

Meeting system strength requirements in NSW

Industry Briefing

1 February 2023

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Agenda

Topic	Presenter	Duration
Welcome	Cassie Farrell , Stakeholder Engagement Manager	10 mins
Introduction	Marie Jordan , EGM Network	5 mins
Overview of the PSCR & EOI	Fiona Orton , GM Innovation & Energy Transition Jesse Steinfeld , Energy Transition Manager	35 mins
Q&A	-	40 mins

Housekeeping and disclaimer

Questions

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- Please submit questions via Menti
- Please 'like' questions you think are most relevant
- Questions answered in order of most 'liked'

Disclaimer

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Summary

Need

- Transgrid is required to resolve a system strength shortfall in NSW from 1 July 2025; and
- Transgrid is required to provide a portfolio of solutions to meet NSW system strength requirements in full under a new rule change from 2 December 2025, including to support the stable operation of new renewable generators.



Eligible technologies and assets that can provide system strength services include:

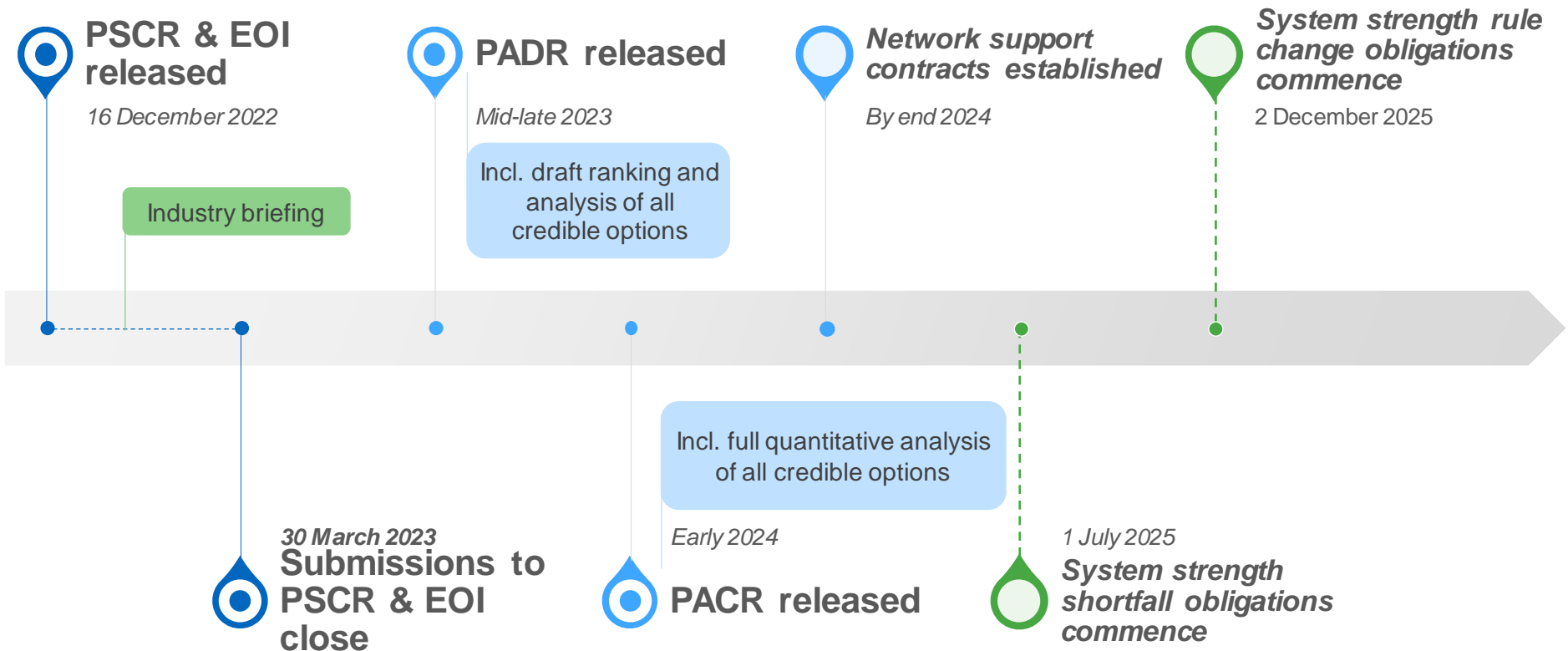
- Existing synchronous generators such as coal, gas and hydro
- Existing synchronous condensers, synchronous hydro units that can operate in 'synchronous condenser' mode and coal units converted to synchronous condensers
- New synchronous generators or synchronous condensers
- Emerging technologies – such as batteries or renewable generation with grid-forming inverters

Opportunity

- We are seeking Expressions of Interest from third parties who can provide system strength services to Transgrid as 'non-network options' to help meet these new obligations. This offers the potential to secure a network support contract with Transgrid, including long-term agreements.
- We anticipate a new, sizeable and ongoing market for System Strength, which will grow over time.

Timeline of key milestones

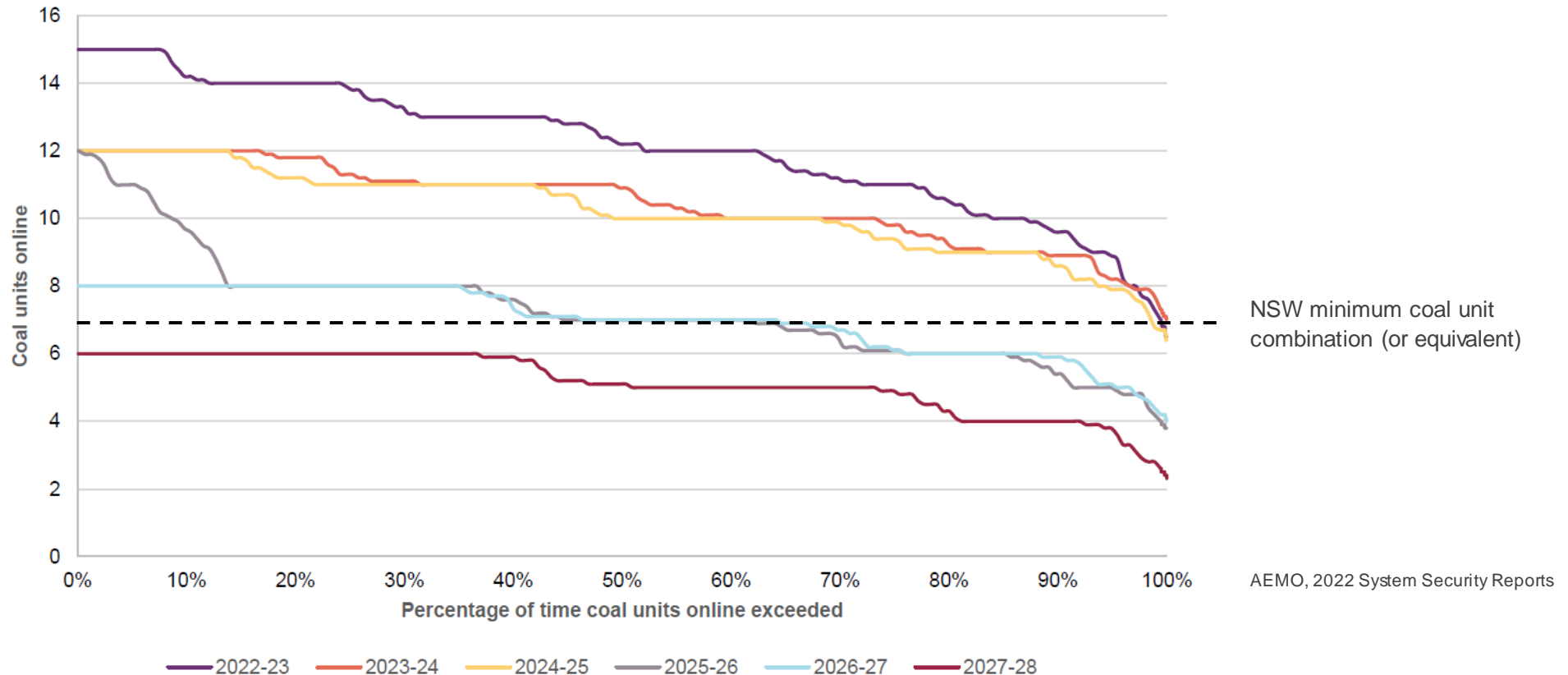
Transgrid will identify through a RIT-T the optimal portfolio of network and non-network solutions to meet system strength requirements and will run a competitive procurement process and/or commercial negotiations for non-network options as required



Context

System strength has traditionally been provided by synchronous generators, as an intrinsic by-product of producing energy. Gaps in system strength will grow as coal generators retire or change their operating patterns, and new solutions will be needed.

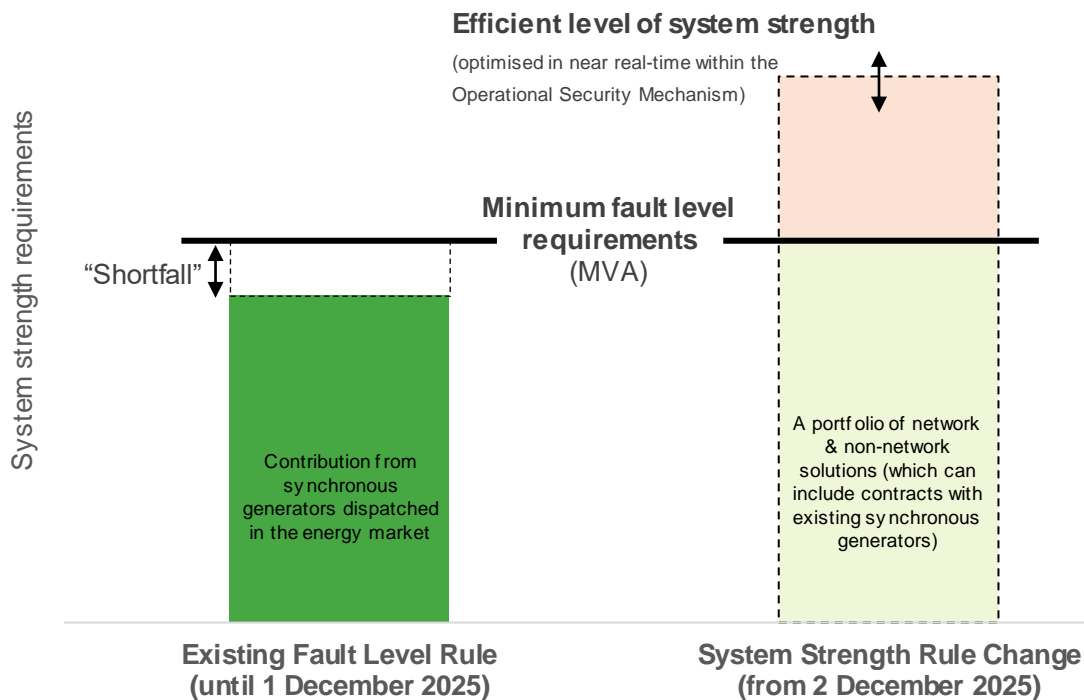
Number of coal units projected online under Step Change scenario (NSW)



Evolving system strength obligations

AEMO has declared a system strength shortfall from 1 July 2025. From 2 December 2025, Transgrid must deliver system strength services for the secure operation of the power system (minimum level) and to support renewable generators (efficient level)

Conceptual representation of evolving system strength obligations



System strength can broadly be described as the ability of the power system to maintain and control the voltage waveform at any given location in the power system, both during steady state operation and following a disturbance

Minimum fault level requirements: three phase fault levels, measured in MVA (fault current x volts)

Efficient level of system strength: the requirement for a stable voltage waveform, such that:

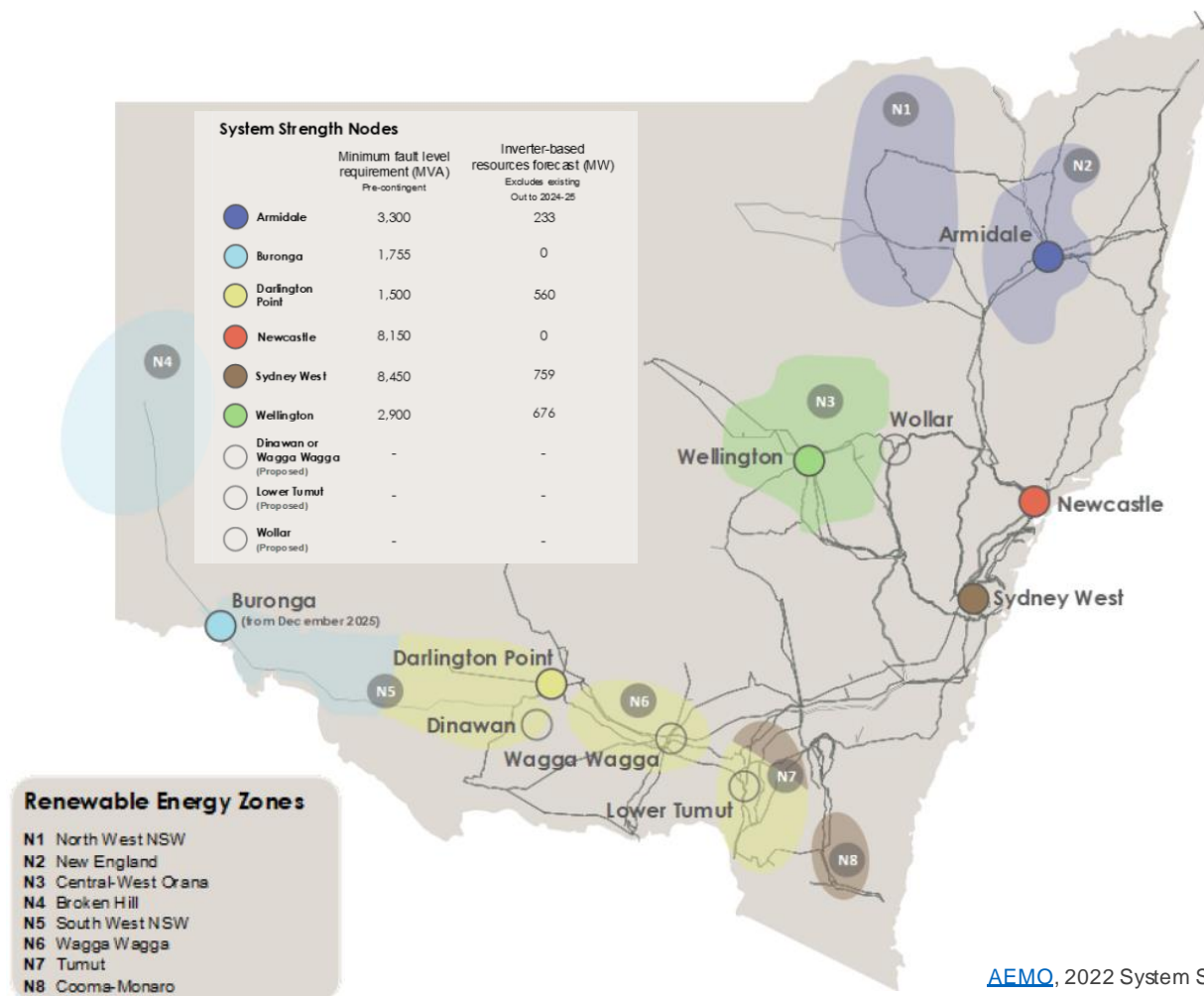
- in steady state conditions, plant does not create, amplify, or reflect instabilities; and
- avoidance of voltage waveform instability following any credible contingency event or protected event is not dependent on plant disconnecting or varying active power or reactive power transfers, other than in accordance with performance standards.

A stable voltage waveform is defined by four criteria:

- Voltage magnitude
- Change in voltage phase angle
- Voltage waveform distortion
- Voltage oscillations

System strength nodes

There are currently five system strength nodes in New South Wales, and a new node at Buronga effective 2 December 2025

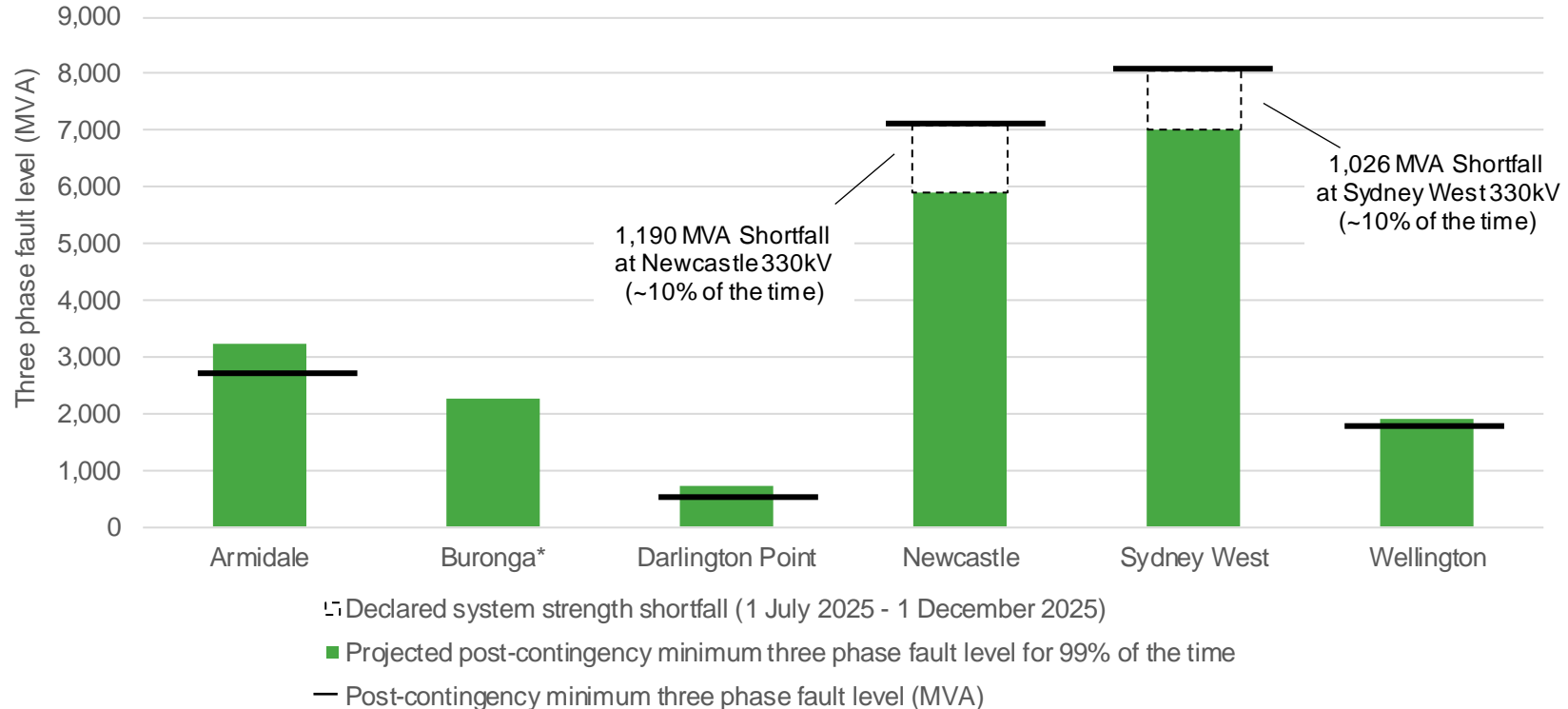


[AEMO](#), 2022 System Security Reports

System strength Shortfall (1 July – 1 December 2025)

Transgrid is required to address the system strength Shortfall declared by AEMO in the transmission network at Newcastle and Sydney West 330kV nodes from 1 July 2025 and continue until the new system strength rules commence on 2 December 2025

New South Wales fault level requirements, 2025-26 post contingency fault level projections and Shortfalls

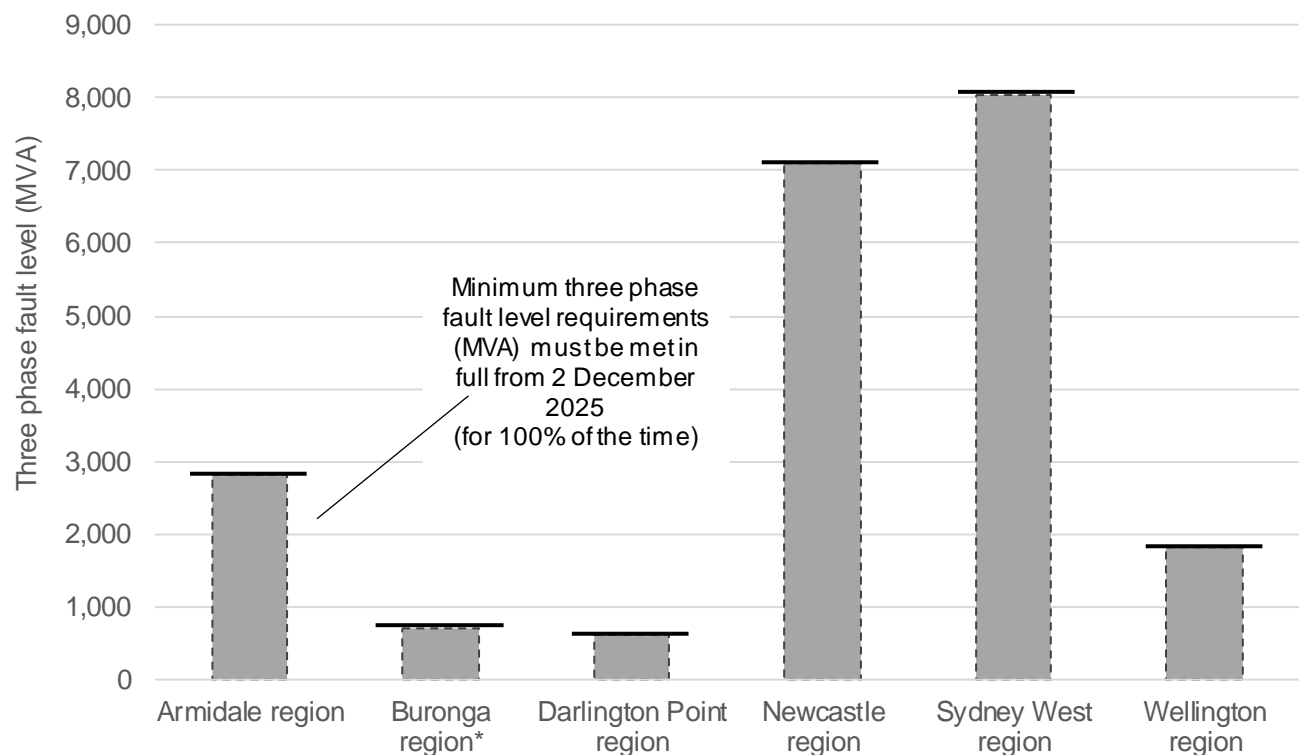


System strength rule change (from 2 December 2025)

Minimum level

From 2 December 2025, Transgrid, as the System Strength Service Provider, must establish a portfolio of solutions to meet NSW's entire minimum fault level requirements (rather than just filling a declared Shortfall) at all times of the year

Minimum fault level requirements

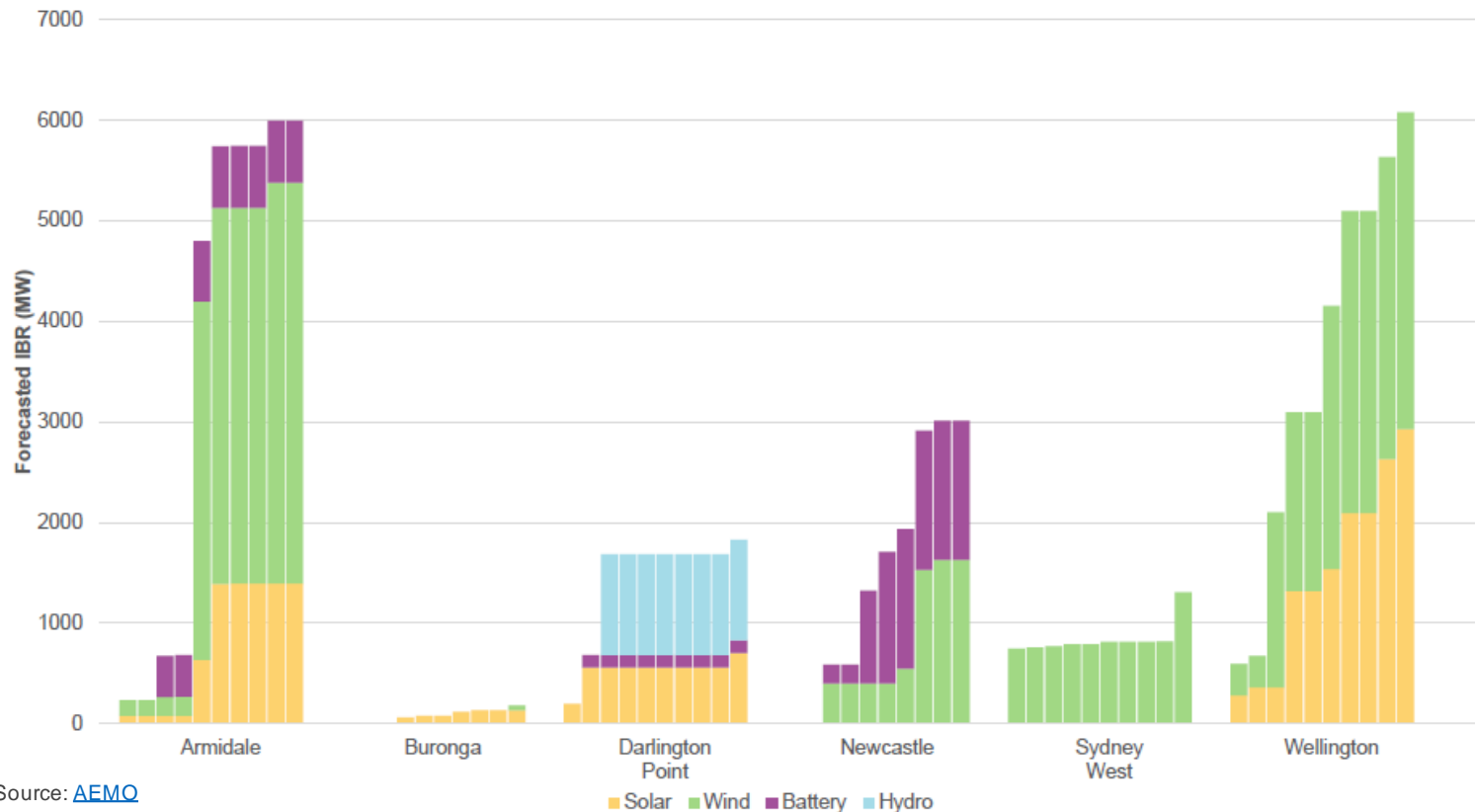


System strength rule change (from 2 December 2025)

Efficient level

Above and beyond minimum system strength levels, Transgrid must provide sufficient strength services to enable the stable operation (stable voltage waveforms) of new connecting generators

10 year forecast of inverter-based renewables and market network services



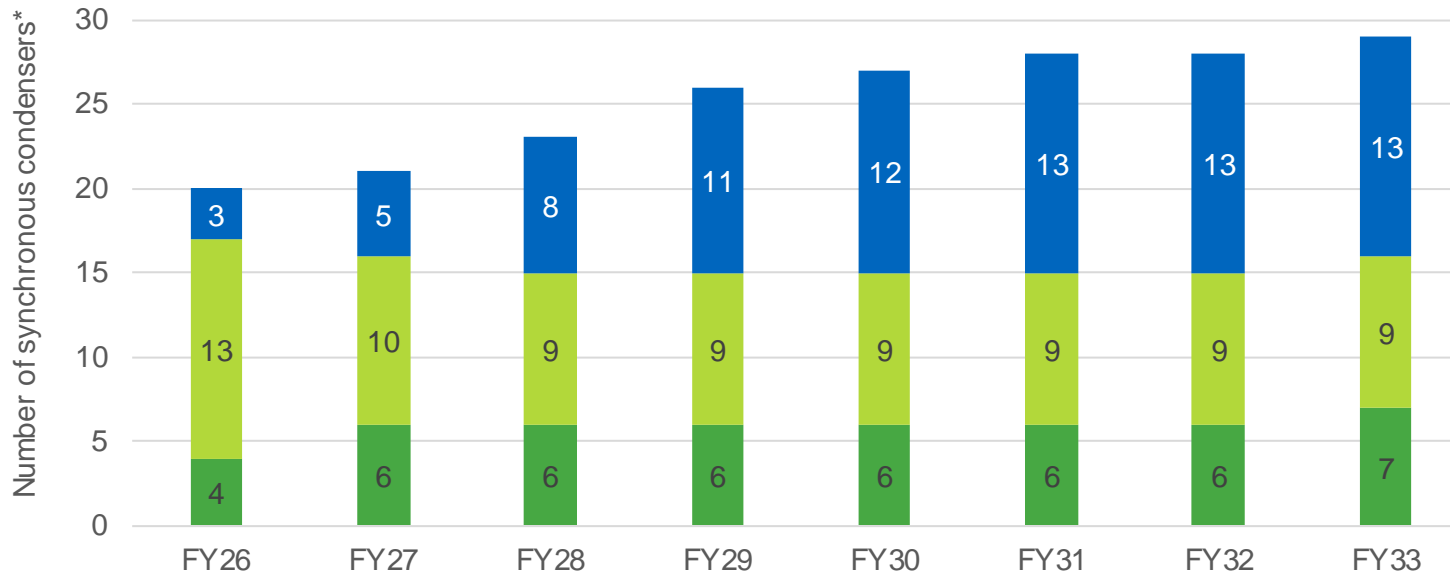
The 'Operational Security Mechanism' will dispatch services to ensure that sufficient system strength levels are always met and will co-optimize additional levels of system strength to enable the economically optimal level of renewable generation to operate stably in real-time.

Source: [AEMO](#)

System strength is a large and growing requirement

We estimate that a portfolio of solutions equivalent to approximately 29 synchronous condensers will be required by FY2033. Non-network solutions are likely to play a significant role, reducing the requirement for synchronous condensers.

Equivalent synchronous condensers needed to meet NSW system strength requirements in full



- To support the stable operation of new connecting renewable generators
- To maintain the minimum level of system strength (on top of interstate contributions)
- Contributions from interstate (equivalent synchronous condensers)

A portfolio of existing and new 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

* Of the 29 synchronous condensers estimated for FY33, 25 are rated at 200MVA and 4 are rated at 125MVA

Eligible non-network technologies

Transgrid is seeking EOI from potential System Strength Contractors to provide non-network solutions to meet NSW's system strength requirements from 1 July 2025 onwards

Potential non-network options may be 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

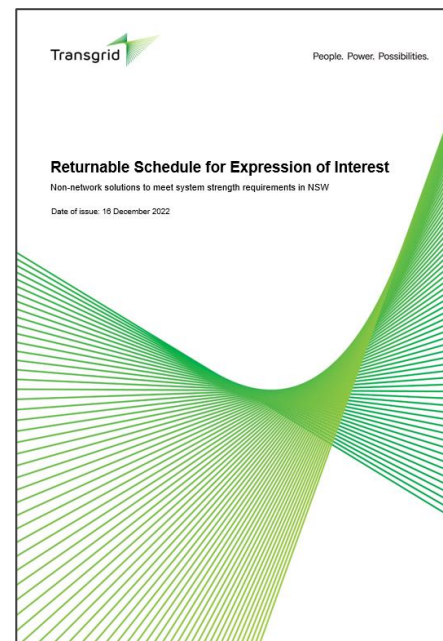
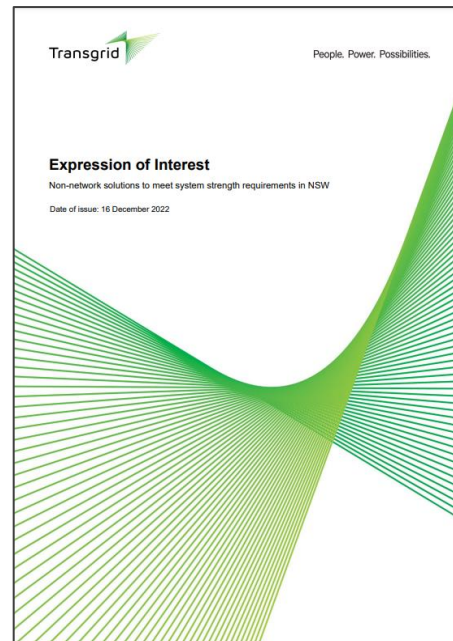
Grid forming SVCs or STATCOMs

Other modifications to existing plant

Next steps

Transgrid invites you to propose solution(s) that can meet, or help to meet, Transgrid's system strength requirements for the NSW power system

- The Project Specification Consultation Report (PSCR), EOI and the Returnable Schedules can be found on [Transgrid's website](#)
- The EOI and Returnable Schedules specifies characteristics of non-network options and information required to be submitted
- **Submissions to the PSCR and EOI are due on 30 March 2023**
- EOI proposal and Returnable Schedules should be submitted to systemstrength@transgrid.com.au
- PSCR submissions should be submitted to regulatory.consultation@transgrid.com.au



Q&A

