

SYSTEM RESTART ANCILLARY SERVICES GUIDELINE 2020

ISSUES PAPER

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EXECUTIVE SUMMARY

System restart ancillary services (SRAS) can be used to re-energise a part of the National Electricity Market (NEM) power system following a black system or other major supply disruption.

AEMO has historically only procured SRAS from generating units capable of starting and re-energising parts of the power system without taking supply from the power system. AEMO's SRAS Guideline sets out requirements and processes for procuring SRAS, and is made under clause 3.11.7 of the National Electricity Rules (NER).

AEMO has prepared this Issues Paper to facilitate informed debate and feedback by industry about how to update the SRAS Guideline to account for the *National Electricity Amendment (System restart services, standards and testing) Rule* recently made by the Australian Energy Market Commission (AEMC).

The amending rule is broad in scope and has required significant changes to the SRAS Guideline, in terms of:

- Specification of services, including the addition of a new category of SRAS – restoration support services.
- New testing requirements, both for SRAS procurement or contract testing and for wider testing of system restoration paths.
- Changes to the general objective for AEMO's procurement of SRAS.

AEMO has prepared a consultation draft SRAS Guideline for comment, which should be read in conjunction with this Issues Paper. This Issues Paper does not revisit the reasoning behind the NER amendments; it focuses on:

- Issues related to how AEMO's SRAS Guideline should apply the new NER obligations on AEMO, Participants and Network Service Providers (NSPs), and
- Clarifications and additional detail intended to better inform and assist Participants' understanding of SRAS capabilities and assessment.

It is important for stakeholders to also read the AEMC's Final Determination and Final Rule which can be found on the AEMC website¹.

The SRAS Guideline also incorporates AEMO's determination of the boundaries of the electrical sub-networks used for SRAS procurement. Currently these boundaries are generally consistent with NEM regions. The exception is Queensland, which is divided into two sub-networks (north and south). AEMO is also seeking feedback on a proposal to consolidate the two Queensland sub-networks into a single, region-based electrical sub-network for SRAS purposes.

Stakeholders are invited to submit written responses on the issues and questions identified in this paper by 5.00 pm (Melbourne time) on 3 July 2020, in accordance with the Notice of First Stage of Consultation published with this paper.

¹ <https://www.aemc.gov.au/rule-changes/system-restart-services-standards-and-testing>



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1. STAKEHOLDER CONSULTATION PROCESS

The *National Electricity Amendment (System restart services, standards and testing) Rule 2020 No. 6* requires AEMO to update the System Restart Ancillary Services (SRAS) Guideline prior to 2 November 2020.

AEMO is consulting on the SRAS Guideline in accordance with rule 8.9 of the NER.

Note that a glossary of terms used in this Issues Paper is at Appendix A.

AEMO's indicative timeline for this consultation is outlined below. Dates may be adjusted depending on the number and complexity of issues raised in submissions and any meetings with stakeholders.

Deliverable	Indicative date
Issues Paper published	13 May 2020
SRAS stakeholder forum	To be confirmed depending on demand
Submissions due on Issues Paper	3 July 2020
Draft Report published	3 August 2020
Submissions due on Draft Report	4 September 2020
Final Report published	16 October 2020

Prior to the due date for submissions on this Issues Paper (3 July 2020), stakeholders can request a meeting with AEMO to discuss the issues and proposed changes raised.

During the consultation process AEMO will liaise closely with the Reliability Panel, which is required to update the system restart standard (SRS) to take account of the amending rule. Changes to the SRS may need to be reflected in the SRAS Guideline.



2. BACKGROUND

2.1 NER requirements

On 2 April 2020, the Australian Energy Market Commission (AEMC) made the *National Electricity Amendment (System restart services, standards and testing) Rule 2020 No. 6*.² The final rule included both an Amending Rule in Schedule 1 and a Transitional Rule in Schedule 2.

Schedule 1 will commence on 2 November 2020; Schedule 2 commenced on 2 April 2020.

As required by Transitional Rule clause 11.123.2(a), AEMO is required to update the SRAS Guideline to reflect the Amending Rule prior to 2 November 2020. The SRAS Guideline is required to include the matters in clause 3.11.7 of the National Electricity Rules (NER), as expanded by the Amending Rule.

The Transitional Rule also requires the Reliability Panel to update the system restart standard (SRS) (clause 11.123.3):

- the Reliability Panel must, as soon as practicable after 2 April 2020, and in accordance with the consultation requirements in clause 8.8.3, update the system restart standard to take into account the Amending Rule.
- from 2 November 2020 and until such time as the system restart standard is updated by the Reliability Panel, the system restart standard is to be interpreted as if it applied to system restart ancillary services as defined under the Amending Rule.

2.2 Context for this consultation

System restart ancillary services (SRAS) can be used to restore the power system following a major supply disruption, including a black system event. As part of AEMO's power system security responsibilities, AEMO must procure adequate SRAS to enable it to coordinate a response to a major supply disruption.

The Amending Rule:

- expands the definitions of SRAS and black start capability, to allow AEMO to procure the capabilities from a range of sources as needed to effectively restore sufficient generation and transmission to meet the SRS;
- clarifies that AEMO can take overall costs into account when procuring SRAS (including both short-term and long-term costs);
- establishes a framework for the physical testing of system restart paths;
- requires any differences between the procedures used for SRAS testing and for a real black system event to be identified and assessed; and
- clarifies roles of the different parties involved in system restoration and the communication processes they must follow.

The SRS is determined by the Reliability Panel convened by the AEMC and sets the key targets and guidelines for AEMO's procurement of SRAS. The current version of the SRS was published by the Reliability Panel on 15 December 2016, with an effective date of 1 July 2018.

The SRS includes the levels of supply (generation and transmission) that the procured SRAS should be capable of restoring within a specified target timeframe and reliability level after a major supply disruption affecting an electrical sub-network in the National Electricity Market (NEM) power system.

² AEMC, System restart services, standards and testing, Rule determination, 2 April 2020.



AEMO does not currently expect that the Amending Rule will necessitate material changes to the SRS, but will liaise closely with the Reliability Panel as it reviews the SRS with the aim to ensure the SRAS Guideline is consistent with any SRS amendments, whether they are made before or after 2 November 2020.

As part of this consultation, AEMO is also considering a change to the boundaries of electrical sub-networks, specifically to consolidate the existing two Queensland sub-networks. As the SRS currently specifies different restoration quantities, timeframes and reliability levels for each sub-network individually, a change of this nature would require further SRS amendment. AEMO will discuss with the Reliability Panel how the necessary consultations could be efficiently managed.

After completion of this consultation process and commencement of the Amending Rule on 2 November 2020, AEMO intends to commence a procurement process for SRAS in all sub-networks for periods from 1 July 2021.



3. ISSUES FOR DISCUSSION

AEMO has drafted proposed amendments to the SRAS Guideline to reflect the Amending Rule, together with clarifications and additional detail intended to better inform and assist Participants' understanding of SRAS capabilities and AEMO's assessment process. The key changes proposed to the SRAS Guideline are described below.

3.1 Amendment to the definition of SRAS and black start capability

The Amending Rule expands the definitions of SRAS and black start capability, to allow AEMO to procure the services needed to effectively restore supply:

- The definition of black start capability now allows for that capability to be provided from facilities other than generating units.
- The definition of SRAS includes services with the capability to sustain the stable energisation of generation and transmission in a system restoration.

Changes to definition of black start capability

Currently, black start capability is the capability to restart a disconnected generating unit and deliver power to the network using an energy source independent of the power system. This is the initial step in energising other generator auxiliaries and networks so supply to customers can be progressively restored.

The Amending Rule expands the scope to allow this service to be provided by a facility other than a generating unit, or a combination of facilities. This recognises the possibility that new and developing technologies, such as specially designed batteries and grid forming inverters, possibly with other technologies such as synchronous condensers, may be able to provide this capability in future.

As a result of this expanded definition of black start capability, the SRAS Guideline must now describe the capabilities that would otherwise have been inherent characteristics of a synchronous generator in terms that can apply to a broader set of potential black start facilities. Most of these amendments will be in section 3.3 of the draft SRAS Guideline. They aim to be technology-neutral, except where there is a specific need to differentiate (e.g. regarding trip to house load (TTHL) schemes).

It should be noted the technical requirements proposed in section 3.3 of the draft SRAS Guideline will apply to a black start service as a whole. As defined in the Amending Rule, a single service could be provided using a mixed set of technologies across more than one facility.

AEMO asks stakeholders to consider whether the proposed amendments provide adequate guidance on the technical requirements for a black start service. Stakeholders may also consider whether they are under or over prescriptive, noting there is a balance between the detail needed to enable potential SRAS providers to understand whether their facility could qualify to provide a service, and the flexibility to consider technologies that could meet those requirements in different ways.

Introduction of Restoration Support Services

AEMO has proposed a new section 3.4 of the draft SRAS Guideline, outlining the technical capabilities for restoration support services. These services are not specifically defined in the Amending Rule, but are contemplated by the extended definition of SRAS.

The Amending Rule requires the SRAS Guideline to describe the capabilities, of which there may be more than one, that a restoration support service must meet to qualify as SRAS. These are 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 generating units following a major supply disruption.

The amended SRAS definition (underlined section above) outlines the high-level outcomes that restoration support services should achieve. These high-level outcomes relate to the SRS, in that restoration support services must assist in continuing the restoration or ensuring the power system can remain stable in the prevailing network conditions.

The aim of the Amending Rule is to provide AEMO with the flexibility to specify technical requirements of support services in the SRAS Guideline and modify them as required, consistent with the objective of developing regulatory frameworks that are adaptable to changing market and power system conditions. It should be noted that restoration support services are most likely to be considered when AEMO expects that restoration might not be achieved to at least SRS levels given the inherent characteristics of power system equipment otherwise available in a restart process. These needs may change over time with changes in network topology, including reductions in system strength and availability of stabilising loads.

For these reasons, drafting suitable amendments to the SRAS Guideline is not straightforward.

Restoration support services represent technical services, or attributes, needed for a stable power system in a range of present and future conditions, that must, at least in part, need to be provided by emerging technologies.

AEMO has proposed some general requirements for all restoration support services in section 3.4.1 of the draft SRAS Guideline, and described the requirements for each alternative service in section 3.4.2. Section 3.4.2 aims to describe the attributes that facilities may provide to support restoration. For example, attributes required to support the stable restoration of the power system in the conditions expected in the early stages of a system restoration process may be dynamic voltage control and frequency control. It is proposed that a restoration support service must demonstrate at least two of these attributes to be considered for SRAS procurement. In practice, AEMO expects the technical capabilities required for each of them would also facilitate the provision of most others.

AEMO asks stakeholders to consider whether the proposed amendments provide adequate guidance on the technical requirements for restoration support services.

Stakeholders may also consider whether they are under or over prescriptive, again noting the need to appropriately balance detail with the flexibility to adapt to changing network conditions and emerging technologies.

Additional complexities arise because, in black system conditions and as initial restoration commences, the network may be weaker and operating conditions more extreme than those contemplated in power system standards or registered performance standards. AEMO welcomes comments on the ability of asynchronous units to meet these requirements under the likely operating conditions of system restoration.

3.2 Amendment to the SRAS Procurement Objective

The Amending Rule makes a minor amendment to the SRAS Procurement Objective to clarify that AEMO can take long-term costs into account when procuring SRAS to meet the SRS at lowest cost.

The AEMC stated that: 'Practically speaking, this change will make it clear that AEMO can enter into long-term SRAS contracts, or procure specific combinations of services, if it considers that this will result in the lowest long-term costs for consumers³'.

³ Page iv, point 22, AEMC, System restart services, standards and testing, Rule determination, 2 April 2020.



The Amending Rule also requires AEMO to provide guidance in the SRAS Guideline on how it will achieve the SRAS Procurement Objective.

Section 6 of the draft SRAS Guideline explains AEMO's proposed approach to meeting the SRAS Procurement Objective. Sections 6(a) and (b) are largely unchanged and reflect AEMO's practice of modelling the system restart using the reliability information provided by potential suppliers of SRAS to assess whether the SRS can be met in each sub-network. At least for the near horizon, AEMO will always need to complete detailed modelling to determine whether its procurement meets the SRS.

The proposed additional sections 6(c) and 6(d) explain how AEMO interprets the change to the SRAS Procurement Objective. When considering lowest long-term costs, AEMO is expected to balance long-term and short-term costs to minimise expenditure. The ability to focus on longer-term procurement requires AEMO to focus less on a deterministic assessment of the SRS, and instead take more of a risk-based approach, where the benefits of new entry, technological advances and longer-term coordinated resource planning must be offset against the risk that AEMO might, in theory, be acquiring more services than might strictly be required for the power system as configured at the time of procurement. There is also the regulatory risk, given the possibility that some system services, like restoration support services, may be remunerated with future market designs.

AEMO considers the additional section 6(d) may be particularly suited to restoration support services.

AEMO asks stakeholders to consider whether the factors described in section 6(c) and (d) of the draft SRAS Guideline are appropriate considerations in meeting the requirements of the SRAS Procurement Objective.

If not, please suggest additional or alternative factors that can be readily applied for a range of future scenarios.

AEMO would also welcome stakeholder views on potential contractual structures that may be generally appropriate for a wide range of SRAS, explaining why they would facilitate achievement of the SRAS Procurement Objective.

3.3 New framework for the physical testing of system restart paths

The Amending Rule introduces a regulatory framework, including AEMO, Network Service Providers (NSPs) and third parties for the physical testing of system restart paths.

This differs from the existing Rule by establishing a formal framework for testing the effectiveness of restoration capability beyond contracted SRAS delivery points. It requires NSPs and other registered Participants to collaborate with AEMO to plan and facilitate testing.

AEMO has proposed new sections in the draft SRAS Guideline to include the content required by the Amending Rule, as well as additional guidance on related matters. The draft additions are in sections 4.5 and Appendix B, and include:

- guidance on the factors influencing a decision of AEMO to conduct a system restart test (section 4.5.1), including (but not limited to) the types of conditions or changes in the power system which could necessitate a system restart test;
- guidance to registered Participants on how they should develop system restart test procedures (section 4.5.2), with reference to how evidence of a successful test should be recorded (appendix B); and



- guidance to registered participants required to participate in a system restart test under clause 4.3.6 (to be made on 2 November 2020) on the measurements and data to be reported to AEMO about the operation of their facilities during the system restart test (section 4.5.3, appendix B).

The Amending Rule also establishes:

- a compensation framework in new clause 4.3.6 to allow third party test participants to claim compensation for any direct costs incurred as a result of their participation in a test; and
- provisions for AEMO to report to test participants on the performance of their facilities in a system restart test, and additional annual public reporting requirements under clause 3.11.10(b) of the NER.

AEMO considers the compensation and reporting requirements are fully covered in the NER and do not require any further change to the SRAS Guideline.

AEMO asks stakeholders to consider whether the draft SRAS Guideline, including Appendix B, provides sufficient guidance on the requirements under the Amending Rule for the new testing regime.

3.4 SRAS testing and test procedures

The Amending Rule requires the SRAS Guideline to include 'requirements designed to identify any inconsistencies between the arrangements used in the testing of system restart ancillary services and those planned to be used in the deployment of system restart ancillary services following a major supply disruption and how the impact of any inconsistencies will be assessed'.

When the SRAS Guideline was amended in 2017, following AEMO's review of the 2016 South Australian black system event and additional feedback from the Australian Energy Regulator's (AER's) investigation of the event, AEMO incorporated provisions that largely address this requirement in the Amending Rule. AEMO has therefore proposed only clarifying amendments to the draft SRAS Guideline (in section 4.1, 4.2 and 4.4), to recognise that:

- in reality, test conditions while the grid is live cannot accurately replicate an actual black system event;
- some SRAS, particularly restoration support services, may be located within distribution networks;
- there is a need for collaborative preparation, testing and reporting processes involving all relevant NSPs, the SRAS Provider and AEMO, to ensure all have a mutual understanding of how things would be done differently in a black system event.

In addition, AEMO has proposed some additional changes to the draft SRAS Guideline to provide flexibility and clarification of SRAS testing roles and requirements. These include:

- An ability for AEMO to request the relevant Transmission Network Service Provider (TNSP) to incorporate the transmission components between the SRAS delivery point and the first downstream substation into an SRAS test (section 3.6.4(e)). Under the SRS, these components must be included in the assessment of the reliability of individual SRAS. Testing may be beneficial (particularly before procurement) to confirm this assessment. This equipment would not be tested if there was a material risk to system security, reliability or other connected equipment.
- Adjustments to the SRAS test triggers and timing in section 4.3 to recognise that a system restart test involving a contracted SRAS source will count as one of its mandatory annual tests, and also to better define the types of maintenance that are relevant in considering whether a post-maintenance SRAS test is needed.



AEMO asks stakeholders to consider whether any additional changes to the SRAS Guideline are needed to facilitate identification of differences between test procedures and actual restart procedures, or other improvements or clarification in relation to testing.

3.5 Boundaries of electrical sub-networks

The SRAS Guideline incorporates AEMO's determination of the boundaries of electrical sub-networks for which SRAS is procured, under clause 3.11.8 of the NER. These are currently defined in line with the NEM regional boundaries, other than Queensland, which is divided into two sub-networks, with the north-south sub-network boundary located just north of South Pine and Tarong.

AEMO is considering whether it is appropriate to consolidate the existing two Queensland sub-networks, and is seeking stakeholder feedback on the appropriateness of this change. Note that no change has yet been made to the draft SRAS Guideline to reflect this option.

AEMO has previously used a separation of north and south Queensland for SRAS procurement purposes. However, recent procurement rounds have shown that almost all SRAS-capable generation and non-SRAS generation capable of supporting restoration is located in central and southern areas of the Queensland region. Having separate sub-networks creates a requirement to identify distinct and separate restoration paths for each sub-network, each with SRAS procured to serve only one of those sub-networks (even though they may all be located in the southern part). NSP, AEMO and generator staff prepare according to the restart plans developed for each individual sub-network.

This current separation may artificially limit the overall restoration capability that could be achieved if the entire Queensland region were a single sub-network, allowing each SRAS source to be procured and planned for concurrent use to energise to the north or south of the region. Additionally, combining the sub-networks may help to maximise the available stabilising load required for the SRAS units, allowing a faster transmission corridor rebuild process.

As the SRS currently specifies different restoration quantities, timeframes and reliability levels for each sub-network individually, a change of this nature would require further, considered SRS amendment. AEMO will discuss with the Reliability Panel how the necessary consultation on the SRS could be efficiently managed to align with any change in the existing boundaries, and how to account for the practical limitations of restoration in the Queensland network within the SRS.

AEMO requests stakeholder views on the potential consolidation of the two existing Queensland sub-networks, in particular whether there may be any drawbacks or unintended consequences of consolidation, matters for deeper investigation, or any advantages not identified in this Issues Paper.



4. SUMMARY OF MATTERS FOR CONSULTATION

In summary, AEMO seeks comment and feedback on whether the changes to the draft SRAS Guideline satisfy the requirements of the Amending Rule.

The following box highlights the requests for stakeholder feedback AEMO has made throughout this document. AEMO welcomes responses to these requests, as well as suggestions about any other issues stakeholders believe are relevant to AEMO's review of the SRAS Guideline, in accordance with the NER.

- AEMO asks stakeholders to consider whether the draft SRAS Guideline provides adequate guidance on the technical requirements for a **black start service**. Stakeholders may also consider whether they are under or over prescriptive, noting there is a balance between the detail needed to enable potential SRAS providers to understand whether their facility could qualify to provide a service, and the flexibility to consider technologies that could meet those requirements in different ways.
- AEMO asks stakeholders to consider whether the draft SRAS Guideline provides adequate guidance on the technical requirements for **restoration support services**. Stakeholders may also consider whether they are under or over prescriptive, again noting the need to appropriately balance detail with the flexibility to adapt to changing network conditions and emerging technologies.
 - AEMO welcomes comments on the ability of asynchronous technologies to meet these requirements under expected operating conditions during system restoration.
- AEMO asks stakeholders to consider whether the factors described in section 6(c) and (d) of the draft SRAS Guideline are appropriate considerations in meeting the requirements of the **SRAS Procurement Objective**. If not, please suggest additional or alternative factors that can be readily applied for a range of future scenarios.
 - AEMO would also welcome stakeholder views on potential **contractual structures** that may be generally appropriate for a wide range of SRAS, explaining why they would facilitate achievement of the SRAS Procurement Objective.
- AEMO asks stakeholders to consider whether the draft SRAS Guideline, including Appendix B, provides sufficient guidance on the requirements under the Amending Rule for the **new system restart testing regime**.
- AEMO asks stakeholders to consider whether any additional changes to the SRAS Guideline are needed to facilitate **identification of differences between test procedures and actual restart procedures**, or other improvements or clarification in relation to testing.
- AEMO requests stakeholder views on the potential consolidation of the two existing **Queensland sub-networks**, in particular whether there may be any drawbacks or unintended consequences of consolidation, matters for deeper investigation, or any advantages not identified in this Issues Paper.

Submissions must be made in accordance with the Notice of First Stage of Consultation published with this paper by 5.00 pm (Melbourne time) on 3 July 2020.



APPENDIX A - GLOSSARY

Term or acronym	Meaning
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator Limited
Amending Rule	Schedule 1 of the <i>National Electricity Amendment (System restart) Rule 2020 No. 6</i>
Black start service	An SRAS procured for its 'black start capability', as defined in the Amending Rule
NEM	National Electricity Market
NER	National Electricity Rules
NSP	Network Service Provider
Restoration support service	A service with the capability to sustain the stable energisation of generation and transmission in a system restoration.
SRAS	System restart ancillary service
SRAS Guideline	The guideline made by AEMO in accordance with clause 3.11.7 of the NER.
SRAS Procurement Objective	The objective to be met by acquiring SRAS. Under the Amending Rule, this is to meet the system restart standard at the lowest long term cost.
SRS	The system restart standard made by the AEMC Reliability Panel
TNSP	Transmission Network Service Provider
Transitional Rule	Schedule 2 of the <i>National Electricity Amendment (System restart) Rule 2020 No. 6</i>
TTHL	Trip to house load