Transgrid

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New South Wales Synchronous Generation

Updated advice for System Normal Requirement

30/06/2025

Contents

1. Intent

The intent of this report to provide updated advice to AEMO of the contribution of synchronous generating units to the stable operation and protection of the New South Wales transmission network, and to advise market participants that this advice has been provided to AEMO.

2. Background

A minimum level of synchronous generation must be in service to ensure the stable operation and protection of the New South Wales transmission network. Transgrid and AEMO have jointly agreed that this requirement is met when the equivalent of six large synchronous generators are in service. Under these conditions, the network is considered to be in a satisfactory state. To be considered secure, the network must still have the equivalent of six large synchronous units in service after any credible contingency—typically the loss of the generator with the highest contribution.

Interim advice was issued on 14 February 2024, which included consideration of contributions from smaller synchronous generators.

Following extensive studies, this updated advice introduces revised equivalence factors for synchronous machines. Notably, the contribution of large synchronous units has been slightly revised downward from 1.000 to 0.970.

When the market does not supply sufficient synchronous generation to maintain a secure network, AEMO may schedule contracted system strength services or, as a last resort, intervene in the market and direct generation to maintain system security.

3. Consideration of unit contribution

As previously outlined, the network is considered satisfactory if the total equivalent contribution from synchronous generators is at least 6.0. It is considered secure if this total remains at or above 6.0 even after accounting for the worst credible contingency. Since the largest credible contingency typically results in the loss of a contribution of 0.970, a total value of 6.970 or higher will generally indicate that the network is secure.

This concept is illustrated by diagram 1 on the following page.

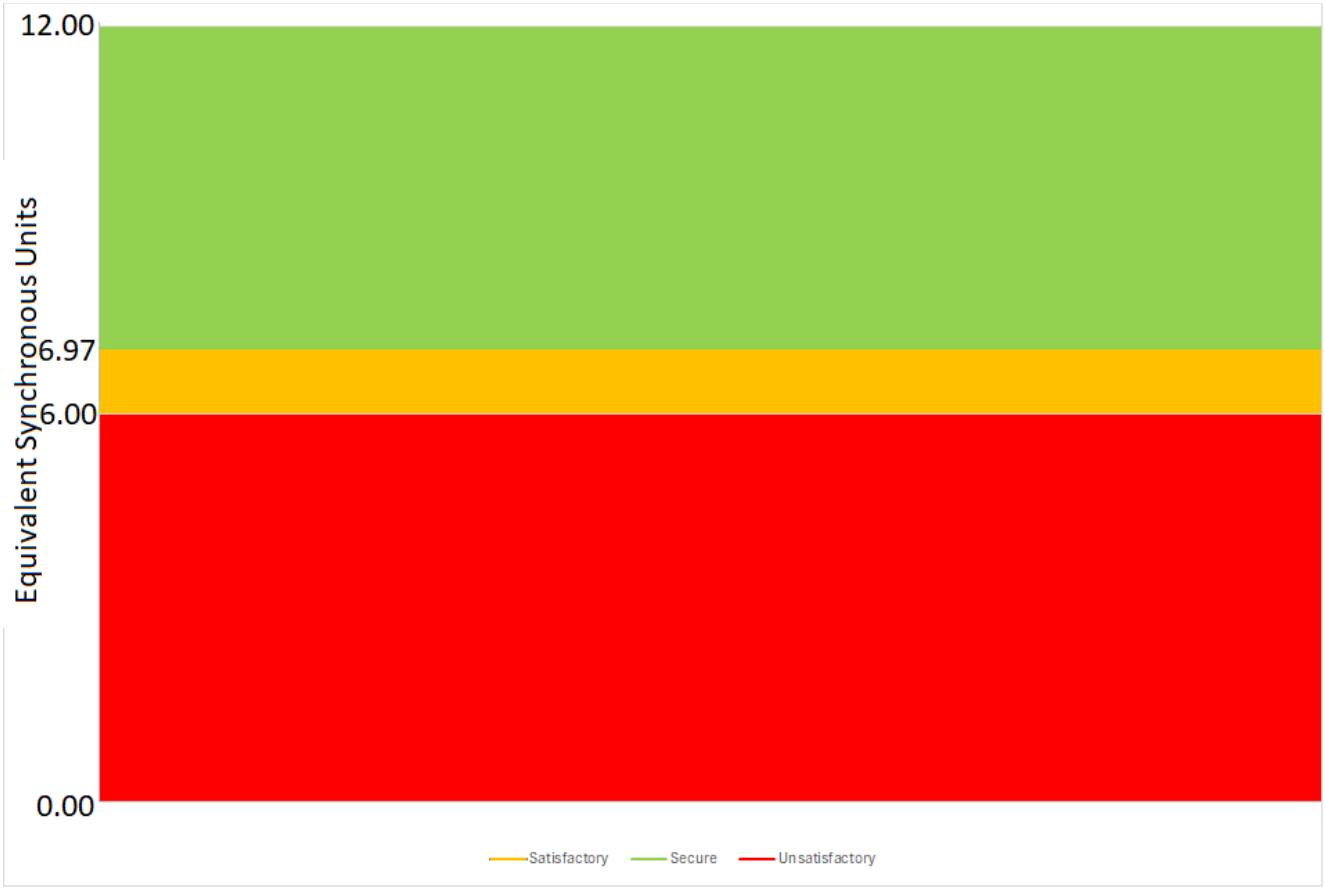

Diagram 1

Extensive studies assessed the individual contributions of both large and small synchronous units. Results showed that large thermal units, while still essential, are marginally less effective than initially estimated. The updated equivalence values now reflect fractional contributions for both large and small units.

Importantly, units only need to be synchronised (not necessarily generating) to contribute. Units operating as pumps or synchronous condensers, where applicable, are also considered to be providing their equivalent contribution.

Table 2 on the following page, contains the equivalent contribution for each synchronous unit used to assess the state of the NSW network.

	Location	Units	Equivalent Proportion
Large Units	Bayswater	4	0.970
	Eraring	4	0.970
	Mount Piper	2	0.970
	Vales Point	2	0.970
Small Units	Tallawarra A	1	0.440
	Tallawarra B	1	0.480
	Murray 1	10	0.070
	Murray 2	4	0.080
	Tumut 1	4	0.020
	Tumut 2	4	0.030
	Tumut 3	6	0.250
	Colongra	4	0.180
	Kangaroo Valley	2	0.090
	Bendeela	2	0.060
	Uranquinty	4	0.230
	Guthega	2	0.030
	Hume	2	0.010
	Jounama	1	0.010
	Blowering	1	0.010
	Smithfield	3	0.010

Table 2

The units only need to be synchronised (not necessarily generating) to provide the equivalent contribution. Units operating as a pump or synchronous condenser (where possible) are considered to be providing the equivalent contribution.

Example Application

Suppose the following units are operating:

- 7 large units
- 2 Colongra units (small)

The total equivalent contribution is:

$7 \times 0.970 + 2 \times 0.180 = 7.150$

This exceeds 6.970, and the network is therefore secure.

Now, assume one large unit trips:

6 × 0.970 + 2 × 0.180 = 6.180

The network remains satisfactory, but not secure. Under NER clause 4.2.6, AEMO must restore the network to a secure state as soon as practicable and within 30 minutes.

To address the shortfall (approximately 0.79), AEMO might activate additional smaller units, for example:

3 × Tumut 3 units at 0.250 each, and

1 × Kangaroo Valley unit at 0.090

= 3 × 0.250 + 0.090 = 0.840

The total equivalent contribution then becomes:

6 × 0.970 + 2 × 0.180 + 3 × 0.250 + 0.090 = 7.020

With this configuration, the network is again considered secure.

3.1. References

AEMO 2024 System Strength Report - https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-system-strength-report.pdf?la=en

AEMO 2023 System Strength Report - https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system-strength-requirements/2023-system-strength-report.pdf?la=en

AEMO 2022 System Strength Report - https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system-strength-requirements/2022-system-strength-report.pdf?la=en

3.2. Disclaimer

The information contained in this report should only be used for the intended purpose, which is to allow AEMO to determine the adequacy of New South Wales Synchronous Generation for stability and correct operation of protection devices during system normal. It has been published for informational purposes only. It is very important to perform analysis before making any decision based on your circumstances. You should take independent professional advice, or independently research and verify, any information that you find in this report and wish to rely upon, whether for the purpose of making a decision or otherwise.