Transgrid

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Summary: Maintaining Safe and Reliable Operation of Murray substation

RIT-T Project Assessment Consultation Report

Region: Southern NSW

Date of issue: 2 April 2024

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Summary

We are applying the Regulatory Investment Test for Transmission (RIT-T) to options for maintaining the safe and reliable operation of Murray Substation. Publication of this Project Assessment Conclusions Report (PACR) represents the final step in the RIT-T process.

Murray 330 kV substation is an ex-Snowy Mountains Hydro-electric Authority site which was commissioned in 1964. Murray substation connects approximately 1500 MW of renewable hydro-electric energy generation, supports four 330kV transmission lines in the southern New South Wales network, and provides electricity flow paths between the Snowy Mountains and Victoria. The 132kV network connects Guthega Hydro (60MW), Jindabyne Pumping Station, Munyang and Cooma Substation.

The substation is expected to continue to play a central role in the safe and reliable operation of the power system throughout and after the transition to a low-carbon electricity future. As a major generation and state interconnector connection point, Murray substation supports transmission through the entire NEM.

The condition of certain 330 kV and 132 kV high voltage and secondary system assets at Murray substation has deteriorated over time, leading to an increasing risk of failure which could result in reliability, safety, environment and financial consequences. The secondary systems assets are also impacted by obsolescence of the equipment, increasing the time to rectify defects and increasing the risk that primary assets at the substation may not be able to reliably operate.

Identified need: ensure the safe and reliable operation of Murray substation

The identified need for this project is to maintain the safe and reliable operation of Murray substation and the broader transmission network in NSW by addressing the risk of failure of certain high voltage and secondary systems at the substation.

Condition assessments performed through our routine maintenance program has shown degradation in the condition of these high voltage and secondary systems assets which will increase their risk of failure. Without intervention, other than ongoing business-as-usual maintenance, the assets are expected to deteriorate further and more rapidly. This will increase the risk of supply interruptions to our customers as well as safety, environmental and financial consequences.

The secondary system assets are also subject to obsolescence of the equipment. This means that the technology is no longer being manufactured or supported and reactive replacement of failed secondary systems component is not sustainable and impacts our ability to meet the requirements of the National Electricity Rules (NER).

We have classified this RIT-T as a ‘market benefits’ driven RIT-T as the economic assessment is not being progressed specifically to meet a mandated reliability standard but by the net benefits that are expected to be generated for end-customers. However, the options considered in this PACR will also ensure compliance with a range of obligations under the NER and jurisdictional instruments (which is not expected to be the case under the base case), including obligations set out in Schedule 5.1 of the NER to provide redundant secondary systems and ensure that the transmission system is adequately protected.

No submissions received in response to the Project Specification Consultation Report

We published a Project Specification Consultation Report (PSCR) on 19 December 2023 and invited written submissions on the material presented within the document. No submissions were received in response to the PSCR.

No material developments since publication of the PSCR

No additional credible options were identified during the consultation period following publication of the PSCR. In addition, no material changes have occurred since the PSCR that have made an impact on the preferred option.

On 21 September 2023, the National Energy Laws were amended to reflect the incorporation of emissions reductions within the National Energy Objectives (NEO).[1] Following this the AEMC made harmonising changes to the National Electricity Rules, prompted by a rule change request from energy ministers, to ensure that network investment and planning frameworks are consistent with the new emissions reduction objective. The AEMC's Final Determination, published on 1 February 2024, included introducing a 'changes in Australia's greenhouse gas emissions' as a new class of market benefit to be considered within the RIT-T process.[2]

Transgrid supports greater consideration of emissions reduction within network planning and investment frameworks. These changes enable network planning and investment frameworks to support the achievement of the Commonwealth Government's net zero targets. Transgrid has set our own science-based targets to cut emissions and decarbonise our business. These include:

- Reducing Scope 1 and 2 emissions by 60 per cent by 2030, compared with a base year of 2021 and net zero by 2040.
- Reducing Scope 3 emissions from Purchased Goods and Services, and Capital Goods by 48 per cent for every million dollars that we spend on these two categories by 2030, compared with a base year of 2021, and net zero by 2050.[3]

For this RIT-T assessment, we do not consider there to be any material change to greenhouse gas emissions under the proposed preferred option, as only one credible option has been identified at this stage of the RIT-T. Therefore, we have not undertaken modelling of this market benefit for this assessment as there would be no change to the outcome of the RIT-T.

Option 1 remains the preferred option at this stage of the RIT-T process.

Credible options considered

We have identified one credible network option that meets the identified need from a technical, commercial, and project delivery perspective.[4] This option is summarised in the below. Three other options were considered (refurbishment of individual assets, asset retirement, and non-network solutions) but not

[1] Statutes Amendment (National Energy Laws) (Emissions Reduction Objectives) Act 2023 (SA)
[2] AEMC, Harmonising the national energy rules with the updated national energy objectives – final determination, 1 February 2024
[3] For more information on Transgrid's planned journey to net zero please see our website here: https://www.transgrid.com.au/about-us/our-approach/our-journey-to-net-zero
[4] As per clause 5.15.2(a) of the NER.

progressed. The reasons for not progressing these options are outlined in Table 3-6. This option is summarised in the below.

Table E-1 Summary of the credible options

Option	Description	Capital costs ($M, 2023-24)	Operating costs ($M/yr, 2023-24)
Option 1	Targeted replacement of high voltage and secondary system assets	21.79	0.009

Table E-2 below presents a list of the specific assets with deteriorating condition to be replaced under Option 1.

Table E-2 List of assets to be replaced under Option 1

Item	Asset
Transformers	No1 Transformer No2 Transformer No1 Auxiliary Transformer No2 Auxiliary Transformer No3 Auxiliary Transformer
Protection relays	No1 & No2 Transformer No1 Protection Relay No1 & No2 Transformer No2 Protection Relay 330kV No1 Section A Bus No1 Protection Relay 330kV No2 Section A Bus No1 Protection Relay 330kV No1 Section B Bus No1 Protection Relay 330kV No2 Section B Bus No1 Protection Relay 97G/1 Geehi Tee No1 Protection Relay 97G/1 Geehi Tee No2 Protection Relay
Switchboard	415V AC Switchboard and Distribution System 11kV Switchboard including Protection and Metering 11kV Switchgear Building with auxiliary services

Non-network options are not expected to be able to assist with this RIT-T

We do not consider non-network options to be commercially and technically feasible to assist with meeting the identified need for this RIT-T. Non-network options will not mitigate the safety and environmental risk and are not able to meet NER obligations to provide redundant secondary systems and ensure that the transmission system is adequately protected.

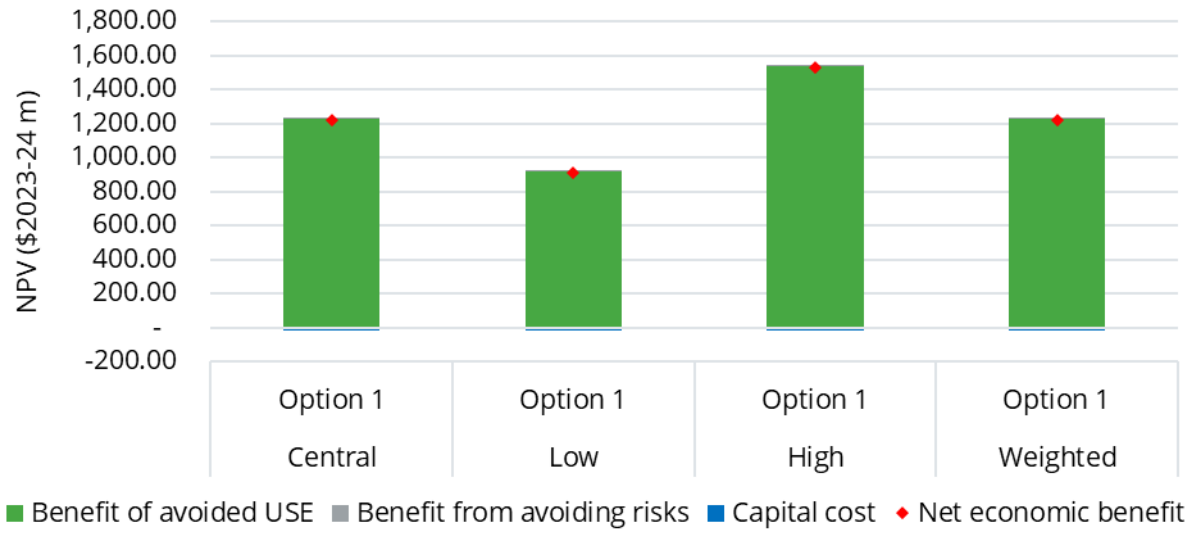
Option 1 delivers the highest net economic benefit and will meet NER requirements

We have assessed that Option 1 is net beneficial under all three reasonable scenarios considered in this PACR. On a weighted basis, where each scenario is weighted equally, Option 1 is expected to deliver net benefits of approximately $1,221.34 million[5]. Option 1 will also enable us to meet a range of obligations

[5] Approximately 99% of the overall net benefit is made up of reliability risk. This is due to both high voltage transformers at the Murray substation having effective ages beyond their technical life. As the assets continue to age the probability of one or both of the transformers failing increases. This increased probability of failure combined with a long load restoration time and

under the NER and jurisdictional instruments (which is not expected to be the case under the base case), including obligations set out in Schedule 5.1 of the NER to provide redundant secondary systems and ensure that the transmission system is adequately protected.

Figure E-1 NPV of net economic benefits ($2023/24 m)



Conclusion

This PACR finds that Option 1 is the preferred option to address the identified need. Option 1 involves targeted replacement of high voltage and secondary system assets at Murray substation that have deteriorating condition and have reached (or will soon reach) the end of their technical lives and for which only limited manufacturer support and spares are available.

The capital cost of this option is approximately $21.79 million (in $2023-24). The work will be undertaken over a five-year period with all works expected to be completed by 2027/28. Routine operating and maintenance costs are estimated at approximately $0.01 million per annum (in $2023-24).

Next steps

This PACR represents the final step of the consultation process in relation to the application of the Regulatory Investment Test for Transmission (RIT-T) process undertaken by Transgrid. It follows a PSCR released in December 2023. No submissions were received in response to the PSCR.

The second step of the RIT-T process, production of a Project Assessment Draft Report (PADR), was not required as Transgrid considers its investment in relation to the preferred option to be exempt from that part of the RIT-T process under NER clause 5.16.4(z1). Production of a PADR is not required due to:

- the estimated capital cost of the preferred option being less than $46 million;
- the PSCR stating:

large industrial loads, means that there is likely to be significant amounts of unserved energy over the assessment period without replacement of the assets.

  - the proposed preferred option, together with the reasons for the proposed preferred option;
  - the RIT-T is exempt from producing a PADR; and
  - the proposed preferred option and any other credible options will not have a material market benefit for the classes of market benefit specified in clause 5.15A.2(b)(4), with the exception of market benefits arising from changes in voluntary and involuntary load shedding;
- no PSCR submissions identifying additional credible options that could deliver a material market benefit; and
- the PACR addressing any issues raised in relation to the proposed preferred option during the PSCR consultation.

Parties wishing to raise a dispute notice with the AER may do so prior to 6 May 2024 (30 days after publication of this PACR). Any dispute notices raised during this period will be addressed by the AER within 40 to 120 days, after which the formal RIT-T process will conclude.
Further details on the RIT-T can be obtained from Transgrid's Regulation team via regulatory.consultation@transgrid.com.au. In the subject field, please reference 'Murray substation renewal PACR'.