AEMC

STANDARD

Reliability Panel AEMC

Final standard

System restart standard

11 December 2025

System restart standard

1. Introduction

This system restart standard (Standard) was determined by the Reliability Panel (Panel) in accordance with clauses 8.8.1(a)(1A) and 8.8.3 of the National Electricity Rules (NER or Rules). The purpose of this Standard is to provide a planning target and guidance to assist the Australian Energy Market Operator (AEMO) in its procurement of system restart ancillary services (SRAS) for the National Electricity Market (NEM). AEMO's power system security responsibilities include the procurement of sufficient SRAS, in accordance with this Standard, to allow the restoration of power system security following a major supply disruption.[1]

The Panel expects that AEMO's procurement of SRAS may include the provision of plant or facilities with black start capability and other restoration support service capabilities required to sustain the restoration of the power system as described in the SRAS Guideline, noting that SRAS is defined in the NER as (italicised terms are defined under the Rules):

> A service provided by *plant* or *facilities* with:
>
> (a) *black start capability*; or
>
> (b) the capabilities described in the *SRAS Guideline* to supply one or more services to sustain the stable *energisation of generation* and *transmission*,
>
> sufficient to facilitate the restoration and maintenance of *power system security* and the restart of *production units* following a *major supply disruption*.

The Panel has detailed the factors that it considered in making its determination of the Standard in its decision, "*AEMC Reliability Panel 2025, System Restart Standard, Final Determination, 11 December 2025*". This final determination explains how the Panel has reviewed and determined the Standard in accordance with the SRAS Objective - "to minimise the expected costs of a major supply disruption, to the extent appropriate having regard to the national electricity objective."

This Standard takes effect from 1 July 2027.

2. NER Requirements for the Standard

The requirements for the Standard are specified in clause 8.8.3(aa) of the Rules, which states that (italicised terms are defined under the Rules):

> The *system restart standard* must:
>
> **(1)** be reviewed and determined by the *Reliability Panel* in accordance with the *SRAS Objective*;
>
> **(2)** identify the maximum amount of time within which SRASs are required to restore *supply* in an *electrical sub-network* to a specified level, under the assumption that *supply* (other than that provided under a *SRASs* agreement acquired by *AEMO* for that *electrical sub-network*) is not available from any neighbouring *electrical sub-network*;
>
> **(3)** include the aggregate required reliability of *SRASs* for each *electrical sub-network*;
>
> **(4)** apply equally across all *regions*, unless the *Reliability Panel* varies the *system restart standard* between *electrical sub-networks* to the extent necessary:
>
> **(A)** to reflect any technical system limitations or requirements; or

1 NER clauses 3.11.7(a1) and 4.3.1(p).

(B) to reflect any specific economic circumstances in an *electrical sub-network*, including but not limited to the existence of one or more *sensitive loads*;

(5) specify that a *SRAS* can only be acquired by *AEMO* under a *SRASs* agreement for one *electrical sub-network* at any one time;

(6) include guidelines to be followed by *AEMO* in determining *electrical sub-networks*, including the determination of the appropriate number of *electrical sub-networks* and the characteristics required within an *electrical sub-network* (such as the amount of *generation* or *load*, or electrical distance between *generation centres*, within an *electrical sub-network*); and

(7) include guidelines specifying the diversity and strategic locations required of *SRASs*.

3. Target restoration timeframe

For each electrical sub-network, AEMO shall procure SRAS to support the achievement of the following targets following a major supply disruption:

1. Form one or more restoration islands, as described in Section 5, in an electrical sub-network within 2 hours of the major supply disruption; and
2. Use those restoration islands to restore generation and transmission in that electrical sub-network equivalent to the capacity to supply[2] 50% of the forecast average annual underlying demand in that electrical sub-network within 8 hours of the major supply disruption.[3]

The target restoration timeframes in this Standard are targets to be used by AEMO for the purpose of restoration planning and SRAS procurement. They are not a specification of any operational requirement to be achieved in the event of a major supply disruption.

4. Aggregate required reliability of SRAS

Aggregate required reliability is the expected probability that the SRAS procured for an electrical sub-network will perform as expected to form the required restoration islands for that electrical sub-network. For each electrical sub-network, the aggregate required reliability shall meet or exceed 95%.[4]

Without limitation, AEMO's assessment of the reliability of any individual SRAS will incorporate:

- the availability of that service;
- where applicable, the expected start-up performance; and
- where applicable, the reliability of the network components between the SRAS source and the first location on a shared network from which the SRAS can energise, or support the energisation of, other generation.

The aggregate reliability of the procured SRAS in each electrical sub-network shall be determined by AEMO, considering the combination of the individual reliabilities of the SRAS procured in that electrical sub-network, together with an assessment of the impact of the points of failure set out in the guidelines for diversity in Section 9 of the Standard.

2 Supply is defined in Chapter 10 of the Rules as "the delivery of electricity".

3 "Underlying demand" in a region is the estimated total of electricity consumption defined as operational demand plus rooftop PV generation.

4 Section 6 sets out specific requirements for aggregate reliability within some electrical sub-network boundaries.

5. Guidelines for restoration islands

AEMO shall determine the specific operational characteristics for restoration islands, which shall include the following attributes:

- the ability to maintain a satisfactory operating state for the duration of a successful restoration process. This includes:
  - self-sufficiency, through maintenance of supply-demand balance, and voltage and frequency within acceptable ranges, including tolerance to reasonable changes to the island; and
  - the availability of sufficient system security capability to support re-energisation of both transmission and distribution systems.
- the ability to return network and load to service commensurate with the available generation throughout the rest of the restoration process.
- the ability to synchronise with other islands and the main grid.
- adequate communication systems to facilitate stable operation of islands.

6. Applicability of the Standard in electrical sub-networks

This Standard shall apply equally across all regions and electrical sub-networks, except as set out in this Section and in Section 10.[5]

In addition to meeting the requirements set out in Sections 3 and 4:

- for the New South Wales electrical sub-network, AEMO shall procure SRAS sufficient to also independently restart, form and maintain at least one restoration island north of Sydney within two hours of a major supply disruption without drawing power from the power system, with an aggregate reliability of at least 75 per cent.
- for the Queensland electrical sub-network, AEMO shall procure SRAS sufficient to also independently restart, form and maintain at least one restoration island north of Bundaberg within two hours of a major supply disruption without drawing power from the power system, with an aggregate reliability of at least 80 per cent.

7. Use of SRAS in neighbouring electrical sub-networks

A SRAS can only be acquired by AEMO under an ancillary services agreement for one electrical sub-network at any one time.[6]

8. Guidelines for the determination of electrical sub-networks

In determining the boundaries for electrical sub-networks, AEMO must consider the technical characteristics that would facilitate the achievement of AEMO's power system security responsibility of procuring adequate SRAS to enable it to co-ordinate a response to a major supply disruption.[7] These technical characteristics would include, without limitation, the following factors:

- the number and strength of transmission corridors connecting an area to the remainder of the power system;
- the electrical distance (length of transmission lines) between generation centres; and

5 AEMO determines the electrical sub-network boundaries in accordance with NER clause 3.11.8. These boundaries are published by AEMO in the SRAS Guideline.

6 In accordance with NER clause 8.8.3(aa).

7 Clause 4.3.1(p) of the Rules.

- an electrical sub-network should be capable of being maintained in a satisfactory operating state to the extent practicable during the restoration process, and in a secure operating state from a stage in the restoration when it is practicable to do so, as determined by AEMO.

9. Guidelines for assessing the diversity of services

In determining the aggregate reliability of SRAS in each electrical sub-network, AEMO shall assess diversity of the following characteristics across the procured SRAS sources to account for common modes of electrical or physical failure:

- **Electrical** characteristics;
- **Geographical** characteristics, including the potential impact of geographical events such as natural disasters;
- **Energy sources** or fuel utilised by services, where applicable; and
- **Systemic risks** that services may be exposed to.

In accounting for electrical diversity, AEMO needs to consider the failure of any single significant transmission element, such as a single line or corridor that is downstream of the first transmission substation in the restoration path.

10. Guidelines for the strategic location of services

AEMO shall determine the strategic location of each restoration island, and the SRAS within or outside it, based on an assessment of how the geographical and electrical location of the restoration island, and those services, best facilitate power system restoration.[8] Locational value relates to the capability of a restoration island or an SRAS to support the energisation and stable restoration of the rest of the power system in the relevant electrical sub-network. A strategic location for an SRAS may be either within or outside the electrical sub-network for which the service is procured.

AEMO must consult with the relevant *jurisdictional system security coordinator* (JSSC) in relation to the strategic location and number of SRAS for each electrical sub-network. The JSSC may provide advice to AEMO in relation to the strategic location and number of SRAS, based on its assessment of the implications for priority loads and any sensitive loads, and the existence of any related energy support arrangements.[9] AEMO must consider any such advice when determining the strategic locations and number of SRAS, and it must report to the Panel in writing how it has considered the advice.

8 NER, clause 8.8.3(aa)(7) specifies that the Panel must include guidelines specifying the diversity and strategic locations required of SRASs.

9 Chapter 10 of the NER defines an *energy support arrangement* as: A contractual arrangement between a *Generator*, *Integrated Resource Provider* or *Network Service Provider* on the one hand, and a customer or *participating jurisdiction* on the other, under which *facilities* not subject to an *ancillary services agreement* for the provision of*SRASs* are used to assist *supply* to a customer during a *major supply disruption* affecting that customer, or customers generally in the *participating jurisdictions*, as the case may be