



**Review of the System Restart Standard
AEMC Terms of Reference to the Reliability Panel
12 December 2024**

Introduction

These terms of reference are intended to guide the Reliability Panel (the Panel) in reviewing the System Restart Standard (the Standard).

In accordance with clause 8.8.3(c) of the National Electricity Rules (NER), the Australian Energy Market Commission (AEMC) requests that the Panel undertake a review of the Standard, consistent with clauses 8.8.1(a)(1A) and 8.8.3(aa). The purpose, scope and timing of this review are set out below in these Terms of Reference. If there are any inconsistencies between the NER requirements and these Terms of Reference, the NER takes precedence.

Context

The Commission considers this review is timely and critical given the transition underway in the national electricity system. This transition involves the progressive retirement of large thermal generation units along with the increase in transmission-connected renewable generation and distribution-connected resources. The Commission considers maintaining energy system security and reliability through a time of unprecedented change a priority in achieving a decarbonised system.¹ We understand that the changing system requires a review of processes and regulatory arrangements related to system restoration following a black system event or a major supply disruption.

The Australian Energy Market Operator (AEMO) has identified that it is becoming increasingly challenging to secure the necessary level of SRAS sources at the appropriate level of reliability across the NEM. The associated challenges include an increasing reliance on a limited and shrinking pool of SRAS providers and a scarcity of SRAS capability amongst new transmission-level generation. At the same time, high levels of distribution connected PV generation are presenting growing risks to system restoration².

In light of these challenges, the existing framework may need to evolve to provide the appropriate investment signals to support competitive and efficient provision of system restart services in a transitioning system. This would promote good outcomes for consumers in accordance with the SRAS objective and the National electricity objective.

Given the Panel's responsibility for determining the Standard, the Commission considers it appropriate that the Panel undertake a review of the Standard and the regulatory arrangements related to system restoration. The Commission recommends, that the Reliability Panel consider providing recommendations on the issues that fall outside the Standard but may arise within the regulatory

¹ AEMC, 2024. A Consumer Focused Net Zero Energy System. p.14.

² AEMO, 2024 General Power System Risk Review – Report, p.125.

framework that relates to system restoration following a major supply disruption – the system restart regulatory framework.

Scope and objectives for this review

The Panel is requested to undertake a review of the Standard.

In the context of the changing power system, the objectives for this review are:

- That the Panel review and make recommendations on the appropriateness of the system restart regulatory framework in the context of the future power system envisaged in the AEMO integrated system plan. In particular, the Panel is asked to consider:
 - The ability for AEMO and TNSP's to manage the restoration of the power system following a major supply disruption.
 - Measures to support the efficient and reliable provision of sufficient system restart services – including the future investment in black start capable resources.
 - The interaction of Renewable energy zones with system restart.
 - The impact of distributed PV and the role of DNSP's in system restart.
 - The role of load in system restart and the implications for the restoration of sensitive loads within critical timeframes.
- That the Panel review and set the Standard to reflect an up-to-date understanding of the power system including the risk of a major supply disruption and the costs and availability of system restart ancillary services (SRAS). The Panel's review of the Standard should be informed by the Panel's considerations on the system restart regulatory framework.

The Panel may make recommendations for actions to address any relevant issues identified through the review. These may include recommendations for potential changes to the NER and/or AEMO's procedures to support the capability to restore and re-energise the future power system following a major supply disruption.

AEMO advice

In accordance with clause 8.8.1(a)(1A) of the NER the Panel shall determine the revised Standard on the advice of AEMO.³

The Panel should give consideration to the findings and recommendations of related work programs, including:

- learnings from AEMO's most recent SRAS procurement round completed in Q3 2024
- relevant findings from AEMO's 2024 General Power System Risk Review
- power system modelling of future restoration pathways to inform the revised parameters in the Standard
- AEMO's Insights paper related to Engineering roadmap action FY25_21 – to evaluate system restart capability and options during periods when large synchronous generation is offline.⁴

³ NER clause 8.8.1(a)(1A)

⁴ AEMO, Engineering Roadmap – FY2025 Priority actions report, Priority action FY25_21, p.42.

Techno-economic advice

The Commission requests the Panel's review be informed by techno-economic modelling and scenario analysis to consider:

- the changing restart pathways given the retirement of existing thermal generation and implementation of renewable energy zones.
- the costs and range of new and existing technologies that may provide SRAS
- the approach to estimating the probability of future black system conditions given the risks and uncertainties in a NEM undergoing a disruptive technological transition.

Background

The Standard is part of the system restart regulatory framework that relates to the requirements and responsibilities for the restoration of the power system following a major supply disruption that leads to the unplanned de-energisation of part of the transmission system. Such an event, also known as a black system event, typically involves a substantial loss of generation and supply to customer load.

In the event of a major supply disruption, SRAS (or restart services) may be used to supply sufficient energy to restart power stations in order to begin the process of restoring the power system. SRAS may include black start capability or the restoration support services which support the stable energisation of generation and transmission following a major supply disruption.

The Panel is responsible for determining the Standard, which guides AEMO's procurement of SRAS and sets out several key parameters for system restoration, including the speed of restoration, how much supply is to be restored and the level of reliability of SRAS. AEMO then procures restart services to meet the Standard, and develops the System Restart Plan in accordance with the Standard. Other aspects of the framework include the general responsibilities and parameters set out in the NER, as well as AEMO's procurement guidelines.

The Standard sets the 'benchmark' for the requirements and procurement of SRAS. The benchmarks specifically relate to the services which allow energy to be supplied (and a connection to be established) sufficient to initiate the process of restarting the power system following a major disruption. The Standard does not define or specify any operational procedures to be followed by AEMO or market participants in the event of a black system condition.

Restoring the power system after a black system event is a highly complex and technical task that would require the coordination of many parties in the NEM including AEMO, network service providers, generators and customers. As most generating units require a source of electrical power to restore their auxiliary plant and restart, SRAS providers "restart" the power system by providing energy to other generators following a major blackout, which enables the power system to be re-energised and supply to consumers to be restored. The availability of sufficient system restart capability is integral to the restoration of the power system following a black system event and mitigates against the risk of prolonged supply disruption caused by high impact – low probability events such as natural disasters.

The Commission notes that the Panel undertook a limited review of the Standard in 2020 focusing on changes to the Standard relating to the amalgamation of the Northern and southern Queensland sub-networks. The Panel completed a more fulsome review of the Standard in 2016.

NER requirements

When determining the Standard, the Panel must consider whether the relevant requirements in the NER have been met. The NER requirements applying to the Panel's determination of the Standard are described below.

NER clause 8.8.1 (a) 1A) sets out that the Reliability Panel must on the advice of AEMO, determine the system restart standard.

NER clause 8.8.3(aa)(1), sets out that the Reliability Panel must review and determine the Standard in accordance with the SRAS Objective.⁵

Clauses 8.8.3(aa)(2) to (7) of the NER state that the system restart standard must:

- 2) *identify the maximum amount of time within which system restart ancillary services 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 system restart ancillary services 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 system restart ancillary services 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*
 - (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 system restart ancillary service can only be acquired by AEMO under a system restart ancillary services 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 system restart ancillary services.*

Consultation

Stakeholder engagement will be central to the effective development of the Standard. The Panel should consult with as wide a range of stakeholders as possible, including AEMO, network service providers, generators, consumers, jurisdictional governments (jurisdictional system security coordinators) and any other relevant bodies.

The Panel may obtain technical advice or assistance as it thinks appropriate including, without limitation, advice or assistance from AEMO and any Registered Participant, pursuant to clause 8.8.3 (h) of the NER.

⁵ The SRAS Objective is defined in Chapter 10 of the NER as: The objective for SRASs is to minimise the expected costs of a major supply disruption, to the extent appropriate having regard to the national electricity objective.

The Panel would undertake this review in two stages:

- **Stage 1:** review the system restart regulatory framework and make recommendations to the Commission with respect to the considerations outlined in this Terms of Reference.
- **Stage 2:** review and set the system restart standard that is informed by stage 1, to reflect an up-to-date understanding of the power system including the risk of a major supply disruption and the costs and availability of SRAS.

Timing and deliverables

The Panel must carry out the review to develop the Standard in accordance with the following process:

- Give notice to all registered participants of commencement of this review and invite submissions for a period of at least four weeks.
- Publish an issues paper for consultation with stakeholders at the time of notifying stakeholders of the review. This paper should outline the key issues and questions the Panel will consider when determining the Standard.
- Publish a draft report and invite submissions for a period of at least six weeks.
- At the time of publishing the draft report, notify stakeholders that they may request a public meeting on the draft report within five business days of the draft report being published.
- If stakeholders have requested a public meeting, notify stakeholders that a public meeting will be held. The Reliability Panel must give reasonable notice of any such meeting (in this case, at least two weeks' notice of the public meeting will be given).
- Publish a final report and submit this report to the AEMC.

The Panel may decide on its own timing for delivery of the review and any additional consultation processes, provided the review is completed by 30 December 2025. This will allow for a period of at least 18 months from the date the revised Standard is determined to the date that AEMO's next SRAS procurement round is planned to be completed, currently 30 June 2027.