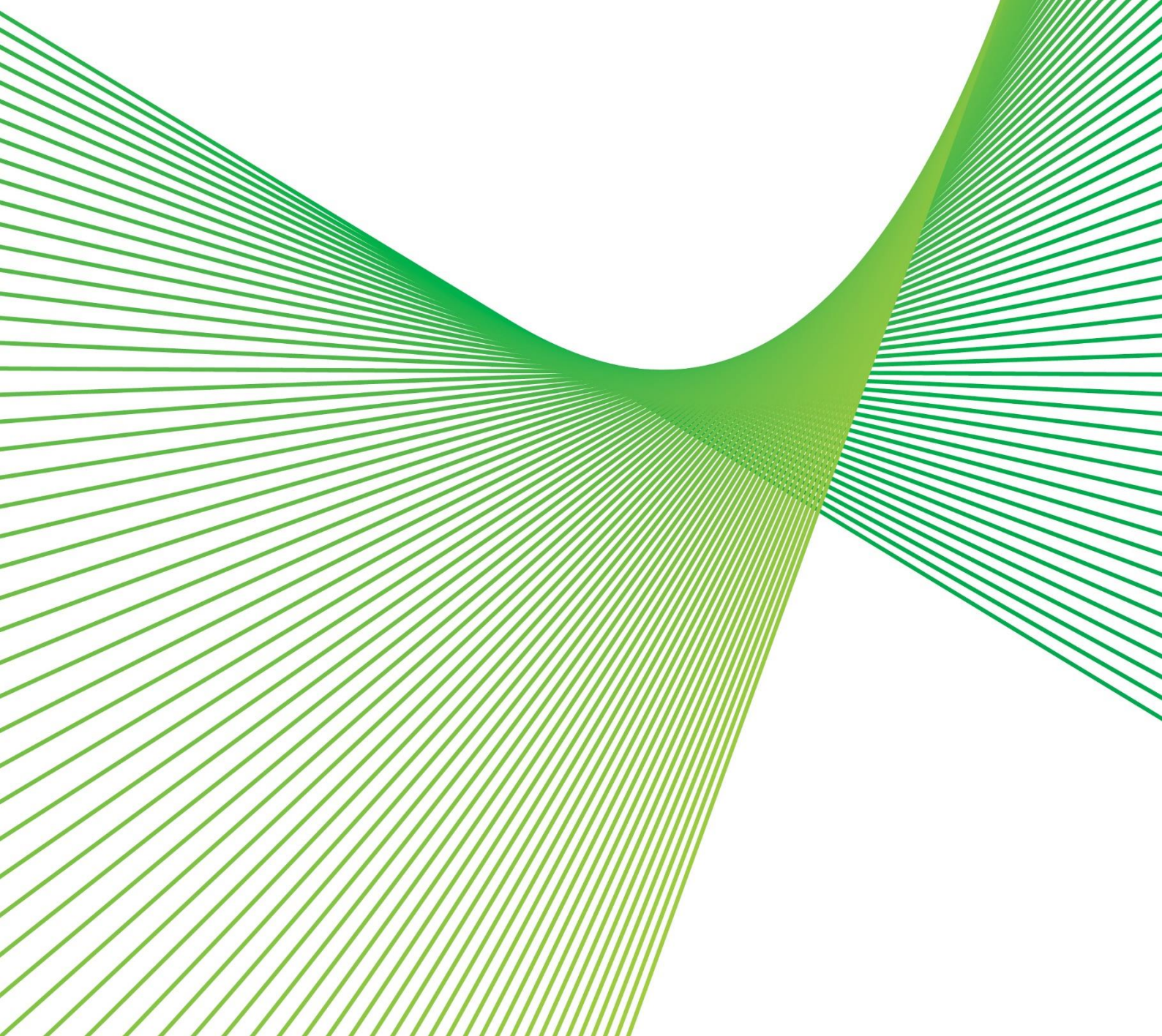


# **Summary: Maintaining compliance with performance standards applicable to Sydney East substation secondary systems**

RIT-T Project Assessment Conclusions Report

Issue date: 21 March 2024



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## Summary

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

Sydney East substation was commissioned in 1976 and forms part of our network that serves the Greater Sydney area. It is a customer connection point supplying Ausgrid's 132 kV network in the area.

The area supplied by Sydney East includes the North Sydney Central Business District (CBD) and provides a base for a number of major infrastructure and transport networks including road tunnels, train networks, hospitals and data centres. These infrastructure assets require a high level of electricity reliability and security to maintain services required for Sydney to operate as a major international city. Additionally, there are large infrastructure developments or expansion plans, with many projects under construction or scheduled for the near term<sup>1</sup>.

Sydney East 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. While residential, industrial and commercial load growth in Inner Sydney has remained steady over the last few years, a significant increase is projected in the uptake of electrical vehicles, with a variety of charging modes. The other potential network impact will be due to rooftop PV panels, with generation across NSW and ACT expected to increase significantly to 8,733 GWh by 2025.<sup>2</sup>

Secondary systems assets at Sydney East substation are facing technological obsolescence, increasing the time to reactively rectify faults and increasing the risk that primary assets at the substation may not be able to reliably operate.

### **Identified need: meet the service level required under National Electricity Rules for protection schemes**

Secondary systems are used to control, monitor, protect and provide secure communication to facilitate safe and reliable network operation.<sup>3</sup> They are necessary to ensure the secure operation of the transmission network and prevent damage to primary assets when adverse events occur.

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

Redundant protection schemes are required to ensure the transmission system is adequately protected as outlined in the Network Performance Requirement under Schedule 5.1 of the National Electricity Rules (NER), therefore the condition issues affecting the identified protection relays on the ACT and NSW transmission network must be addressed. The Network Performance Requirements, set out in Schedule 5.1 of the NER, place an obligation on Transmission Network Service Providers (TNSPs) to provide redundant protection schemes to ensure the transmission system is adequately protected. Clause 5.1.9(c) of the NER requires a TNSP to provide sufficient primary and back-up protection systems (including

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<sup>1</sup> Transgrid, NSW Transmission Annual Planning Report 2022, p.42

<sup>2</sup> Transgrid, NSW Transmission Annual Planning Report 2023, p.51

<sup>3</sup> As per Schedule 5.1 of the NER.

breaker fail protection systems), to ensure that a fault of any type anywhere on its transmission system is automatically disconnected.

Additionally, TNSPs are required to disconnect the unprotected primary systems where secondary systems fault lasts for more than eight hours (for planned maintenance) or 24 hours (for unplanned outages). TNSPs must also ensure that all protection systems for lines at a voltage above 66 kV are well-maintained so as to be available at all times other than for short periods (less than eight hours), while the maintenance of protection systems is being carried out.<sup>4</sup>In the event of an unplanned outage, AEMO's Power System Security Guidelines require that the primary network assets must be taken out of service within 24 hours<sup>5</sup>.

Furthermore, as per clause 4.11.1 of the NER, remote monitoring and control systems are required to be maintained in accordance with the standards and protocols determined and advised by AEMO.

A failure of the secondary systems would involve replacement of the failed component or removing the affected primary assets, such as lines and transformers, out of service. Though replacement of failed secondary systems component is a possible interim measure, the approach is not sustainable as the stock of spare components will deplete due to the technology no longer being manufactured or supported. Once all spares are used, replacement will cease to be a viable option to meet performance standards stipulated in clause 4.6.1 of the NER.

If the failure to provide functional secondary systems due to technology obsolescence is not addressed by a technically and commercially feasible credible option in sufficient time (by 2027/28), the likelihood of not recovering from secondary systems faults and not maintaining compliance with NER performance requirements will increase.

The proposed investment will enable us to continue to meet the standards for secondary systems availability set out in the NER, and to avoid the impacts of taking primary assets out of service. Consequently, it is considered a reliability corrective action under the RIT-T.

A reliability corrective action differs from a 'market benefits'-driven RIT-T in that the preferred option is permitted to have negative net economic benefits on account of it being required to meet an externally imposed obligation on the network business.

## **No submissions received in response to the Project Specification Consultation Report**

We published a Project Specification Consultation Report (PSCR) on 31 October 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.

On 21 September 2023, the National Energy Laws were amended to reflect the incorporation of emissions reductions within the National Energy Objectives.<sup>6</sup> Following this the AEMC made harmonising changes to the National Electricity Rules, prompted by a rule change request from energy ministers, to ensure that

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<sup>4</sup> As per S5.1.2.1(d) of the NER.

<sup>5</sup> AEMO. "Power System Security Guidelines, 6 November 2023." Melbourne: AEMO, 2023.23. Accessed 20 March 2024.

<sup>6</sup> Statutes Amendment (National Energy Laws) (Emissions Reduction Objectives) Act 2023 (SA)

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.<sup>7</sup>

Transgrid supports greater consideration of emissions reduction within network planning and investment frameworks. These changes ensure network planning and investment frameworks support achievement of the Commonwealth Government's net zero targets. Transgrid has set 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.<sup>8</sup>

The updated National Energy Laws and Rules included transitional provisions that applied these changes to any RIT-T project that was required to publish a PADR where the deadline for doing so was after 21 November 2023.

As the PSCR for this RIT-T was submitted prior to 21 November 2023, and there is no requirement in this project to publish a PADR, this RIT-T is still subject to the old National Electricity Rules which did not consider changes in Australian emissions as a class of market benefit.

Additionally, the identified need for this RIT-T is driven by an externally imposed obligation, and therefore framed as reliability corrective action in which induced market benefits are not the primary objective.

Thus, to ensure timely publication of this RIT-T and delivery of the proposed solution, Transgrid has not assessed the change in Australian emissions tied to the project, as a benefit within this RIT-T.

Option 2 remains the preferred option at this stage of the RIT-T process.

## Credible options considered

We consider there are two credible options that would meet the identified need from a technical, commercial, and project delivery perspective.<sup>9</sup> These are summarised in Table Table E-1.

Table E-1: Summary of the credible options

Option	Description	Capital costs (\$M, 2021-22)	Operating costs (\$/yr, 2021-22)
Option 1	Replacement of individual assets	17.55	10,548
Option 2	Complete in-situ replacement	26.53	10,548

Assets with deteriorating condition to be replaced include protection relays, control systems and metering systems. See Appendix B for a full list of assets to be replaced under Option 1.

<sup>7</sup> AEMC, [Harmonising the national energy rules with the updated national energy objectives – final determination](#), 1 February 2024

<sup>8</sup> 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>

<sup>9</sup> As per clause 5.15.2(a) of the NER.

## No submissions received in relation to non-network options

In the PSCR we noted that 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 are not able to meet NER obligations to provide redundant protection schemes (secondary systems) and ensure that the transmission system is adequately protected. No submissions were received in response to the PSCR in relation to non-network options.

## Conclusion: complete in-situ replacement is optimal

This PACR finds that implementation of Option 2 is the preferred option to address the identified need.. Option 2 involves replacement of all secondary systems at the site. This option will adopt an automation philosophy consistent with current design standards and practices. This option also includes replacement of Direct Current (DC) supplies to account for an increase in secondary systems power requirements and remediation of the 415 V Alternating Current (AC) distribution in the building and switchyard.

The condition of various categories of automation assets such as protection relays, control systems, AC distribution, DC supply systems, and market meters creates a need for modernisation. This will deliver benefits such as reduced preventative maintenance requirements, improved operational efficiencies, better utilisation of our high-speed communications network, improved visibility of assets using modern technologies and reduced reliance on routine maintenance and testing. There are also additional operational benefits available to improved remote monitoring, control and interrogation, efficiency gains in responding to faults, and phasing out of obsolete and legacy systems and protocols.

The capital cost of this option is approximately \$26.53 million (in \$2021-22). The work will be undertaken in stages over a five-year period with all works expected to be completed by 2027/28. Routine operating and maintenance costs are estimated to be approximately \$10,548 per annum (in \$2021-22).

## 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.

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:
  - 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 (noting that no issues have been raised).

Parties wishing to raise a dispute notice with the AER may do so prior to 24 April 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](mailto:regulatory.consultation@transgrid.com.au) . In the subject field, please reference 'Sydney East Secondary Systems PACR'.