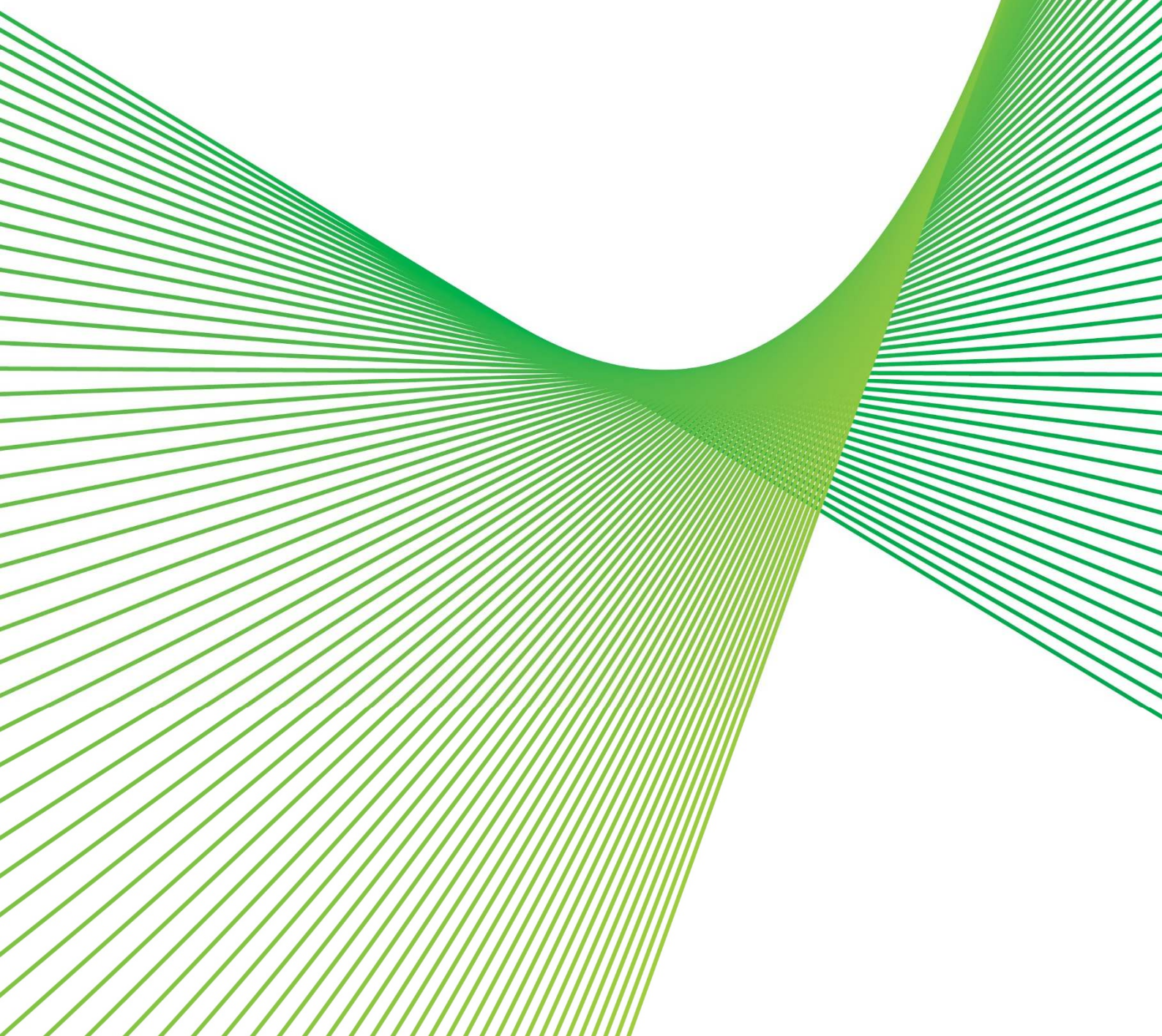


# Meeting system strength requirements in NSW

RIT-T Project Specification Consultation Report

Region: New South Wales

Date of issue: 16 December 2022



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## Summary

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We are applying the Regulatory Investment Test for Transmission (RIT-T) to options that:

1. address a system strength Shortfall in the transmission network at Newcastle and Sydney West that is forecast to arise from 1 July 2025 and continue until 1 December 2025; and
2. deliver system strength services to the NSW power system to meet standards set by AEMO from 2 December 2025, including for the safe and secure operation of the power system (minimum level) and to facilitate the stable voltage waveform of new inverter-based renewable generators (efficient level).

Publication of this Project Specification Consultation Report (PSCR) is the first step in the RIT-T process. This PSCR is accompanied by an [Expression of Interest \(EOI\)](#), seeking non-network options from potential System Strength Contractors to address system strength requirements in NSW (i.e. third party businesses that provide system strength services to Transgrid under a network support contract).

This RIT-T examines network and non-network options to ensure compliance with system strength requirements of the NER and provide the greatest net economic benefit to the energy market.

### Identified need: meeting system strength requirements in NSW

As the System Strength Service Provider for NSW we are required to make sufficient system strength available, as specified by AEMO, under NER:

- Clause 11.143.15 to address the system strength Shortfall declared by AEMO from 1 July 2025 to 1 December 2025 at Newcastle and Sydney West,<sup>1</sup> and
- Schedule 5.1.14 to provide the minimum and efficient levels of system strength forecast by AEMO at each of the NSW system strength nodes from 2 December 2025 into the future.<sup>2</sup>

We have therefore commenced this RIT-T to assess options to ensure the above NER requirements are met. We consider that this will enable us to identify the optimal solution to meet both the short-term and long-term needs.

### System strength Shortfall (1 July 2025 – 1 December 2025)

Following the publication of AEMO's 2022 System Security Reports on 1 December 2022, AEMO gave notice to us under clause 11.143.14 of the National Electricity Rules (NER) that a system strength Shortfall is projected to occur at the Newcastle and Sydney West fault level nodes from 1 July 2025. A system strength Shortfall is an identified gap between the minimum fault levels that is projected to be available as a result of typical market dispatch (from existing synchronous generators), and minimum fault level requirements. A key cause of the projected system strength Shortfall is the planned early retirement of Eraring Power Station in August 2025. Under clause 11.143.15 of the NER, we must make system strength services available to address the expected system strength Shortfall identified by AEMO in its notice.

### System Strength Rule Change (from 2 December 2025)

From 2 December 2025, a new system strength framework<sup>3</sup> ('System Strength Rule Change') will begin under the NER, requiring us to deliver system strength on a forward-looking basis to standards set by

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<sup>1</sup> AEMO, December 2022, System security services – Revised notice and request under the National Electricity Rules (NER)

<sup>2</sup> AEMO, December 2022, [2022 System Security Report](#)

<sup>3</sup> AEMC October 2021, *National Electricity Amendment Efficient Management of System Strength On The Power System* Rule 2021, [ERC0300: System strength final determination - 21 Oct 2021 \(aemc.gov.au\)](#)

AEMO. Under this framework, system strength will be effectively ‘unbundled’ from the operation of the energy market, and we are required to establish a portfolio of solutions (network and/or non-network) to ensure minimum three-phase fault level requirements are met in full at all times of the year. This is a change from the system strength Shortfall methodology, where only the ‘Shortfall’ or gap in NSW’s system strength has to be filled. In addition, we are required to deploy system strength solutions above the minimum levels to facilitate the stable connection and operation of the efficient level of renewable generators as they come online in NSW in the coming decade.

AEMO has indicated that where a Shortfall overlaps with the introduction of the new system strength framework, it expects System Strength Service Providers (Transgrid in NSW) to address Shortfalls as part of its overall delivery against the new system strength framework.

We consider this a ‘reliability corrective action’ as the considered options are for the purpose of meeting externally imposed regulatory obligations and service standards, i.e., Clause 11.143.15 and Schedule 5.1.14 of the NER.

### **Credible network options have been identified**

We have identified credible network options that are likely to meet the identified need from a technical, commercial, and project delivery perspective.<sup>4</sup> We have determined that the installation of synchronous condensers is the most credible short- to medium-term network solution to contribute to meeting NSW’s system strength needs, comprising:

- from 1 July 2025 to 1 December 2025, four synchronous condensers to address the system strength Shortfall declared by AEMO, and
- from 2 December 2025, approximately 20 synchronous condensers in total to meet the entire minimum and efficient levels of system strength required by AEMO’s forecast, growing to 29 synchronous condensers in 2032-33 as more inverter-based renewables connect.

We note that supply chain constraints could impact on the feasibility of deploying synchronous condensers in the short term.

We expect that a combination of network and non-network options are likely to form a diverse portfolio of preferred solutions to meet system strength requirements from 2 December 2025 onwards, given the scale of the requirements and that existing solutions will continue to operate in the energy market for some period of time. The availability of cost-effective non-network solutions will commensurately reduce the number of synchronous condensers needed as a network solution.

### **System strength Shortfall (1 July 2025 – 1 December 2025)**

In response to the declared Shortfall at Newcastle and Sydney West, we have identified a combination of network options to meet the Shortfall, as summarised in Table E-1. Synchronous condenser options that address the Shortfall would also contribute to meeting needs beyond 2 December 2025 under the System Strength Rule Change. As such, varying sizes and configurations of synchronous condensers and transformers were assessed.

We expect that non-network solutions may be able to meet all or part of the Shortfall, and if so, any network solution would be commensurately smaller.

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<sup>4</sup> As per clause 5.15.2(a) of the NER.

Table E-1: Summary of capex for least-cost credible network options to meet the Shortfall

Option	Description	Least cost configurations <sup>5</sup>	Capex (\$2021-22, ±25%)
Option 1	Meets the needs of the system strength Shortfall	Newcastle <b>or</b> Vales Point – 2 x 125MVA synchronous condensers <b>and</b> Kemps Creek <b>or</b> Sydney West – 2 x 125MVA synchronous condenser	\$326-374M
Option 2	Meets the needs of the system strength Shortfall and provides a more scale efficient solution for future system strength needs	Newcastle <b>or</b> Vales Point – 2 x 200MVA synchronous condensers) <b>and</b> Kemps Creek – 2 x 200MVA synchronous condensers)	\$349-351M
Option 3	Non-network options	The assessment of non-network options will depend on responses received to this PSCR and associated EOI	To be estimated based on responses to the EOI

### System Strength Rule Change (from 2 December 2025)

We have estimated the network solutions which would be required to meet minimum and efficient levels of system strength under the System Strength Rule Change, based upon synchronous condensers being deployed to meet system strength requirements in full (without the support of non-network options). Approximately 20 synchronous condensers would be required from 2 December 2025 to meet NSW's system strength requirements, growing to 29 synchronous condensers in 2032-33 as more inverter-based renewables connect.<sup>6</sup>

This represents an 'upper limit' provided to indicate the scale of network solutions required. In practice, we expect that non-network solutions will play a significant role in providing these services, and that any network solution would be commensurately smaller. A portfolio of existing and emerging network and non-network solutions, including services from interstate, is likely to best meet the needs of the NSW power system and energy consumers throughout the energy transition.

### Non-network solutions are likely to help address the identified need

Potential options to address the Shortfall and the System Strength Rule Change requirements may be an existing plant or new plant and can include but are not limited to:

- synchronous generators;
- synchronous hydro units operating in 'synchronous condenser' mode;
- conversion of existing synchronous generators to synchronous condensers;
- synchronous condensers (with or without fly wheels);
- grid forming battery energy storage systems;
- grid forming inverter-based renewable generators;

<sup>5</sup> This summary includes the lowest cost solution(s) from each Option to meet the need. Note that for all options, each synchronous condenser is coupled with a 275MVA transformer.

<sup>6</sup> Of the 27 synchronous condensers estimated for FY33, 24 are rated at 200MVA and 4 are rated at 125MVA.

- grid forming SVCs or STATCOMs; and
- other modifications to existing plant.

We have set out the characteristics (refer to Section 4) that non-network options would need to meet to be capable of contributing system strength services to meet the Shortfall and System Strength Rule Change requirements. The accompanying EOI provides greater detail and specifies the type and form of information we are seeking from proponents in order to have their solutions assessed in the PADR.

## Submissions and next steps

The purpose of this PSCR is to set out the reasons we propose that action be taken, present the options that address the identified need, outline the technical characteristics that non-network options will need to provide, and allow interested parties to make submissions and provide input to the RIT-T assessment.

We welcome written submissions on materials contained in this PSCR. Submissions are due on 30 March 2023. Submissions should be emailed to our Regulation team via [regulatory.consultation@transgrid.com.au](mailto:regulatory.consultation@transgrid.com.au).<sup>7</sup> In the subject field, please reference 'Meeting system strength requirements in NSW'.

At the conclusion of the consultation process, all submissions received will be published on our website. If you do not wish for your submission to be made public, please clearly specify this at the time of lodgement.

In addition, we are undertaking an [EOI](#) for non-network proponents to contribute to meeting system strength needs as set out in this PSCR. Proposals are due before 6pm, 30 March 2023. Submissions to the EOI will not be published on our website.

The next formal stage of this RIT-T is the publication of a PADR. The PADR will include the full quantitative analysis of all credible options and is expected to be published in mid-2023.

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<sup>7</sup> Transgrid is bound by the Privacy Act 1988 (Cth). In making submissions in response to this consultation process, Transgrid will collect and hold your personal information such as your name, email address, employer and phone number for the purpose of receiving and following up on your submissions. If you do not wish for your submission to be made public, please clearly specify this at the time of lodgement. See Privacy Notice within the Disclaimer for more details.