers that given the benefits Transgrid describes it will garner, it should self-fund this capex.
<b>Customer and Safety Support</b> <b>(\$1.0 million)</b>	Transgrid proposed to consolidate and integrate its customer relationship management (CRM) tool with a cloud-based solution as the current system is not fit-for-purpose. From the options assessed, EMCa considers that Transgrid has likely not selected the prudent option and has not supported the preferred option with compelling economic benefits analysis to demonstrate positive NPV. Transgrid selected option 2 over option 1 despite a lower NPV because of additional non-quantified benefits. EMCa considers the additional totex for option 2 is not justified but acknowledges the expected capex for either option is similar (at or below \$1 million) after accounting for SaaS reclassification.

Overall, our trend analysis of Transgrid’s revealed costs and our assessment of EMCa’s review indicates Transgrid has not demonstrated its proposed forecast is prudent and efficient. We have included an amount in line with historical trend based on revealed costs in our substitute estimate of total capex, which includes Transgrid’s recently updated 2018–21 numbers for SaaS.<sup>76</sup> This is \$35 million (92%) higher than the ICT capex Transgrid expects to incur in 2018–23 (excluding SaaS).<sup>77</sup>

## A.4 Other non-network capex

Other non-network capex includes fleet, plant and equipment, and property. Fleet, plant and equipment expenditure supports Transgrid’s network maintenance services and construction work and includes assets such as cars, utilities, vans, trucks, trailers and cranes. Property expenditure relates to maintenance and refurbishment of offices and depots.

### A.4.1 AER draft decision

We include \$70.9 million for Other non-network capex in our substitute estimate of capex for the 2023–28 period. This is \$4.1 million (5%) lower than Transgrid’s forecast of \$75.0 million.

<sup>76</sup> Transgrid, *Response to information request 033*, July 2022.

<sup>77</sup> Alternatively, this is \$9 million (13%) higher than the \$65 million in 2018–23 presented in Transgrid’s proposal.

#### A.4.2 Transgrid’s proposal

Transgrid proposed \$75 million for Other non-network capex, which is \$14 million (or 23%) higher than the amount of expenditure Transgrid expects to incur in the 2018–23 period. Transgrid’s proposed Other non-network capex is comprised of:

- \$48.6 million for fleet, plant and equipment, which is 7% higher than the 2018–23 period. An increase in the forecast capex for fleet from the 2018–23 period is mostly offset by a decrease for plant and equipment. The primary driver for the increase in fleet capex is higher volumes and unit rates
- \$26.4 million for property, which is 71% higher than the 2018–23 period. Transgrid’s property expenditure is ‘lumpy’ in nature and is driven by the results of independent property condition reports.<sup>78</sup>

Transgrid stated that one of the key investments for the proposed fleet forecast was to provide capabilities to support the delivery of major ISP projects.<sup>79</sup> In response to an information request, Transgrid submitted that all fleet expenditure has been accounted for in the proposal and that there will be no double counting of fleet capex in the ISP projects.<sup>80</sup>

#### A.4.3 Reasons for decision

Our review identified proposed capex for two programs that go beyond the requirements of the capex objectives<sup>81</sup> to maintain service levels:

- \$1.4 million for fleet, associated with transitioning its car fleet from petrol/diesel to higher-cost electric vehicles (EV)<sup>82</sup>
- \$2.7 million program for property sustainability projects, such as installing solar photovoltaic (PV) systems and LED lighting.

The proposed capex for these programs is not required to deliver prescribed transmission services nor are they required under any regulatory obligations. Transgrid submitted that the programs are expected to reduce property and fleet operating and maintenance expenditure.<sup>83</sup> However, Transgrid has not provided cost/benefit analyses and has not reduced its opex forecast to reflect any estimated savings. Further, Transgrid has not provided evidence of consumer support and willingness to pay for these programs.

For these reasons, we do not consider the two programs to be prudent and efficient and have not included \$4.1 million in our substitute estimate of total capex. Our substitute estimate for Other non-network is also 16% more than Transgrid expects to incur in the 2018–23 period, providing Transgrid with sufficient capex to maintain service quality.

---

<sup>78</sup> Transgrid initially proposed \$22.8 million for property. As per a change in accounting standards AASB16, Transgrid has proposed to capitalise existing leases and has since updated its property forecast to include \$3.6 million in capitalised leases.

<sup>79</sup> Transgrid, *2023–28 Revenue proposal – Non-network Other Overview paper*, 31 January 2022, p. 18.

<sup>80</sup> Transgrid, *Response to AER Information Request 037*, 1 July 2022, p. 1.

<sup>81</sup> NER, cl. 6A.6.7(a).

<sup>82</sup> This amount is calculated comparing the higher unit cost in the forecast period for EVs compared to the historical unit costs for petrol/diesel car fleet.

<sup>83</sup> Transgrid, *Response to AER Information Request 003*, 30 March 2022.

We also note that Transgrid stated in its asset strategy that such programs align with its corporate strategy.<sup>84</sup> Our draft decision does not preclude Transgrid from self-funding these programs if it considers there is value in aligning with its corporate strategy or if it considers the estimated opex savings will outweigh the higher upfront capex.

## A.5 Capitalised overheads

Overhead costs include business support costs not directly incurred in producing output, and shared costs that the business cannot directly allocate to a particular business activity or cost centre. The Australian Accounting Standards and the distributor's cost allocation methodology determine the allocation of overheads.

### A.5.1 AER draft decision

We include \$144.9 million for capitalised overheads in our substitute estimate of capex for the 2023–28 period. This is \$14.1 million (9%) lower than Transgrid's forecast of \$159.0 million.<sup>85</sup>

### A.5.2 Transgrid's proposal

Transgrid forecasts \$159.0 million in capitalised overheads for the 2023–28 period. To arrive at its forecast, Transgrid says it used "the AER's default approach" based on:<sup>86</sup>

- 75% of capitalised overheads are fixed based on the most recent available year of actual capex (i.e. 2021–22)
- 25% of capitalised overheads vary with direct capex.

Transgrid apply capitalised overheads to direct augex and repex. Non-network capex also attracts corporate capitalised overheads.

### A.5.3 Reasons for decision

We consider Transgrid's approach is a suitable method to forecast capitalised overheads. However, as set out below, we have made the following key changes to align Transgrid's methodology with our "default approach".

#### A.5.3.1 Base years

Transgrid used the four years to 2020–21 to establish 'base' capitalised overheads.<sup>87</sup> We have changed this to the three years to 2020–21 (i.e. actual capitalised overheads in the 2018–23 period).

---

<sup>84</sup> Transgrid, *Response to AER Information Request 003*, 30 March 2022, p. 13.

<sup>85</sup> This amount excludes capitalised overheads associated with Project EnergyConnect capex. We have assessed these capitalised overheads separately, consistent with Transgrid's forecast approach.

<sup>86</sup> Transgrid, *2023–28 Revenue Proposal*, January 2022, p. 119. We consider that some overheads are relatively fixed in the short term and are not closely correlated with the size of the capex program. However, we expect that a portion of the overheads will vary in relation to the size of capex. Our position is that 75% of capitalised overheads are fixed and 25% are variable – this is our 'default approach' that Transgrid refers to in its proposal.

<sup>87</sup> Transgrid, *2023–28 Revenue Proposal*, January 2022, p. 119. In its proposal, Transgrid states that it used 2021–22 as the base year; however, in its modelling, Transgrid has used the four years to 2020–21.

### A.5.3.2 Rate of change

Transgrid included partial factor productivity, real cost escalation and output changes in its rate of change calculation. We have changed this to only include real cost escalation.

### A.5.3.3 Adjusting for our lower estimate of capex

We consider that our reductions to Transgrid’s forecast capex relative to its proposed capex should result in lower capitalised overheads. We accept that some of these costs are relatively fixed in the short term and are not closely correlated to the size of the capex program. However, we maintain that a portion of the overheads should vary in relation to the size of the capex program. We have adopted a 75% fixed and 25% variable ratio to adjust capitalised overheads.

## A.6 Modelling Adjustments

In our draft decision, we have considered the following inputs on inflation (consumer price index (CPI)) and labour real cost escalation:

- actual inflation for 2021–22 and forecast inflation for 2022–23
- labour real cost escalators based on BISOE and KPMG forecasts.

Table A.4 and Table A.5 show the modelling adjustments we have made to reflect the latest inflation data in our roll forward model (RFM) and updated labour real cost escalators in line with our opex alternative estimate (Attachment 6 – Operating expenditure).

**Table A.4 Modelling adjustments (%)**

Cost escalator	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Transgrid's inflation <sup>(a)</sup>	2.75	2.25					
AER's inflation <sup>(a)</sup>	3.50	7.80					
Transgrid's real labour	-0.97	0.36	0.46	0.76	0.90	0.82	0.62
AER's real labour	-1.39	-1.07	0.81	1.43	1.38	0.65	0.55

Source: AER analysis and Transgrid’s proposal.

Note: (a) for the purpose of the capex forecast in \$2022–23, only the CPI for 2021–22 and 2022–23 is relevant as Transgrid’s base inputs are in \$2020–21.

**Table A.5 Cost escalation impact to capex forecast (\$ million, \$2022–23)**

Cost escalator	2023-24	2024-25	2025-26	2026-27	2027-28	Total
Transgrid's proposal <sup>(a)</sup>	691.5	329.3	216.8	198.7	223.5	1,659.8
AER's draft decision	704.5	344.7	230.8	211.4	237.9	1,729.3
Variance	13.0	15.4	14.0	12.7	14.3	69.5

Source: AER analysis. Totals may not sum due to rounding.

Note: (a) these figures represent our draft decision using Transgrid’s proposed CPI and real cost escalators.

It is worth noting that the inflation adjustment resulted in a \$71.7 million increase, while the labour real cost escalators adjustment resulted in a \$2.3 million decrease, in the 2023–28 period. In our final decision, we will update inflation to reflect actual inflation for 2022–23.



## B Contingent projects

Contingent projects are usually significant network augmentation projects that are reasonably required to be undertaken in order to achieve the capex objectives. However, unlike other proposed capex projects, the need for the project within the regulatory control period and the associated costs are not sufficiently certain. Consequently, expenditure for such projects does not form a part of the total forecast capex that we approve in this determination. Such projects are linked to unique investment drivers and are triggered by defined ‘trigger events’. The occurrence of the trigger event must be probable during the relevant regulatory control period.<sup>88</sup> The cost of the projects may ultimately be recovered from customers in the future if certain predefined conditions (trigger events) are met.

Transgrid identified two types of contingent projects:

- eight standard contingent projects with an estimated 2023–28 cost of \$1,175.9 million.
- four projects undergoing a RIT-T with an estimated 2023–28 cost of \$275 million. In its regulatory proposal, Transgrid’s indicative estimate was \$742 million for the cost of these projects.<sup>89</sup>

This appendix details our assessment of Transgrid’s eight standard contingent projects. We discuss the four projects undergoing a RIT-T in Appendix C.

Transgrid has also identified, but not included, actionable and future ISP projects. Transgrid considers these projects to be automatic contingent projects under the automatic contingent project provisions for Actionable ISP projects. We are satisfied with Transgrid’s approach to actionable and future ISP projects.

### B.1 Draft decision – Standard contingent projects

#### B.1.1 AER Position

Our draft decision is to accept one of Transgrid’s proposed contingent projects for the 2023–28 period. We have concluded that Transgrid’s \$51.1 million contingent project to ‘manage increased fault levels in Southern NSW’ may be reasonably required to be undertaken in order to maintain the quality, reliability and security of supply, or to meet or manage the expected demand for transmission services over the 2023–28 period.<sup>90</sup>

We have not accepted the other seven contingent projects proposed by Transgrid. This is because the triggers were not consistent with the requirements of the NER. In particular, for a majority of the projects, we found that the trigger events were not appropriate, as they did not appear to be events which were probable to occur during the regulatory control period. We must also be satisfied that the capex is required if the trigger occurs.

Where we identified a trigger would be appropriate with less material adjustments, we have engaged with Transgrid to amend its triggers.

---

<sup>88</sup> NER, cl. 6A.8.1(c)(5).

<sup>89</sup> Transgrid, *2023–28 Revenue Proposal*, January 2022, p. 164.

<sup>90</sup> NER, cl. 6A.8.1(b)(1).

In developing its revised proposal, we invite Transgrid to provide further information to support its proposed contingent projects, having regard to the information gaps we have noted in this draft decision.

### B.1.2 Transgrid’s proposal

Transgrid proposed \$1.2 billion for eight standard contingent projects for the 2023–28 period.<sup>91</sup> Transgrid identified the key drivers of these proposed contingent projects are:

- system inertia and strength requirements
- increased fault levels
- expected demand growth
- expected new generation connection.

Table B.1 below shows Transgrid’s proposed contingent projects.

**Table B.1 Transgrid’s proposed contingent projects**

Project name	2023–28 cost (\$m)	Total cost (\$m)	Proposed trigger
Manage increased fault levels in Southern NSW	51.1	51.1	Updated trigger submitted 8 July: <ol style="list-style-type: none"> <li>Transgrid Board commitment to proceed with the HumeLink project, subject to the AER amending the revenue determination pursuant to the Rules</li> <li>Issue of a joint notification to AEMO under 5.3.7(g) of the Rules that a connection agreement for Snowy 2.0 has been entered into, including relevant technical details of the proposed plant and connection.</li> <li>The AER accepts that Transgrid has completed a RIT-T that demonstrates that the proposed network investment is the most efficient option to ensure fault current ratings of equipment at Lower Tumut, Upper Tumut, Wagga 330kV and Murray are not exceeded.</li> <li>Transgrid Board commitment to proceed with the Manage increased fault levels in Southern NSW project, subject to the AER amending the revenue determination pursuant to the Rules.</li> </ol>
Meeting NSW system inertia requirement	105.1	262.7	<ol style="list-style-type: none"> <li>Notice by AEMO under NER clause 5.20B of the existence of an inertia shortfall in the NSW region, and</li> <li>Successful completion by Transgrid of a RIT-T that demonstrates that transmission investment is the preferred option (or part of the preferred option)</li> </ol>
Meeting NSW system strength requirement	283.7	640.9	<ol style="list-style-type: none"> <li>Notice by AEMO under NER clause 11.143.14 of the existence of a system strength shortfall in the NSW region,</li> <li>Unless the system strength project is not subject to the RIT-T under clause 11.143.16, then successful completion of a RIT-T that demonstrates that transmission investment is the preferred option (or part of the preferred option)</li> </ol>
Supply to Bathurst, Orange and Parkes Stage 2	94.6	404.9	<ol style="list-style-type: none"> <li>One or more of the following:               <ol style="list-style-type: none"> <li>Total demand in the Orange area exceeds 355 MW, or</li> <li>Total demand in the Parkes area exceeds 155 MW, and</li> </ol> </li> <li>Successful completion of a RIT-T demonstrating that increasing capacity of the network in the Bathurst, Orange and Parkes areas is the option or part of the option that maximises positive net economic benefits.</li> </ol>

<sup>91</sup> Transgrid, *2023–28 Revenue Proposal*, January 2022, pp. 165–166.

Improve capacity of Southern NSW lines for renewables	275.8	394.0	<p>a) New generation of more than 1,000 MW is committed in Southern and/or South Western NSW</p> <p>b) Successful completion of a RIT-T demonstrating that increasing capacity of the network in southern NSW is the option or part of the option that maximises positive net economic benefits</p>
Supply to ACT network capability	71.4	94.6	<p>a) One or more of the following: (i) Combined demand between Canberra to Williamsdale exceeds 890 MW (ii) The ACT utilities (Technical Regulation)(Electricity Transmission Supply Code) makes a change to the agreed maximum demand under a special contingency event, and</p> <p>b) Successful completion of a RIT-T that demonstrates that transmission investment is the preferred option (or part of the preferred option)</p>
Moree special activation precinct	42.0	42.0	<p>a) Moree total demand forecast exceeds 50 MW</p> <p>b) Successful completion of a RIT-T that demonstrates that transmission investment is the preferred option (or part of the preferred option)</p>
Strategic Easement acquisition for supply to Sydney from the South	252.2	252.2	<p>a) Inclusion of Southern 500 kV Ring (supply to Sydney, Newcastle and Wollongong future ISP project, southern section) in optimal development path in 2022 (or subsequent) ISP, and</p> <p>b) Rezoning of land along the proposed easement between South Creek and Greendale from rural to residential, commercial or industrial</p>

Source: Transgrid, *Regulatory proposal*, January 2022, pp. 165-166.

### B.1.3 Assessment approach

We reviewed Transgrid's proposed contingent projects against the assessment criteria in the NER.<sup>92</sup> We considered whether:

- the proposed contingent project is reasonably required to be undertaken in order to achieve any of the capex objectives<sup>93</sup>
- the proposed contingent project capex is not otherwise provided for in the capex proposal<sup>94</sup>
- the proposed contingent project capex reasonably reflects the capex criteria, taking into account the capex factors<sup>95</sup>
- the proposed contingent project capex exceeds the defined threshold<sup>96</sup>
- the trigger events in relation to the proposed contingent project are appropriate.<sup>97</sup>

We sought additional information from Transgrid about each contingent project.<sup>98</sup>

<sup>92</sup> NER, cl. 6A.8.1.

<sup>93</sup> NER, cl. 6A.8.1(b)(1).

<sup>94</sup> NER, cl. 6A.8.1(b)(2)(i). Relevantly, a transmission NSP must include forecast capex in its revenue proposal which it considers is required in order to meet or manage expected demand for prescribed transmission services over the regulatory control period (see NER, cl. 6A.6.7(a)(1)).

<sup>95</sup> NER, cl. 6A.8.1(b)(2)(ii).

<sup>96</sup> NER, cl. 6A.8.1(b)(2)(iii).

<sup>97</sup> NER, cl. 6A.8.1(b)(4).

<sup>98</sup> Transgrid, *Response to information request 021*, 20 May 2022.

Given the significant uncertainty about the timing and requirements for the proposed contingent projects, at this stage we have not undertaken a detailed assessment of the costs and technical scope of the projects. As part of our assessment, we reviewed whether each proposed contingent project is reasonably likely to be required in the 2023–28 period based on the materiality and plausibility of the trigger conditions. This gives us a high-level view of whether the project is reasonably required to be undertaken in the regulatory control period in order to achieve any of the capex objectives and reflect the capex criteria.

We also considered whether the proposed trigger events for each project are appropriate, including that the trigger event is required:

- to be reasonably specific and capable of objective verification<sup>99</sup>
- to be a condition or event which, if it occurs, makes the project reasonably necessary in order to achieve any of the capex objectives<sup>100</sup>
- to be a condition or event that generates increased costs or categories of costs that relate to a specific location rather than a condition or event that affects the transmission network as a whole<sup>101</sup>
- to be described in such terms that it is all that is required for the revenue determination to be amended<sup>102</sup>
- to be a condition or event, the occurrence of which is probable during the 2023–28 period but the inclusion of capex in relation to it (in the total forecast capex) is not appropriate because either:
  - it is not sufficiently certain that the event or condition will occur during the regulatory control period or if it may occur after that period or not at all, or
  - assuming it meets the materiality threshold, the costs associated with the event or condition are not sufficiently certain.<sup>103</sup>

#### **B.1.4 Reasons for position**

We have focussed our assessment on Transgrid’s proposed triggers. This is because if we consider a trigger is appropriate, we would typically be satisfied that it would be reasonably required to meet the capex objectives.

We note Transgrid’s initial proposal provided limited supporting information to support its contingent project proposal. There was no information on how Transgrid derived its cost estimates. Further, there was no explanation of how the triggers related to the contingent project itself.

---

<sup>99</sup> NER, cl. 6A.8.1(c)(1).

<sup>100</sup> NER, cl. 6A.8.1(c)(2).

<sup>101</sup> NER, cl. 6A.8.1(c)(3).

<sup>102</sup> NER, cl. 6A.8.1(c)(4).

<sup>103</sup> NER, cl. 6A.8.1(c)(5).

We have reviewed the trigger events for each of the eight proposed standard contingent projects. We identified three main issues for why we did not consider seven of the proposed contingent projects to be acceptable:

- the condition or event in the trigger was unlikely to occur during the 2023–28 period, therefore we considered the occurrence of such a trigger as not probable, such that the proposed trigger was not appropriate<sup>104</sup>
- there was no clear link between the trigger occurring and Transgrid needing to undertake additional capex, such that the proposed trigger was not appropriate<sup>105</sup>
- in some cases the trigger did not relate to a specific location but rather a wider area where some assets may or may not require augmentation.<sup>106</sup>

We note Transgrid identified that several of its contingent projects were originally classified as augex but due to the uncertainty were classified as contingent projects.<sup>107</sup> Although we consider identifying significant projects that have a low probability of occurring does increase the transparency to stakeholders of potential investments Transgrid may have to undertake in the 2023–28 period, we do not consider proposing these projects as contingent projects reflects the intent of the contingent project framework.

Contingent projects should reflect projects that Transgrid can reasonably expect would occur in the 2023–28 period, with uncertainty related to the scope, timing and costs of the contingent project. For some of Transgrid’s proposed contingent projects, general demand uncertainty appeared to be driver for these projects. We consider that general demand uncertainty is an insufficient reason for the inclusion of a contingent project.

We consider managing risks, such as demand uncertainty, is part of good industry practice. NSPs are expected to prudently anticipate and efficiently manage these risks like demand changes themselves. Based on the evidence before us, we do not consider that for the majority of its proposed contingent projects, Transgrid’s event or conditions associated with its contingent projects were probable such that it would result in Transgrid experiencing a material increase in costs. Further, we do not consider contingent projects reliant on multiple sources of potential, but low probability, load increases through a wide geographic area reflects a contingent project.

We discuss our consideration of each contingent project below.

#### **B.1.4.1 Contingent projects to meet inertia and system strength requirements**

Transgrid proposed two similar contingent projects related to system inertia and system strength.

---

<sup>104</sup> NER, cl. 6A.8.1 (c)(5)

<sup>105</sup> NER, cl. 6A.8.1 (c)(2)

<sup>106</sup> NER, cl. 6A.8.1 (c)(3)

<sup>107</sup> Transgrid, *Response to information request 022*, May 2022, p. 3.

Transgrid considers the closure of synchronous generation may lead to an inertia shortfall and that this project would be triggered when required by the Australian Energy Market Operator (AEMO).<sup>108</sup>

In response to our information request, Transgrid noted that given the rate of change in the energy system, it considered a project to address an inertia shortfall is reasonably required to be undertaken in the 2023–28 period. Transgrid also considered for transparency reasons, it has included this as a contingent project rather than a cost pass through.<sup>109</sup>

We have identified the following issues with these contingent projects:

- Transgrid did not provide information on how it derived its cost estimate of \$105 million in the 2023–28 period and \$263 million as the total cost of the project for system inertia. Similarly for system strength, it was unclear how Transgrid derived its cost estimates.
- Transgrid did not explain why the trigger event is probable in the 2023–28 period for either of these two projects.<sup>110</sup>
- The trigger is reliant on a notice by AEMO, however, there is no information on the location, what is required and alternative options to address the inertia shortfall and system strength issues. The trigger relates more to a condition or event that affects Transgrid rather than a specific location.<sup>111</sup> Further, there is no threshold for the shortfall in which Transgrid would be required to undertake capex.
- An inertia shortfall event and system strength event are defined cost pass through events in the NER.<sup>112</sup> Although this does not preclude it from being assessed as a contingent project, and the identification of such a project does increase transparency to stakeholders, we consider the significant uncertainty on the probability and costs of such an event does not necessarily provide greater clarity about potential bill impacts.

#### **B.1.4.2 Supply to Bathurst, Orange and Parkes Stage 2**

Transgrid expects electricity demand to increase substantially in central west NSW around Bathurst, Orange and Parkes, mainly due to expected expansion of mining load.<sup>113</sup>

Transgrid's proposed trigger relates to one or more of total demand in Orange and Parkes areas to exceed 355 MW and 155 MW, respectively.

Transgrid also noted that it is undertaking a RIT-T for Stage 1 of this project. However, if additional planned loads commit, then there will be further investment to ensure voltage compliance as part of Stage 2.

In response to our information request, Transgrid noted that this project aims to meet the underlying load growth in the Parkes area and that this project would be required by 2027–28

---

<sup>108</sup> Transgrid, *2023–28 Revenue Proposal – Augex overview paper*, January 2022, p. 49.

<sup>109</sup> Transgrid, *Response to information request 21*, May 2022, p. 1.

<sup>110</sup> NER, cl. 6A.8.1 (c)(5)

<sup>111</sup> NER, cl. 6A.8.1 (c)(3)

<sup>112</sup> NER, cl. 6A.7.3 (a1)(6) and cl. 6A.7.3 (a1)(7)

<sup>113</sup> Transgrid, *2023–28 Revenue Proposal – Augex overview paper*, January 2022, p. 51.

if Transgrid’s high demand scenario eventuates and by 2031–32 under its central scenario.<sup>114</sup>

We consider that Transgrid has not provided sufficient evidence to support the probability of high demand scenario and why this scenario would result in an event which would be probable.<sup>115</sup> Rather this is an outcome that is reflective of multiple independent events where, although unlikely, would be possible of occurring together in the 2023–28 period.

For the three reasons identified in section B.1.4, we are not satisfied that the triggers related to this project are appropriate.

We also note that Stage 1 of this project has been significantly deferred to beyond the 2023–28 period. We therefore do not consider it probable that Stage 2 will be required in the 2023–28 period to the extent that Stage 1 has been partially deferred.

#### **B.1.4.3 Improve capacity of Southern NSW lines for renewables**

The driver of this project is an opportunity to increase capacity of the Southern NSW lines to accommodate future renewable generators. Transgrid has received applications for 1,900 MW for renewable generation projects in Southern NSW together with committed Snowy 2.0 pumped hydro development of 2,000 MW.

Transgrid expects increasing the capacity of the Southern NSW lines will bring a range of market benefits.

We are not satisfied that the proposed trigger of new generation of more than 1,000 MW is committed in Southern and/or Southwestern NSW is appropriate. This is because we are not satisfied that the trigger is such that if the trigger event were to occur, the investment would be reasonably necessary.<sup>116</sup> Additionally, it is not location specific as it covers a large geographic area with numerous network assets.<sup>117</sup>

Further, Appendix 3 of the 2022 ISP does not indicate that there will be significant growth in generation in the south and southwest areas in the 2023–28 period.<sup>118</sup>

We also note that Humelink and Project EnergyConnect are providing significant increases in capacity in these areas.

In response to our information request, Transgrid detailed potential new renewable connections.<sup>119</sup> We consider that several of these projects would be required to go ahead for the trigger capacity to be exceeded. However, the projects are spread over a large geographic area with many feeders and elements in the network. The connections of possible new generation and Transgrid requiring network augmentation is very dependent on the location rather than cumulative generation capacity.

---

<sup>114</sup> Transgrid, *Response to information request 021*, May 2022, pp. 3-4.

<sup>115</sup> NER, cl. 6A.8.1 (c)(5)

<sup>116</sup> NER, cl. 6A.8.1 (c)(2)

<sup>117</sup> NER, cl. 6A.8.1 (c)(3)

<sup>118</sup> AEMO, *2022 ISP Appendix 3 - Renewable Energy Zones*, June 2022, pp. 31, 35–36.

<sup>119</sup> Transgrid, *Response to information request 021*, May 2022, p. 5.



We consider this contingent project reflects the outcome from a combination of multiple generation projects that could individually be a contingent project. This results in a trigger that is not location specific and is not a condition that would necessarily increase Transgrid's costs.<sup>120</sup>

#### **B.1.4.4 Supply to ACT network capability**

Transgrid identified that if the ACT Utilities Regulator makes a change to the maximum demand requirements to restore supply to Canberra for special contingency events, a major transmission upgrade would be required.

In response to our question about the likelihood of the ACT Utilities Regulator changing its threshold, Transgrid noted it expects a change because forecast 2022 maximum demand exceeds the current threshold.<sup>121</sup> However, Transgrid does not appear to be engaged with the ACT Government on changes to the threshold and Transgrid did not provide a view on the timing of the threshold being exceeded.

We consider there is insufficient evidence to indicate that a change by the ACT Utilities Regulator is probable.<sup>122</sup>

We have also assessed the 890 MW threshold and consider this trigger is not probable of occurring in the 2023–28 period. Forecast loads for ACT in 2030 is a maximum demand of 728 MW.<sup>123</sup> Transgrid has not provided information on the basis of the 890 MW threshold and why it is probable for the trigger event to occur in 2023–28 period.

#### **B.1.4.5 Moree Special Activation Precinct**

Transgrid identified that initial joint planning discussions with Essential Energy have identified a future requirement to augment the transmission network in the Moree area. Transgrid considers the NSW Government is preparing a plan to develop the Moree area to provide a new business hub as the main driver of demand.<sup>124</sup>

We consider the driver of this project appears to be organic load growth. Transgrid also noted that there is sufficient network capacity to manage the loads in the 2023–28 period.<sup>125</sup> The trigger relates to total demand exceeding 50 MW. Our analysis of demand information provided by Transgrid suggests the probability of the trigger occurring in 2023–28 to be around 10%. Accordingly, we do not consider this to be an event or condition, the occurrence of which is probable during the 2023–28 period.<sup>126</sup> Although we recognise that demand forecasting is inherently uncertain, we do not consider this should serve as the sole basis for a contingent project.

---

<sup>120</sup> NER, cl. 6A.8.1 (c)(3) and cl. 6A.8.1 (c)(5)

<sup>121</sup> Transgrid, *Response to information request 021*, May 2022, p. 10

<sup>122</sup> NER, cl. 6A.8.1 (c)(5)

<sup>123</sup> Transgrid, *2023–28 Revenue Proposal – Augex overview paper*, January 2022, p. 50.

<sup>124</sup> Transgrid, *2023–28 Revenue Proposal – Augex overview paper*, January 2022, p. 51.

<sup>125</sup> Transgrid, *Response to information request 021*, May 2022, p. 12.

<sup>126</sup> NER, cl. 6A.8.1 (c)(5)

#### **B.1.4.6 Manage increased fault levels in Southern NSW**

We have accepted the contingent project to 'Manage increased fault levels in Southern NSW'.<sup>127</sup> Transgrid identified that various major ISP projects, such as PEC, HumeLink and Snowy 2.0, could increase fault level ratings. Transgrid also provided updated triggers for this contingent project.<sup>128</sup>

Following discussions with Transgrid, we are satisfied that the following projects would, together, contribute to increased fault levels:

- Retirement of Liddell Power Station
- Project EnergyConnect is a committed and actionable ISP project
- Snowy 2.0 being a committed project
- Humelink and VNI West being Actionable ISP projects.

We note that Transgrid's initial proposal trigger largely related to HumeLink. Transgrid has subsequently updated its trigger to recognise the interdependencies of various projects going ahead. This includes the addition of a trigger related to Snowy 2.0, a RIT-T related to fault levels and a commitment from the Transgrid Board to proceed with HumeLink and the Manage increased fault levels projects.<sup>129</sup>

We are satisfied that the updated triggers are appropriate.

#### **B.1.4.7 Strategic easement acquisition for supply to Sydney from the South**

Transgrid considered future growth in Western Sydney would require Transgrid to make strategic land acquisitions to support a future 500 kV transmission corridor.

Transgrid's proposed triggers related to the inclusion of Southern 500 kV Ring (supply to Sydney, Newcastle and Wollongong) in an optimal development path in the 2022 ISP and the rezoning of the relevant land.

We are not satisfied that the proposed trigger is a condition or event, which, if it occurs, makes the undertaking of the proposed contingent project reasonably necessary in order to achieve any of the capex requirements.

We note the 2022 ISP identifies two options to address its Sydney Ring project to reinforce supply to Sydney, Newcastle and Wollongong load centres. The first is supply from the south-west of Sydney that would utilise the land referred to in the trigger with an estimated cost of \$2.25 billion. However, the other option is an upgrade in the north near Newcastle which does not involve this land with an expected cost of \$0.9 billion.<sup>130</sup> Noting that it appears both options are considered viable by AEMO, we are not satisfied that if the conditions of the trigger were met, this would constitute a condition or event that makes the undertaking of the proposed capex reasonably necessary in order to achieve the capex

---

<sup>127</sup> NER, cl. 6A.8.1 (b)

<sup>128</sup> Transgrid, *Response to information request 034*, July 2022, p. 4.

<sup>129</sup> Transgrid, *Response to information request 034*, July 2022, p. 4.

<sup>130</sup> AEMO, *2022 Integrated System plan*, June 2022, p. 67.

objectives.<sup>131</sup> We consider Transgrid would not necessarily be required to make strategic property acquisitions as there are other viable options that are at similar or lower cost.

---

<sup>131</sup> NER, cl. 6A.8.1 (c)(2)

## C Projects undergoing a RIT-T

### C.1 AER Position

Our draft decision does not include the four major projects undergoing a RIT-T as contingent projects or forming part of the total capex forecast. This is because these projects do not satisfy the requirements of a contingent project (for instance, trigger events were not proposed) and Transgrid did not include an ex-ante forecast for these projects in its regulatory proposal.<sup>132</sup>

Transgrid has indicated it is likely to submit the network costs for these projects when it provides its revised proposal. Transgrid's position to not include a material component of its forecast in its initial proposal, but to instead provide an indicative cost with the intention of submitting the forecast in its revised proposal, is not typical of regulatory proposals. While we appreciate that circumstances can change that lead to a change in the indicative cost associated with these projects, this is the case with forecast uncertainty more generally. Our regulatory process recognises this, with regulated businesses being able to submit updated forecasts in the revised proposal stage.

Our expectation is that a regulated business includes the best forecast it considers is required to satisfy the capex objectives in its initial regulatory proposal. The proposal should be as complete as possible at the initial proposal stage to provide all stakeholders with the necessary information and sufficient time to give a meaningful opportunity to assess the regulated business' proposal. The incomplete nature of Transgrid's initial proposal was raised by consumer groups in response to our Issues Paper noting that the uncertainty with the forecast reduces the ability to meaningfully engage with the entire proposal.

In the event that Transgrid submits that these projects should be included in its revised proposal, we encourage Transgrid to engage with all of its customers on these projects and to address the issues raised by EMCa in its review of these projects. In this section, we provide stakeholders with information about these projects to assist in their consideration, including EMCa's findings on these projects.

### C.2 Transgrid's proposal to include indicative costs for these projects

Transgrid proposed indicative capex of \$742 million in the 2023–28 for four major projects as contingent projects, though they were not accompanied with trigger events as required for contingent projects under the NER. The latest estimates for these four projects total \$275 million in 2023–28.<sup>133</sup>

Transgrid considered the uncertainty of whether the solutions would be network, non-network or a combination, and what the likely costs would be, made these suitable for including as

---

<sup>132</sup> These projects do not meet the requirements of a contingent project because no trigger events were provided. NER cl. 6A.8.1(b)(4).

<sup>133</sup> Transgrid, *Response to information request 018 – update*, August 2022.

contingent projects rather than as part of the ex-ante forecast. The four proposed projects and the revised costs from the conclusion of the RIT-T processes are:

- Managing risk on Line 86 (\$331 million, updated to \$12 million)
- Improving stability in southwestern NSW (\$127 million, updated to \$169 million)
- Supply to North West Slopes (\$166 million, updated to \$50 million)
- Stage 1 for supply to Bathurst, Orange and Parkes (\$117 million, updated to \$44 million).

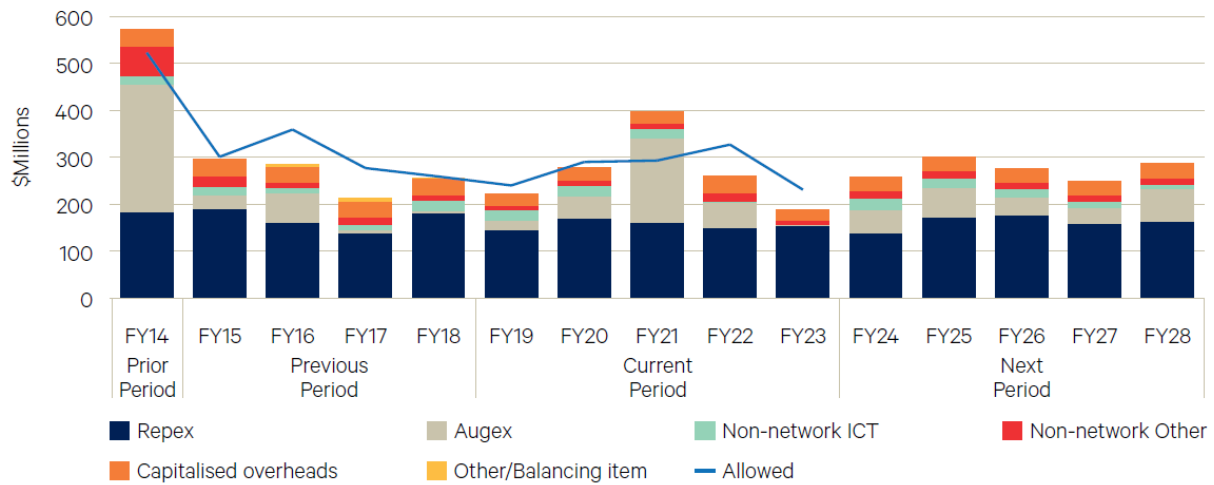
In February 2022, we raised concerns about the exclusion of these projects from the capex forecast. Transgrid responded with a letter providing further information regarding these RIT-Ts including indicative cost ranges, further detail about the projects, and the likely bill impact if these projects were incurred.<sup>134</sup> In particular, Transgrid:

- provided the indicative cost range is \$565 million to \$2,075 million, with \$742 million the most likely cost estimate
- indicated the inclusion of \$742 million would result in a 2023–28 capex forecast that is \$765 million (or 57%) higher than its estimated 2018–23 capex, rather than the capex forecast presented in the proposal, which was presented as \$23 million (or 1.7%) higher than 2018–23
- indicated the expected change in the transmission bill impact in 2023–28 compared to 2018–23:
  - for residential customers, the bill increased by \$1.99 from -\$19.55 to -\$17.56
  - for small business customers, the bill increased by \$7.44 from -\$73.05 to -\$65.61.
- presented the difference in historical and forecast capex between the initial proposal and the capex forecast if it included the \$742 million, as shown below in Figure C.1 and Figure C.2 noting the increase in the augex bars from FY24 to FY28.

---

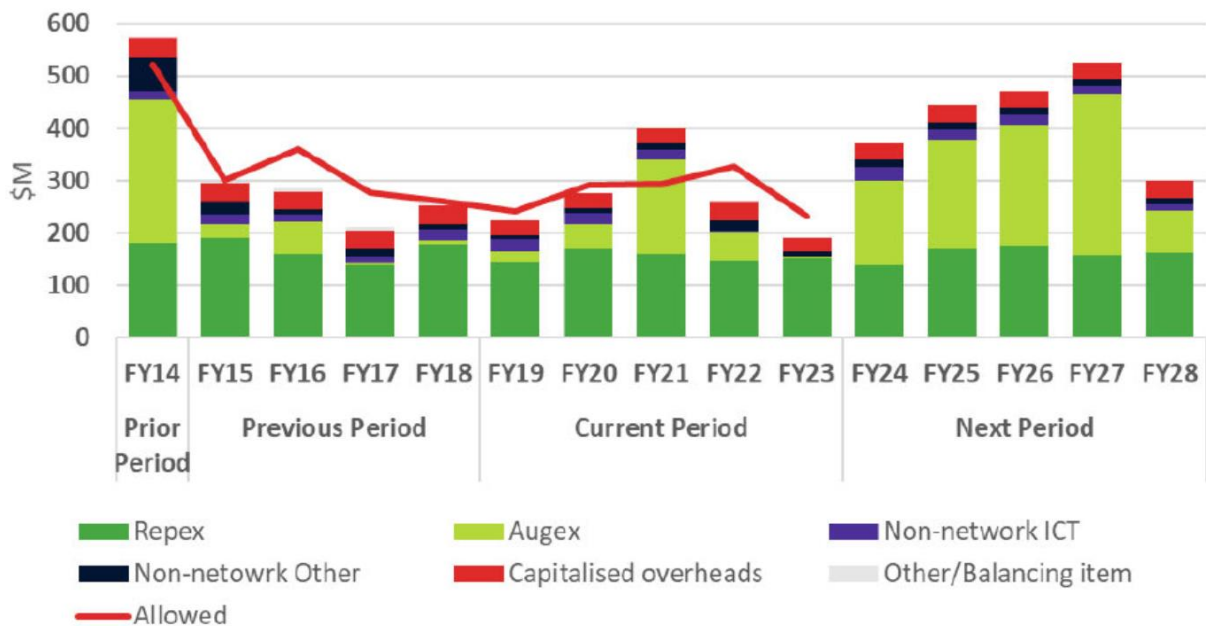
<sup>134</sup> Transgrid, *Letter to the AER providing further details on major projects*, 10 February 2022, [www.aer.gov.au/networks-pipelines/determinations-access-arrangements/transgrid-determination-2023-28/proposal](https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/transgrid-determination-2023-28/proposal)

**Figure C.1 Transgrid’s historical and forecast capex trend provided in the initial proposal, excluding major projects undergoing a RIT-T (\$million, 2022–23)**



Source: Transgrid 2023–28 revenue proposal Figure 8-2, p. 95.

**Figure C.2 Transgrid’s historical and forecast capex trend, including major projects undergoing a RIT-T (\$million, 2022–23)**



Source: Transgrid clarification letter Figure 1.

In June/July 2022, Transgrid completed the PACR stages of the RIT-T process for each of these projects and has indicated it is likely to submit that the capex for any network solutions be included in its revised proposal.

### C.3 Considerations for assessing these projects

In this section, we discuss stakeholder submissions, a notice of dispute in the RIT-T process, and EMCA’s findings in relation to three out of four projects.

### C.3.1 CCP25 and the EUAA raised concern with the uncertainty of Transgrid’s capex forecast

In response to our Issues Paper and Transgrid’s initial proposal, CCP25 raised concern with the high level of uncertainty in the proposal capital program associated with the contingent projects being excluded from the capex forecast. It acknowledged the challenges associated with the uncertainty in forecasting but indicated its preference for Transgrid to “present a ‘most likely forecast’ rather than hold all uncertain projects to one side from its engagement and Proposal” and highlighted that “customers can only meaningfully view the overall work of Transgrid as a whole.”<sup>135</sup>

We agree that given Transgrid signalled the likely inclusion in the revised proposal of at least the major projects undergoing a RIT-T, it would have been appropriate for Transgrid to include best estimates so stakeholders could engage in the likely capex forecast in its entirety. This would also encourage Transgrid to engage on prioritising its capital program, focusing on customers’ key priority of affordability.

In its submission, EUAA stated that:<sup>136</sup>

“...both capex and opex that was originally included in the revenue proposal does not accurately reflect what many believed will be the future likely cost to consumers, given the significant number of contingent projects likely to be incorporated over the 2023–2028 period. Therefore, the headline “savings” outlined by Transgrid must be seen as somewhat unreliable given they exclude what can reasonably be considered as certain future increases [in] both capex and opex associated with contingent projects.”

EUAA was encouraged that Transgrid went some way to be transparent in showing the potential bill impact if the proposed contingents projects (including the RIT-Ts) proceeded in 2023–28.

### C.3.2 PIAC issued a notice of dispute on RIT-Ts

Public Interest Advocacy Centre (PIAC) issued a notice of dispute under the RIT-T process.<sup>137</sup> We are considering the issues raised in this dispute and we understand Transgrid is also addressing these through its TAC, which PIAC is part of. We encourage Transgrid to include its response to these issues in its revised proposal for transparency and completeness if resolved prior to submission. In summary, the issues raised by PIAC relate to:<sup>138</sup>

- concerns with demand forecasts predicated on regional growth plans that “are largely aspirational and include targets that are rarely met within intended timeframes, if at all.”

---

<sup>135</sup> CCP25, *Advice to the AER on Transgrid’s 2023–28 Revenue Proposal*, May 2022, pp. 1, 11, 16.

<sup>136</sup> EUAA, *Submission to Transgrid’s 2023–28 Revenue Determination*, May 2022, p. 4.

<sup>137</sup> PIAC, *Dispute Notice – North West Slopes and Bathurst, Orange, Parkes RIT-Ts*, 1 August 2022. NER cl. 5.16B. [www.aer.gov.au/communication/aer-receives-notification-of-rit-t-dispute-from-piac](http://www.aer.gov.au/communication/aer-receives-notification-of-rit-t-dispute-from-piac).

<sup>138</sup> PIAC, *Dispute Notice – North West Slopes and Bathurst, Orange, Parkes RIT-Ts*, 1 August 2022.



- consumers not being able to properly review demand forecasts that are treated as commercial in confidence, which are a key driver of the expenditure
- the underestimation of network capital costs in the central scenario, given evidence that capital costs typically exceed base estimates
- the discount rates applied in the high economic benefits scenario are implausibly low to be provided with a weighting of 18%
- the application of the value of customer reliability does not appear to align with AER values and the adjustments have not been clearly explained/justified
- concerns with the weightings applied to scenarios that may be incorrect or implausible.

PIAC is concerned that the use of these incorrect or implausible assumptions, and the unreasonable weighting of the scenarios, may have materially influenced the timing of investment, the ranking of the credible options, and basis for any investment.

### **C.3.3 EMCa’s review of the projects undergoing a RIT-T**

In anticipation of Transgrid including the projects undergoing a RIT-T in its revised proposal, we engaged EMCa to review three out of four of the proposed projects, aside from the project Supply for Bathurst, Orange and Parkes. For the latter project, Transgrid indicated a significant reduction in project costs in 2023–28 due to a short-term non-network solution to defer further network investment beyond 2023–28.

For the three projects it reviewed, in summary, EMCa came to the following conclusions:

- Managing risk on Line 86 — Transgrid has demonstrated the prudence of the descope project, but the proposed estimate of \$12 million for the pole replacements is likely conservative (over-stated).
- Improving stability in southwestern NSW — EMCa does not consider Transgrid has justified the proposed network costs of this project because the assumed benefits of the network investment are likely overstated and the extension of network support arrangements to relieve the constraints has not been sufficiently examined.
- Supply to North West Slopes — Transgrid has demonstrated the need and costs for the network support and installation of a third transformer (\$8 million) but has not justified the remaining transmission line works due to uncertainty of dominant spot loads.

We discuss each of the projects below including an overview of the project drivers, change in expected network costs as projects have progressed through the RIT-T stages, and EMCa’s advice.

#### **C.3.3.1 Managing risk on Line 86**

Transgrid originally classified this project as driven by 'economic benefits' because of the opportunity to augment the 330 kV transmission line transfer capacity between Armidale and Tamworth while replacing composite wood poles with asset condition issues. Transgrid notes that the wholesale market benefits component of this project is no longer material relative to the costs and therefore the augmentation component of this project is no longer NPV

positive.<sup>139</sup> Transgrid indicates the preferred option is now to target the replacement of the 31 (8%) highest risk poles, rather than replacing all poles on the line, and the estimated capex is \$12 million.<sup>140</sup> We understand Transgrid will likely resubmit this de-scoped project for inclusion as part of its repex forecast in its revised proposal. Transgrid indicated that a second tranche of pole replacements is not expected to be required until after 2040 and will be considered closer to that time.<sup>141</sup>

EMCa considers the preferred de-scoped option of a targeted pole replacement is prudent.<sup>142</sup> However, EMCa considers the costs are likely overstated because of a lack of accounting for economies of scale and including scaling factors in Transgrid's analysis that were not adequately justified and may be conservative and higher than an efficient level.<sup>143</sup> EMCa considers the “costs estimate will likely reduce as the project planning and approval is progressed to be more representative of an efficient level.”<sup>144</sup>

EMCa also highlighted two inconsistencies in Transgrid's application of our Asset Replacement Industry Note that lead to overstating the benefits in the NPV analysis. Firstly, EMCa notes that Transgrid incorrectly applies disproportionality factors to non-safety related environmental risk consequences including bushfire risk, property damage and widespread environment damage (excluding bushfire). The application of disproportionality factors for risks and consequences other than health and safety is inconsistent with the intent of the Asset Replacement Industry Note and AS5577.<sup>145</sup> Secondly, Transgrid has included reputational risk in its risk-cost calculation, which is not aligned with the Asset Replacement Industry Note.

### C.3.3.2 Improving stability in Southwestern NSW

This project intends to strengthen the transmission network to provide market benefits by improving stability, reducing constraints for existing generators and enabling increased renewable generation to connect to the transmission network in south-western NSW. There has been substantial change from the Project Assessment Draft Report (PADR) stage (September 2021) to the PACR stage (June 2022), with the now preferred solution combining three-year network support solution using a battery in 2023–26 followed by a new 330 kV transmission line from Darlington Point to Dinawan. Transgrid's proposed total capex in the PACR has increased from \$175 million to \$188 million, with the 2023–28 portion increasing from \$127 million to \$169 million. The increased cost in 2023–28 is partly due to a change in the likely project commissioning timing.

---

<sup>139</sup> Transgrid, *Managing the risk on Line 86 – RIT-T Project assessment conclusions report*, July 2022, p. 19.

<sup>140</sup> Transgrid, *Response to information request 018 – update*, August 2022.

<sup>141</sup> Transgrid, *Managing the risk on Line 86 - RIT-T Project assessment conclusions report*, July 2022, p. 16.

<sup>142</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: managing risk on Line 86*, August 2022, p. 26.

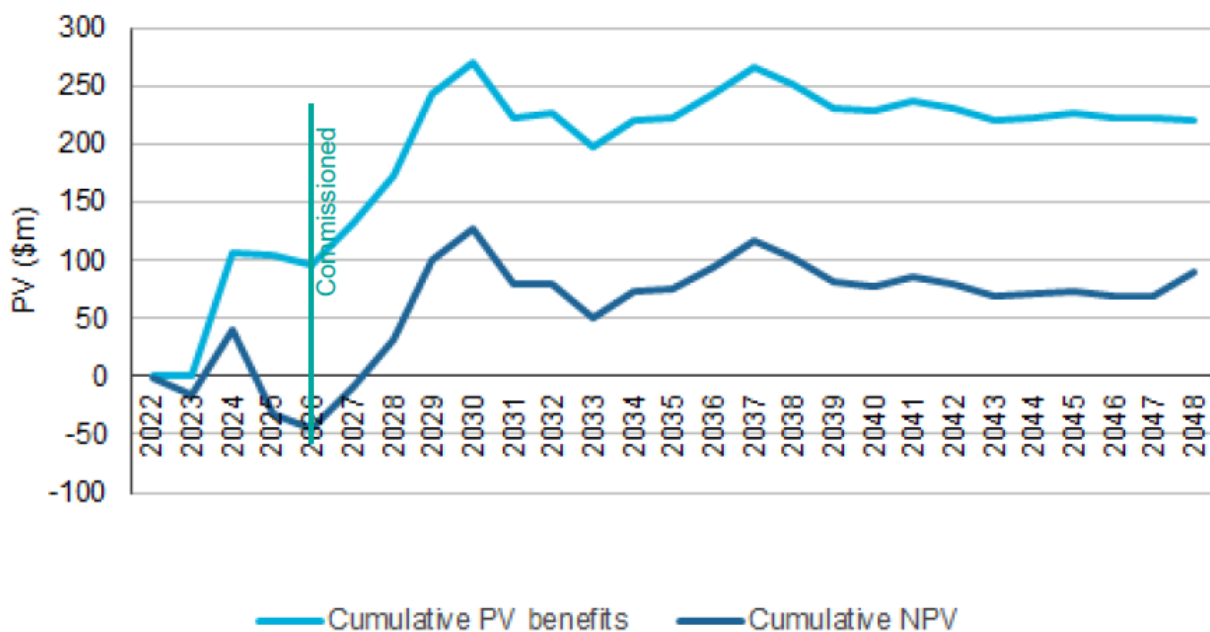
<sup>143</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: managing risk on Line 86*, August 2022, p. 19.

<sup>144</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: managing risk on Line 86*, August 2022, p. 7.

<sup>145</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: managing risk on Line 86*, August 2022, p. 24.

EMCa considers Transgrid has established the need to consider options to relieve the constraint, but the justification of the proposed solution depends on whether there is likely to be a positive net market benefit.<sup>146</sup> EMCa analysed the cumulative present value and NPV of the preferred solution over the modelling period to 2048. Figure C.3 highlights that the benefits largely accrue through to 2030, before turning negative and then stabilising to near zero. The implications EMCa highlighted with this profile is that there significant benefits available at low cost from extending the battery energy storage system (BESS) network support arrangement beyond the initially assumed three years, and the incremental benefits of the transmission line investment Transgrid is proposing may be significantly overstated.<sup>147</sup> This also leads EMCa to conclude that there is an inherent mismatch in Transgrid’s proposal to construct assets with a 40–50-year life when the benefits are predominantly from 2026–30.<sup>148</sup>

**Figure C.3 EMCa’s analysis of the preferred solution cumulative present value and NPV using Transgrid’s assumptions**



Source: EMCa analysis

EMCa considered four sensitivities to test the net market benefit presented by Transgrid.<sup>149</sup> The outcomes of this sensitivity analysis suggest a negative NPV as shown in Figure C.4 below. EMCa recognises the tested sensitivities are not all independent factors but has used this test to indicate that on the balance of probabilities it is not reasonable for Transgrid to conclude that the proposed transmission line solution is NPV positive.

<sup>146</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: improving stability in southwestern NSW*, August 2022, p. 10.

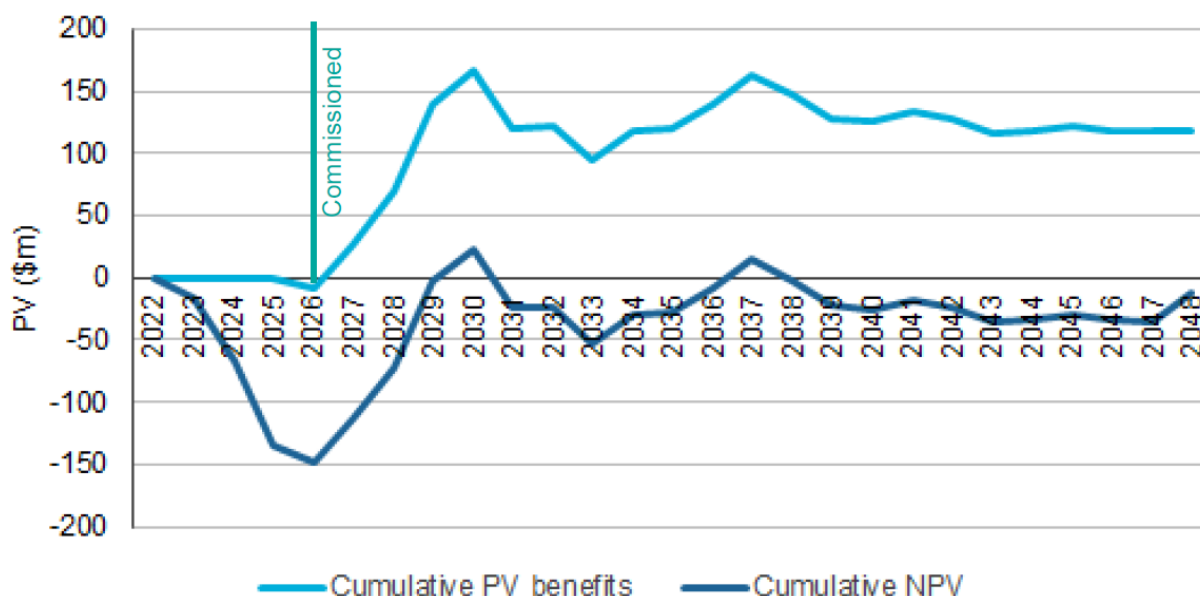
<sup>147</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: improving stability in southwestern NSW*, August 2022, p. 21.

<sup>148</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: improving stability in southwestern NSW*, August 2022, pp. 20, 26

<sup>149</sup> EMCa’s analysis including testing the inclusion of the SPS in the NPV, excluding the terminal value of the transmission line, extending the SPS and BESS network support, and assuming benefits commence from 2026 when commissioning is assumed.

A key factor considered by EMCa relates to network support arrangements to relieve constraints in the short-term. EMCa considers the option of extending the network support arrangements (special protection scheme (SPS), and BESS) to cover the years when the majority of the benefit is assumed to occur, has been too readily dismissed by Transgrid. Transgrid does not consider a longer-term SPS is credible as it does not have a proponent and does not consider extending the BESS network support service beyond the assumed three years due to impracticalities of reconfiguring the BESS controls to continue providing identified benefits.<sup>150</sup> EMCa considers the lack of rigorous examination of the feasibility of extending the SPS and BESS beyond the assumed timeframes leads it to conclude that the construction of a new transmission line is not justified.<sup>151</sup>

**Figure C.4 EMCa’s analysis of the preferred solution cumulative present value and NPV using four modified assumptions**



Source: EMCa analysis

Overall, EMCa found the proposed network support costs are appropriate but Transgrid has not adequately demonstrated the value of proceeding with the proposed 330 kV line build and associated works.<sup>152</sup> EMCa’s advice has factored the future landscape with the Energy Security Board’s exploration of improved congestion management in the NEM and the NSW REZs and notes that the proposed investment is not in an existing REZ.<sup>153</sup>

### C.3.3.3 Supply to North-West Slopes

This project addresses the likely exceedance of NER voltage limits and the Independent Pricing and Regulatory Tribunal (IPART) thermal limits due to increased spot load from the

<sup>150</sup> Transgrid, *Improving stability in south-western NSW - RIT-T Project assessment conclusions report*, June 2022, pp. 21, 34.

<sup>151</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: improving stability in southwestern NSW*, August 2022, p. 15.

<sup>152</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: improving stability in southwestern NSW*, July 2022, p. 26.

<sup>153</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: improving stability in southwestern NSW*, August 2022, p. 24

connection of new industrial loads and underlying demand growth. The preferred solution is a combination of a near-term solution comprising a non-network solution (battery network support services) and an additional transformer to delay or avoid transmission line rebuilds and upgrades, which Transgrid states are likely required by 2030. Through the progress of the RIT-T stages, the total estimated capex is \$138 million, with \$50 million expected in 2023–28 and the remainder beyond 2028 for transmission line works, with commissioning likely required by 2030.<sup>154</sup>

EMCa’s review found that Transgrid has demonstrated the need for the proposed transformer in 2025–26 (\$8 million out of a total \$50 million in 2023–28). However, EMCa considers the proposed transmission line works cannot be supported until there is greater certainty around the committed loads.<sup>155</sup> The timing of the transmission line works is highly sensitive to the realisation of load from the Narrabri Gas Project, which is uncertain at this stage.<sup>156, 157</sup> Given this uncertainty, EMCa considers it is prudent to defer consideration of transmission line works—the majority of the costs—until there is greater certainty around the committed loads and other developments in the area.

#### **C.3.3.4 Stage 1 for supply to Bathurst, Orange and Parkes**

This project addresses the potential exceedance of NER voltage stability limits from increased locational demand due to expansions and connections of new mines. At the conclusion of the PADR stage in February 2022, Transgrid advised us that a non-network solution (services from batteries and solar PV) is the preferred solution in the short term, coupled with a network option (additional 132 kV line) in the long-term beyond 2023–28. At that time, Transgrid advised the expected 2023–28 network cost had reduced to \$1.3 million (\$2020–21). Given the substantial decrease in the network costs for this project, EMCa has not reviewed this project.

In August 2022, Transgrid advised the estimated 2023–28 capex at the conclusion of the PACR stage is \$44 million.<sup>158</sup>

We will assess further information provided in relation to these projects if submitted in Transgrid’s revised proposal.

---

<sup>154</sup> Transgrid, *Response to information request 018 – update*, August 2022.

<sup>155</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: Supply to North West Slopes*, August 2022, p. ix.

<sup>156</sup> EMCa, *Transgrid revenue proposal 2023–28 – Review of RIT-T project: Supply to North West Slopes*, August 2022, p. 7.

<sup>157</sup> Transgrid, *Supply to North West Slopes Area – RIT-T Project assessment conclusions report*, June 2022, p. 70.

<sup>158</sup> Transgrid, *Response to information request 018 – update*, August 2022.

## D Ex-post review

We are required to provide a statement on whether the roll forward of the regulatory asset base (RAB) from the previous period contributes to the achievement of the capex incentive objective. The capex incentive objective is to ensure that, where the RAB 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 RAB.<sup>159</sup>

The NER require the review period to be:<sup>160</sup>

- the previous control period (excluding the last two regulatory years of that previous control period); and
- the last two regulatory years of the regulatory control period preceding the previous control period.

For the purposes of this decision, our ex-post assessment for this decision applies to the 2016–17 to 2020–21 regulatory years.

We may exclude capex from being rolled into the RAB in three circumstances:<sup>161</sup>

- when a NSP has overspent, the amount of capex above the allowance that does not reasonably reflect the capital expenditure criteria can be excluded from the RAB
- where there is an inflated related party margin, the inflated portion of the margin can be excluded from the RAB
- where a change to a NSP’s capitalisation policy has led to opex being capitalised, the capitalised opex can be excluded from the RAB.

### D.1 Position

Transgrid incurred \$19 million of capex above its forecast regulatory allowance for the ex-post review period. We are satisfied that Transgrid’s capex in the 2016–17 to 2020–21 regulatory years should be rolled into the RAB.

### D.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 capex:

- Stage one — initial consideration of actual capex performance
- Stage two — detailed assessment of drivers of capex and management and planning tools and practices.

---

<sup>159</sup> NER, cl. 6A.5A(a).

<sup>160</sup> NER, cl. S6A.2.2A(a1).

<sup>161</sup> AER, *Capital Expenditure Incentive Guideline*, November 2013, p. 17.



The first stage considers whether the transmission business 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 transmission business had overspent against its allowance
- the overspend was significant; and
- capex in the period of our ex-post assessment suggests that levels of capex may not be efficient or do not compare favourably to other transmission businesses.

### D.3 AER assessment

We have reviewed Transgrid's capex performance for the 2016–17 to 2020–21 regulatory years. This assessment has considered Transgrid's actual capex relative to the regulatory allowance given the incentive properties of the regulatory regime for a transmission business to minimise costs.

Transgrid incurred total capex above its forecast regulatory allowance for the ex-post review period. Therefore, the overspending requirement for an efficiency review of past capex is satisfied.<sup>162</sup>

Where we consider that the overspending requirement is satisfied, in accordance with our Guideline, we then consider a range of factors to determine whether to move to stage two of the ex post review. These factors are:<sup>163</sup>

- whether the overspend is significant
- what is the transmission business' history of capex
- how the transmission business has performed relative to other businesses.

We have identified that Transgrid has underspent in years 2016–17 to 2019–20 and the overspend occurred in 2020–21 regulatory year. The accumulative under/overspend results in a net overspend for the review period.

We requested further information from Transgrid to better understand the nature of the overspend. Transgrid explained that the overspend of \$19 million is primarily attributable to ISP projects, and it would have underspent \$13.7 million if the ISP projects were excluded. Overall, we are satisfied that Transgrid's capex in the 2016–17 to 2020–21 regulatory years should be rolled into the RAB because:

- we consider the overspent ISP related capex in 2020–21 represents a non-material portion of the overall ISP costs Transgrid expects to incur
- although Transgrid overspent its ISP projects in the ex-post period, this is offset by an expected underspend in the remaining years of the 2018–23 period
- the total cost for PEC, which is the majority of ISP related costs, is forecast to be completed by 2025 which is within its capex forecast. We are satisfied that Transgrid's

---

<sup>162</sup> NER, cl. S6A.2.2A(c).

<sup>163</sup> AER, *Capital Expenditure Incentive Guideline*, November 2013, p. 14; and AER, *Explanatory statement - Capital Expenditure Incentive Guideline*, November 2013, p. 47.



non-ISP related capex is prudent and efficient and we do not consider Transgrid's overspend for ISP related capex is inefficient in the context of its overall ISP spend.

We are therefore satisfied that including this actual capex in the RAB is likely to contribute towards achieving the capex incentive objective.<sup>164</sup>

---

<sup>164</sup> NER, cl. 6A.5A(a).

## Shortened forms

Term	Definition
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ALARP	As low as reasonably practicable
Augex	Augmentation capex
BESS	Battery energy storage system
Capex	Capital expenditure
CCP25	The AER's Consumer Challenge Panel, sub-panel 25
CPI	Consumer price index
DNSP	Distribution network service provider
EMCa	Energy Market Consulting associates
EUAA	Energy Users Association of Australia
EV	Electric vehicle
ICT	Information and communications technology
IPART	Independent Pricing and Regulatory Tribunal
ISP	Integrated System Plan
NER	National Electricity Rules
NEM	National Electricity Market
NEO	National Electricity Objective
NPV	Net present value
NSP	Network service provider
Opex	Operating expenditure
PACR	Project Assessment Conclusions Report
PADR	Project Assessment Draft Report
PEC	Project EnergyConnect
PIAC	Public Interest Advocacy Centre
PV	Photovoltaic
QNI	Queensland-NSW interconnector
RAB	Regulatory asset base
Repex	Replacement capex
REZ	Renewable Energy Zone
RFM	Roll forward model
RIN	Regulatory information notice
RIT-D	Regulatory investment test for distribution
RIT-T	Regulatory investment test for transmission
SaaS	Software-as-a-Service
SPS	Special protection scheme
TAC	Transgrid Advisory Council
Totex	Total expenditure
VNI	Victoria-NSW interconnector

Term	Definition
WACC	Weighted average cost of capital

---