AEMC

RULE

Australian Energy Market Commission

DRAFT RULE DETERMINATION

NATIONAL ELECTRICITY AMENDMENT (SYSTEM RESTART SERVICES, STANDARDS AND TESTING) RULE 2020

PROPONENTS

Australian Energy Market Operator (AEMO)
Australian Energy Regulator (AER)

19 DECEMBER 2019

INQUIRIES

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ABOUT THE AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

SUMMARY

1 The Australian Energy Market Commission (AEMC or Commission) has made a more preferable draft rule to improve the provision and effectiveness of system restart ancillary services (SRAS).

2 The draft rule will enhance the ability of AEMO, transmission network service providers (TNSPs) and other parties involved in the restoration of the power system to effectively prepare for, and respond to, a major supply disruption. These changes will increase the likelihood that electricity supply can be restored to consumers in a timely manner following a major blackout.

3 The Commission considers that these changes are necessary to make sure that the frameworks for the procurement, testing and deployment of SRAS are adaptable to the ongoing changes in the power system. In particular, the changing generation mix, such as the increasing penetration of asynchronous, inverter-connected generators in the national electricity market (NEM), can create challenges relating to the availability and dependability of the services required to restore supply during a system restoration.

4 The draft rule addresses these challenges by:

- expanding the definitions of SRAS and black start capability to allow AEMO to procure the services needed to effectively and promptly restore supply to consumers
- clarifying that AEMO can take *overall* costs into account when procuring SRAS (including both short-term and long-term costs)
- establishing a transparent framework for the physical testing of system restart paths
- clarifying the scope, form and content of the SRAS communication protocols.

5 Background

6 The Commission's more preferable draft rule is in response to two rule change requests relating to SRAS:

- On 29 July 2019, the Australian Energy Market Operator (AEMO) submitted a rule change request seeking to incentivise the provision of both system restart and restoration support capabilities from a range of different technologies and to facilitate more extensive testing to verify the viability of system restart paths.
- On 6 September 2019, the Australian Energy Regulator (AER) submitted a rule change request seeking to provide greater clarity and transparency about the roles and responsibilities of parties involved in responding to a major supply disruption.

7 What is SRAS?

8 System restart ancillary services enable the recovery of the power system following a major disturbance, where large parts of the power system have collapsed to a "black system" condition. SRAS is currently provided by generators with the capability to start, or remain in service, without electricity being provided from the grid. Not all generators currently have this capability, given the additional cost involved to equip generating plant with this capability.

9 Why are changes to the SRAS frameworks needed?

10 AEMO and the AER identified a number of challenges arising under the existing frameworks governing the procurement, testing and deployment of SRAS, including:

- there are fewer traditional sources of SRAS available in some NEM regions, and those that remain are potentially less capable of restoring the power system. This issue can be at least partly addressed by expanding the definition of SRAS, to allow new parties and new technologies to offer these services.
- the definition of SRAS currently only encompasses black start capability and does not refer to other ancillary services that are needed to support the stable restoration of the power system. Defining these new services will allow AEMO to source them as necessary to deliver an effective restoration of the power system.
- existing modelling and generator-level testing of contracted SRAS sources may not be sufficient, by themselves, to accurately determine whether the SRAS acquired by AEMO is capable of effectively restoring the power system to meet the requirements of the system restart standard. Physical testing of restart paths is needed to complement this modelling and generator-level testing.
- the NER do not provide sufficient clarity and delineation between the roles of AEMO, transmission network service providers (TNSPs) and other parties involved in system restoration, particularly in relation to the communication processes needed to facilitate an effective response to a major supply disruption. Clarifying these roles and responsibilities will enhance the effectiveness of the system restoration process generally.

11 Overview of draft rule

12 The more preferable draft rule proposes a number of changes to the existing frameworks governing the definition, procurement, testing and deployment of SRAS, to address the issues identified above.

13 These changes will provide AEMO with the tools that are needed to effectively prepare for and respond to major blackouts in the context of a changing power system. The ***changes to the definition of SRAS*** and the ***clarification of the SRAS Procurement Objective*** will ensure that AEMO has access to the services required to restore the power system in a timely manner. ***Incorporating a framework for physical testing of system restart paths*** in the rules will also allow issues which could delay or prevent a successful system restoration to be identified and resolved ahead of time. In addition, the draft rule provides ***greater transparency and certainty to participants about the roles and responsibilities*** of the various parties involved in system restoration.

14 Taken together, these changes to the SRAS frameworks are expected to enhance the security and resilience of the power system and reduce costs for consumers over the long term. The key changes under the draft rule are summarised below.

- **Changes to the definitions of SRAS and black start capability:** The draft rule makes two key changes to the definition of SRAS:
  - Firstly, it amends the definition of black start capability, to allow for this capability to be provided by plant other than generating units. This may include, for example,

battery storage systems and new technologies utilising grid-forming inverters which may be capable of providing this service.

- Secondly, it also expands the definition of SRAS to include system restoration support services. These are a new type of ancillary service that support the stable re-energisation of the grid, in support of black start services. These services will be specified by AEMO and procured under the SRAS procurement framework.

- **Clarification of the SRAS Procurement Objective:** The draft rule makes a minor amendment to the SRAS Procurement Objective to clarify that AEMO can take *overall* costs into account when procuring SRAS to meet the SRS at lowest cost. This change clarifies the existing policy intent of the NER, which is that AEMO should consider the full extent of costs associated with its procurement of SRAS, including the ability to consider and balance the short term and long term costs of procuring SRAS to meet the SRS. Practically speaking, we consider this minor change will make it clear that AEMO has the ability to 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 consumers.
- **System restart path testing:** The draft rule establishes a transparent framework for the physical testing of system restart paths. This framework is designed to provide greater certainty that AEMO's system restart plans will work effectively, improving the likelihood of a prompt restoration of supply following a major black system event. The changes made to the frameworks specify clear roles and obligations for the parties involved in such testing. The draft rule also addresses a number of issues raised by stakeholders in relation to these tests, including by enabling participants that incur direct costs as a result of participating in a test to claim compensation using an existing compensation process. This is considered necessary given that participants have limited ability to manage these costs and some participants may be disproportionately affected. The draft rule also requires AEMO to:
  - provide guidance to participants on the frequency with which the tests may occur
  - provide at least six months' notice to participants prior to a test occurring
  - design the test to minimise the cost and operational impacts on participants
  - report on the outcomes of a test, including how it sought to achieve the above objective.
- **SRAS communication protocols:** The draft rule clarifies the scope, form and content of information that must be exchanged by the parties involved in system restoration and the processes by which these communications are to occur.
- **Local black system procedures (LBSPs):** The draft rule clarifies the nature of the information included in LBSPs and how this relates to parties' compliance obligations under the rules.

15 The draft rule does not propose any changes to the generator technical performance standards. The Commission considers that mandating that new connecting generators be capable of providing restoration support services (as proposed by AEMO) would be inefficient and duplicative, as AEMO will have the ability to procure these services through the SRAS frameworks in accordance with the system restart standard.

16 Consultation and next steps

17 The Commission invites submissions on this draft rule determination, including the more preferable draft rule, by 20 February 2020. Following consideration of submissions, the Commission intends to publish its final determination and final rule by 2 April 2020. If any stakeholder wants to discuss aspects of this draft determination, please do not hesitate to contact Mitchell Shannon on (02) 8296 7800 or mitchell.shannon@aemc.gov.au to request a meeting.

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1 THE RULE CHANGE REQUESTS

1.1 Rule change requests

The Australian Energy Market Commission (AEMC or Commission) has received two rule change requests relating to System Restart Ancillary Services (SRAS):

- On 29 July 2019, the Australian Energy Market Operator (AEMO) submitted a rule change request seeking to incentivise the provision of both system restart and restoration support capabilities from a range of different technologies. AEMO's rule change request also seeks to facilitate more extensive testing to verify the viability of system restart paths, increasing the level of assurance that system restoration will succeed. AEMO's rule change request proposes changes to four key aspects of the existing regulatory framework for SRAS, including the:
  - definition of the services that fall within the scope of SRAS
  - way SRAS is procured by AEMO
  - framework for ongoing testing of SRAS
  - technical access standards which must be met by new connecting generators.
- On 6 September 2019, the Australian Energy Regulator (AER) submitted a rule change request seeking to provide greater clarity and transparency about the roles and responsibilities of parties involved in responding to a major supply disruption, particularly in respect of information provision and communication protocols relating to SRAS, and to ensure rigorous process approval for each step of the system restart process.

Given the common subject material and close interactions between the two rule change requests, the Commission decided to consolidate them under section 93 of the NEL.

1.2 Rationale for the rule change requests

1.2.1 Decline of effective SRAS sources and supporting resources

AEMO's rule change request suggests that it has become apparent during recent SRAS procurement cycles that there are fewer traditional sources of SRAS in some NEM regions, and those that remain are potentially less capable of reliably restoring generation and transmission to a point from which load can ultimately be restored within a reasonable timeframe.[1]

According to AEMO, this is due to a number of factors, including:[2]

- the increasing penetration of asynchronous, intermittent grid-connected generation with no black start capability and currently no active capability to support grid stability during restoration
- the declining reliability and availability of synchronous generating plant that has historically been assumed to be available and ready to be energised as required to

1 AEMO, *System restart services, standards and testing* - rule change request, p. 4.
2 Ibid.

provide the black start capability and system support needed to continue the restoration process after initial restart

- fewer static loads (i.e. loads not connected via power electronic inverters) being available for grid stabilisation, combined with a very high uptake of distributed energy resources, make it increasingly difficult to restore supply in a stable manner.

AEMO also note that the planned withdrawal of thermal plant from the NEM over the next three to four years could further exacerbate these challenges.[3]

1.2.2 Lack of incentives for alternative sources of restart and support

AEMO considers that stronger incentives are needed for generators, energy storage providers and other types of plant to invest in black start capability, as the incentives available through the existing SRAS contract market are not sufficient to facilitate such investment.[4]

In addition, AEMO contends that the NER imposes limitations on the scope of SRAS services because the definition of SRAS prescribes that:[5]

- SRAS is currently only capable of being provided by generating units
- the service is limited to the delivery of electricity to (or energisation of) a particular point on the network.

AEMO also suggests that the SRAS Procurement Objective, which requires AEMO to procure sufficient SRAS to meet the system restart standard at lowest cost, restricts its ability to enter into long-term contracts with new SRAS providers as these may not be the lowest cost providers available.[6]

1.2.3 SRAS testing and communications protocols

System restart path testing

AEMO suggests that existing generator level testing carried out on contracted SRAS sources cannot be used to validate the interactive and inter-dependent response of the SRAS source and the wider network to which it is connected, as current testing is only sufficient to validate the simulated response of SRAS generators to deliver electricity to a defined point and sustain stable output for a specified period.[7]

Further, AEMO considers that modelling alone is insufficient to establish whether the SRAS acquired by AEMO is effective for system restart due to the ongoing transformation of the power system and emerging phenomena which can reduce the level of confidence in modelling outcomes unless validated against actual test results involving the wider network.[8]

SRAS communication protocols

3 Ibid.
4 Ibid.
5 Ibid, p. 9.
6 Ibid.
7 Ibid.
8 Ibid.

The AER's rule change request has been informed by the conclusions of its report on stages 1, 3 and 4 of the black system event in South Australia on 28 September 2016.[9] In particular, the AER notes that the circumstances surrounding the provision of SRAS by Origin Energy's Quarantine Power Station (QPS) during the black system event highlighted a number of issues relating to a lack of communications between the South Australian TNSP, ElectraNet and AEMO. This lack of communication materially contributed to QPS' inability to deliver SRAS when required, which ultimately delayed restoration to South Australian generators by one hour.[10]

Specifically, the AER's rule change request noted that a key contributing factor to QPS being unable to deliver SRAS during the black system event was the incompatibility of ElectraNet's System Restart System Switching Program (SSP) with QPS' protection settings.[11] The System Restart SSP is developed by the TNSP and consists of a system diagram, subparts of the relevant restoration option, followed by the detailed steps required to achieve each of the subparts. The detailed steps consist of the communication which must occur between the TNSP, AEMO and generators/DNSPs, specific plant switching instructions (e.g. which circuit breakers must be closed) and checks of the completed operations. The SSP are utilised to coordinate restoration of the system following a major supply disruption.

Both AEMO and Origin were not aware that the System Restart SSP had a different switching arrangement for QPS to that used in QPS' SRAS tests. When system restart was attempted with QPS, the assumed switching arrangements used caused the generator to trip, ultimately rendering it unavailable. The AER's rule change proposal notes that ElectraNet was the only party in a position to be able to identify the discrepancy between the System Restart SSP and the SRAS test SSP, and to raise the issue with AEMO and/or Origin.[12]

The AER notes that AEMO has since amended the SRAS Guideline to address this scenario. However, the AER considers that the NER should be amended to explicitly require the SRAS Guidelines to mandate that SRAS testing include an element of comparison between test arrangements and those planned to be used in the event of a major supply disruption to mitigate this risk.[13]

1.2.4 Role of NSPs in relation to SRAS

The AER considers that the central role of TNSPs in relation to the procurement, verification of capability, and effective delivery of SRAS in the event of a major supply disruption is not adequately reflected in the NER.[14]

The AER notes that, in relation to SRAS, the NER currently only explicitly require TNSPs to:[15]

- assess the capability of a SRAS to meet the SRS

9 Ibid.
10 Ibid, p. 108.
11 Ibid.
12 AER, rule change request, p. 7.
13 Ibid, p. 8.
14 AER, rule change request, p. 4.
15 NER, clause 3.11.9(i).

- participate in, or facilitate, testing of, ***proposed*** SRAS providers (but with no requirement to participate in testing of ***existing*** SRAS providers)
- assist a prospective tenderer of SRAS to identify and resolve issues pertinent to the delivery of SRAS.

The AER suggests that the existing obligations imposed on NSPs under the NER do not create a comprehensive, seamless regulatory framework which mirrors their involvement in SRAS delivery.[16]

1.3 Solutions proposed in the rule change requests

1.3.1 Expansion of definition of SRAS

The current definition of SRAS is limited to facilities with black start capability. This is defined as a capability provided by generating units to deliver power to a connection point, or to a point in the network that allows power to be supplied to other units.[17] As such, the definition does not encompass other ancillary services beyond black start capability, which may be provided by facilities other than generators.

AEMO is proposing that the definition of SRAS be amended to:[18]

- remove the limitation that it can only be provided by generation, to allow for the possibility that alternative technologies or plant combinations might provide that capability in the future
- include additional ancillary services that can support system restart in the conditions expected in the early stages of a system restoration process, allowing AEMO to acquire such services in addition to black start capability, again from a range of potential facilities. AEMO describe, at a high level, a range of such potential new ancillary services for restoration, including the provision of reactive support or frequency control.[19] AEMO's rule change request proposes that these services be specified by AEMO in the SRAS Guideline, rather than being set out in the NER, on the basis that the nature of the services can be expected to change over time and between SRAS sub-networks.[20]
- remove unnecessary duplication of the concept of supplying energy to a connection point in order to restart other generating units. This is already captured by the reference in the definition to black start capability. AEMO propose to more clearly tie the definition to the intended outcomes of AEMO's power system security responsibilities (i.e. facilitating the restoration and maintenance of power system security).[21]

16 Ibid, p. 5.

17 Black start capability is defined in full in chapter 10 of the NER as: A capability that allows a *generating unit*, following its disconnection from the *power system*, to be able to deliver electricity to either: (a) its *connection point*; or (b) a suitable point in the *network* from which *supply* can be made available to other *generating units*, without taking *supply* from any part of the *power system* following *disconnection*.

18 AEMO, *rule change request*, p. 12.

19 Ibid, p. 5.

20 Ibid, p. 12.

21 Ibid.

AEMO also suggested that the Commission may want to consider whether the commercial contracting framework for SRAS should be amended to provide for SRAS to be acquired from NSPs.[22]

This issue is discussed further in appendix A.

1.3.2 Generator technical performance standards

Under AEMO's proposed rule, the generator technical performance standards would be expanded upon the commencement of the final rule to address the capability of new connecting generating units to provide active and reactive power in system restart conditions.[23] In particular, AEMO proposed the technical access standards in the NER be amended to include new minimum and automatic access standards in relation to restoration support services:

- the proposed minimum access standard would require generating units to have the capability to provide at least one of the restoration support services specified in the SRAS Guideline
- the automatic access standard would apply where the capability of the generating unit extends to all of those restoration support services.

The proposed changes focus on restoration support services and would not mandate black start capability for generating units. The rule change request identifies a number of indicative requirements for the proposed SRAS capabilities, which AEMO proposes would be set out in the SRAS Guidelines. These are set out in Table 1.1.

Table 1.1: Indicative requirements for proposed SRAS capabilities[1]

TYPE OF SRAS	INDICATIVE REQUIREMENT
Black start capability	• Energise a delivery point without external supplies. • Operate stably with auxiliary supplies only or with network loads in a power island. • Maintain nominated MW supply level for a nominated period, generally at least 4 hours. • Ability to perform at least two, and preferably three or more sequential start-ups. • Provide steady-state and dynamic voltage control, including under the conditions supplying its auxiliary loads. • Provide steady state and dynamic frequency control when supplying a nominated MW supply level. • Energise sections of transmission network so as energise auxiliaries of sufficient non-black start generating systems (to collectively

22 Ibid, p. 12.
23 Ibid.

TYPE OF SRAS	INDICATIVE REQUIREMENT
	provide a minimum restart path to load restoration). • Provide sufficient fault current for correct operation of protection systems for the minimum restart path. • Response not adversely impacted by other generation or network elements.
Initial restoration support service	• Energise sections of transmission or distribution network so as to energise auxiliaries of other non-black start generating systems under specified system conditions. • Provide steady-state and dynamic voltage control including under the conditions supplying its auxiliary loads. • Provide steady-state and dynamic frequency control when supplying its nominated MW supply level. • Provide sufficient fault current for correct operation of protection systems in its restoration path.

Note: 1. AEMO, rule change request, p. 15.

AEMO's proposed rule change also includes consequential changes to:

- include the new access standard as an AEMO advisory matter
- include a reference to the new performance standard in clause 5.3.9 of the NER where a generating system is modified, meaning a generator would need to meet the requirements of that clause where it proposes an alteration to equipment that would affect its ability to provide restoration support services.

This issue is discussed further in appendix B.

1.3.3 SRAS Procurement Objective

In order to address the perceived barrier the SRAS Procurement Objective poses to the development of new SRAS and the acquisition of a combination of services that delivers the best value in terms of reliability, AEMO proposes that the concept of the SRAS Procurement Objective be removed from the NER.

AEMO instead propose that AEMO's procurement of SRAS instead be expressly guided by the NEO.[24] AEMO suggests that this would ensure a focus on efficient operation in the long term interests of consumers with respect to price, reliability and security of supply.

This issue is discussed further in appendix C.

1.3.4 SRAS testing and communication protocols

NSP involvement in ongoing testing of contracted SRAS providers

24 Ibid.

AEMO's proposed rule seeks to clarify that NSPs are required to participate in and facilitate the ongoing testing of SRAS once those services have been contracted by AEMO, in addition to testing of prospective SRAS, and are entitled to recover the costs of such testing from the SRAS provider.[25] An explicit requirement for NSPs to comply with the SRAS Guideline is also proposed.

System restart path testing

AEMO's rule change request also proposes the addition of a new clause in the NER which would set out the circumstances in which AEMO can require a physical test of system restart paths, and the resulting obligations of the NSP and other registered participants in relation to such testing. AEMO's proposal includes requirements relating to:

- notification of a system restart test to the TNSP by AEMO
- the preparation of a test program by the TNSP in consultation with AEMO and affected participants
- the timing of system restart tests
- the obligations of affected participants to participate in, and bear their own costs associated with, such tests.

AEMO stated that the proposed changes relating to the coordination, participation and costs for system restart tests have been modelled on the existing clause 5.7.6 of the NER, which allows NSPs to require tests of generating units for power system modelling or performance assessment purposes.[26]

Roles and responsibilities of NSPs and AEMO in relation to SRAS

The AER has proposed the following amendments to the NER to clarify the roles and responsibilities of NSPs and AEMO with respect to SRAS:[27]

- changes to AEMO's power system security responsibilities to clearly define the actions AEMO should take to prepare for and respond to a major supply disruption - these changes are intended to highlight what the AER considers to be key steps that need to be carried out to ensure an efficient response to a major supply disruption, while acknowledging AEMO's discretion in determining any additional steps that are required
- the inclusion of explicit obligations on NSPs to use reasonable endeavours to assist AEMO in the preparatory steps required to ensure SRAS is capable of delivering as required - this extends the responsibility of NSPs beyond assisting a prospective SRAS provider to assisting in all stages of system restart where required.

The AER acknowledges that the SRAS Guideline currently contains provisions for comparing the procedures used in SRAS testing with those used in response to a major supply disruption. However, the AER also considers that any misalignment between the two procedures may present significant challenges when seeking to restore the power system. As such, the AER has proposed mandating in the NER that the SRAS Guideline include a process

25 Ibid, p. 13.
26 Ibid, p. 14.
27 Ibid, p. 12.

for comparing testing procedures with deployment procedures to ensure that any discrepancies will not pose a barrier for SRAS deployment in response to a major supply disruption.[28]

SRAS communication protocols

AEMO and NSPs are required to develop communication protocols relating to the implementation of the system restart plan. The AER has proposed that these communication protocols be explicitly required to be in written form, as this would clarify the type and timing of information to be disclosed between all relevant parties. Additional rules have also been proposed by the AER to:[29]

- ensure that AEMO and NSPs are bound by the communication protocols (where reasonable to do so) to ensure the timely and efficient dissemination of all relevant information
- ensure that AEMO and NSPs have access to any relevant information required to assist in system restoration.

The AER's rule change proposal acknowledges that increasing the scope of the communication protocols may in practice expand them beyond matters relating only to communication and that consideration could therefore be given to re-framing them as information sharing and responsibilities protocols.[30] The AER also notes that the protocols should consider how any confidential information would be exchanged between parties.[31]

AEMO has also proposed that the scope of the SRAS communication protocols be expanded to cover system restart path tests.[32]

These issues are discussed further in appendix D.

1.4 The rule making process

On 19 September 2019, the Commission published:

- a notice advising of its commencement of the rule making process and consultation in respect of the rule change request.[33]
- a consolidation notice advising that AEMO and the AER's rule change requests are consolidated.[34]

A consultation paper identifying specific issues for consultation was also published on 19 September 2019. Submissions closed on 17 October 2019.

The Commission received 19 submissions as part of the first round of consultation, including one supplementary submission from AEMO. The Commission considered all issues raised by

28 Ibid, p. 13.
29 Ibid, p. 13.
30 Ibid, p. 14.
31 Ibid, p. 14.
32 Ibid, p.13.
33 This notice was published under s.95 of the National Electricity Law (NEL).
34 This notice was published under s.93(1)(a) of the NEL.

stakeholders in submissions. Issues raised in submissions are discussed and responded to throughout this draft rule determination. Issues that are not addressed in the body of this document are set out and addressed in appendix G.

1.5 Consultation on draft rule determination

The Commission invites submissions on this draft rule determination, including the more preferable draft rule, by 20 February 2020.

Any person or body may request that the Commission hold a hearing in relation to the draft rule determination. Any request for a hearing must be made in writing and must be received by the Commission no later than 9 January 2020.

Submissions and requests for a hearing should quote project number ERC0278 and may be lodged online at www.aemc.gov.au.

If any stakeholder wants to discuss aspects of this draft determination, please do not hesitate to contact Mitchell Shannon on (02) 8296 7800 or mitchell.shannon@aemc.gov.au to request a meeting.

1.6 Structure of draft determination

The remainder of this draft determination is structured as follows:

- Chapter 2: Context
- Chapter 3: Draft rule determination
- Appendix A: Definition of SRAS
- Appendix B: Generator technical performance standards
- Appendix C: SRAS Procurement Objective
- Appendix D: SRAS testing and communication protocols
- Appendix E: Local black system procedures
- Appendix F: Legal requirements under the NEL
- Appendix G: Summary of other issues raised in submissions

2 CONTEXT

This chapter provides an introduction and background to System Restart Ancillary Services (SRAS).

SRAS are an integral part of the ability of the power system to recover from high impact, low probability events. SRAS enhance power system security and resilience by enabling recovery of the power system following a major disturbance, where large parts of the power system have collapsed to a "black system" condition. During a black system event, large numbers of generators trip off the system, potentially resulting in large numbers of customers losing their supply of energy.

This chapter provides an overview of the existing SRAS frameworks, and explores how SRAS fits into the overarching NEM frameworks for resilience.

2.1 What is SRAS and why is it needed?

SRAS are procured by AEMO in order to mitigate the economic costs of a major supply disruption. SRAS provides the capability to restart the power system if there has been a major loss of power across large parts of the power system, or if the power system has collapsed to a "black system".[35]

In the history of the NEM, there have only been two black system events. The most recent of these occurred on September 28, 2016, in South Australia.[36] It has been estimated that the event came at a total cost to South Australian businesses of approximately $367 million, and affected approximately 800,000 customers.[37] While rare, the severe impact of these events is such that the procurement of a specific number of SRAS by AEMO is critical to the resilience of the system, as it enables timely restoration of supply following a black system event.

SRAS is currently provided by generators with the capability to start, or remain in service, without electricity being provided from the grid. These generators must be capable of delivering electricity to a connection point within specified timeframes and be able to control frequency and voltage. Not all generators currently have this capability, given the additional cost involved to equip generating plant with this capability.

Once an SRAS provider has restarted its own plant, it provides energy to restart other generators and commence the processes required for system restoration. This typically involves re-energising parts of the transmission system to restart subsequent generators, followed by blocks of customer load being brought on to stabilise the voltage and frequency of the electricity in the grid. The number of generators and blocks of customer load brought on are gradually increased until the full electricity system is restored.

35 A black system is defined in Chapter 10 as "the absence of voltage on all or a significant part of the transmission system or within a region during a major supply disruption affecting a significant number of customers."

36 The other event occurred in the Northern subregion of Queensland in 2009 and was less severe than the South Australian event of 2016.

37 AEMO, *Integrated final black system incident report*, March 2017, p. 5.

Importantly, the NER currently define SRAS only by reference to the capability to provide a black start service, being the ability to start without taking electricity from any part of the network. As discussed in further detail below, the ability to black start is only one of the services needed during the earlier stages of system restoration. This current definition of SRAS as providing black start capability only is central to AEMO's proposal to expand the range of services that may be procured as SRAS.

There is a clear delineation of the roles of objectives of different parties under the frameworks set out in the National Electricity Rules (NER) in relation to SRAS. The NER set out the general requirements applying to the procurement, testing and deployment of SRAS. The rules also allocate responsibilities for determining more specific requirements of the SRAS framework between AEMO and the Reliability Panel (the Panel), establishing clear governance arrangements that appropriately reflect the roles and expertise of these parties.

The key responsibilities of AEMO and the Panel in relation to SRAS include:

- **Reliability Panel:** The Panel is responsible for determining the system restart standard (SRS).[38] The parameters included in the standard are the maximum time in which a specified level of generation capability must be restored in each sub-network, and the aggregate level of reliability of restart services in each sub-network, (i.e. the overall reliability of the SRAS procured for the sub-network rather than just for any individual source of SRAS). The content of the system restart standard is discussed further in section 2.4.1. The requirements set out in the system restart standard guide AEMO's procurement of SRAS. In determining the system restart standard the Panel undertakes technical and economic analysis to consider the trade-offs between the ongoing cost of the provision of SRAS and the potential cost of an extended outage, in accordance with the relevant governance frameworks.
- **AEMO:** AEMO is responsible for procuring SRAS from plant with the capability to provide that service. In doing so, AEMO is subject to the SRAS Procurement Objective, which currently requires it to use reasonable endeavours to procure SRAS to meet the requirements set out in the system restart standard at lowest cost.[39]

2.2 How does AEMO procure SRAS?

AEMO is responsible for procuring SRAS to meet the requirements of the System Restart Standard (SRS), which is determined by the Reliability Panel and sets out a number of requirements relating to SRAS.[40] These requirements include the length of time within which defined volumes of load need to be restored in a region, following a black system event. The SRS also sets out specific requirements as to the reliability of the restart services.

38 NER, clause 8.8.1(1a).

39 NER, clause 3.11.7(a1).

40 Reliability Panel, *The System Restart Standard*, July 2018. Available at: https://www.aemc.gov.au/regulation/electricity-guidelines-and-standards. The system restart standard is described in more detail later in section 1.1.4 of this paper.

In procuring SRAS, AEMO must also comply with the SRAS Procurement Objective, which requires AEMO: to use its reasonable endeavours to acquire SRAS to meet the system restart standard at the lowest cost.[41]

AEMO currently acquires SRAS from generators with black start capability as part of its power system security responsibilities.[42] Examples of generating units that could potentially provide SRAS include:

- selected hydro generating units, gas turbines or diesel generating units that have the equipment necessary to restart without drawing supply from the network
- large thermal (coal or gas) generating units with a trip to house load (TTHL) scheme, designed to reduce the unit's output to match its auxiliary load when it is tripped from the network during a major supply disruption, thus being able to remain in operation and available to re-energise the network when required.[43]

AEMO's procurement processes for SRAS are set out in its SRAS Guideline.[44] The NER provide that the SRAS Guideline must include guidance on the factors that AEMO must take into account when making a decision to follow a particular type of procurement process to acquire SRAS to meet the SRAS Procurement Objective.[45] The SRAS Guideline currently states that AEMO may procure SRAS through an open competitive tender process or by making a direct request for an offer to provide SRAS to one or more generators. Generators may also submit expressions of interest to provide SRAS to AEMO at any time. AEMO can amend the SRAS Guideline at any time, subject to consultation with stakeholders.[46]

AEMO procures SRAS by entering into an SRAS Agreement with the service provider.[47] Under this SRAS Agreement AEMO may require contracting generators to provide restart services on instruction by AEMO and demonstrate their restart capability through regular testing.

The Commission understands that AEMO last completed a round of SRAS procurement over the 2017-18 financial year, the contracts for which are due to expire on 30 June 2021.[48] The Commission understands that AEMO will therefore be seeking to commence its next round of SRAS procurement in late 2020, so that SRAS Agreements with the relevant providers are finalised by 1 July 2021. To enable this next round of procurement, any revisions to AEMO's SRAS Guideline would need to be completed to reflect any relevant rule changes under a final rule (if one is made), prior to this procurement process commencing.

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41 NER, clause 3.11.7(a1).

42 NER clause 4.3.1(p)

43 Most generating units are designed to shut down when the power system frequency is collapsing during a major power system incident. However, some generating units have the capability to remain operating and supplying their auxiliary loads following a system frequency collapse, referred to as trip to house load.

44 AEMO, *SRAS Guideline*, 15 December 2017. Available at: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Ancillary_Services/SRAS-Guideline-2017.pdf.

45 NER, clause 3.11.7(d)(5).

46 NER, clause 3.11.7(e).

47 NER, clause 3.11.9(a).

48 AEMO, *Non-market ancillary services cost and quantity report 2017-18*, September 2018. Available at: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Data/Ancillary_Services/2018/NMAS-Cost-and-Quantities-Report-2017-18.pdf.

2.3 When might SRAS be utilised?

SRAS currently provides a service that is intended to provide a dependable 'restart' capability. Under this current formulation, SRAS is only expected to be required infrequently, following a major supply disruption and/or a black system.

A series of events resulting in a black system could occur at any time and in any range of network outage, demand and supply conditions.

Given this risk, in consultation with transmission network service providers (TNSPs), AEMO prepares system restart plans, incorporating the SRAS contracted by AEMO, to cover the most plausible alternative paths (generally two to four) that could be used to progressively restore supply and stabilise load in each NEM region.

If there is zero voltage in the transmission network, power to restart tripped generators can be drawn from:

- an unaffected part of the transmission network (including interconnectors)[49]
- an isolated pocket of generation and load that remained operating within the affected region.

SRAS can be used in place of these other sources, or to complement them, to begin the process of system restoration.

The most recent incident involving the attempted utilisation of SRAS occurred during the South Australian black system event on 28 September 2016. The details of this are set out in Box 1.

BOX 1: UTILISATION OF SRAS DURING SOUTH AUSTRALIAN BLACK SYSTEM EVENT

During restoration of the South Australian network following the black system event on 28 September 2016, neither of the two local SRAS providers were able to contribute to the restoration process.[1]

Following the black system event, AEMO and ElectraNet agreed on a restoration strategy. One of the two SRAS generators in South Australia, Synergen's Mintaro power station, was declared unavailable prior to the restoration process due to their emergency generator tripping,[2] most likely caused by lightning.[3] The restoration strategy therefore involved using the other contracted SRAS capable generator in the region, Origin's Quarantine Power Station (QPS), and to import electricity from Victoria through the Heywood interconnector. However, QPS also failed to deliver its contracted SRAS when called upon by AEMO.

QPS was unable to deliver SRAS due to the switching configuration used by ElectraNet to

49 In the South Australian black system event of 28 September 2016, the Heywood interconnector between South Australia and Victoria was used as the primary source of energy to begin the process of restoring the South Australian region, due to the fact that both sources of SRAS within the South Australian region failed to operate as intended.

start the generator, which caused the protection settings at QPS unit 5 to trip. ElectraNet had a different switching arrangement for QPS in its System Restart System Switching Program (SSP) to those it used in QPS's SRAS tests. Origin and AEMO did not know that the System Restart SSP had a different switching arrangement for Quarantine to that set out in the SRAS test system switching plan.[4]

In the AER's view, QPS' failure to provide SRAS highlighted that the communication protocols that were in place to facilitate the exchange of information in the implementation of the system restart plan were not sufficiently clear or comprehensive. The AER found that Origin's failure to provide SRAS as requested delayed auxiliary supply to Adelaide's main generators, requiring AEMO to rely solely on the Heywood interconnector for restart, which ultimately delayed overall restoration of load in South Australia for approximately one hour. The framework governing these communication protocols are a key focus of the AER's rule change request.

Note: 1. This event is discussed in more detail in the Commission's final report for its *Review of the System Black Event in South Australia on 28 September 2016*, available at: https://www.aemc.gov.au/markets-reviews-advice/review-of-the-system-black-event-in-south-australi.

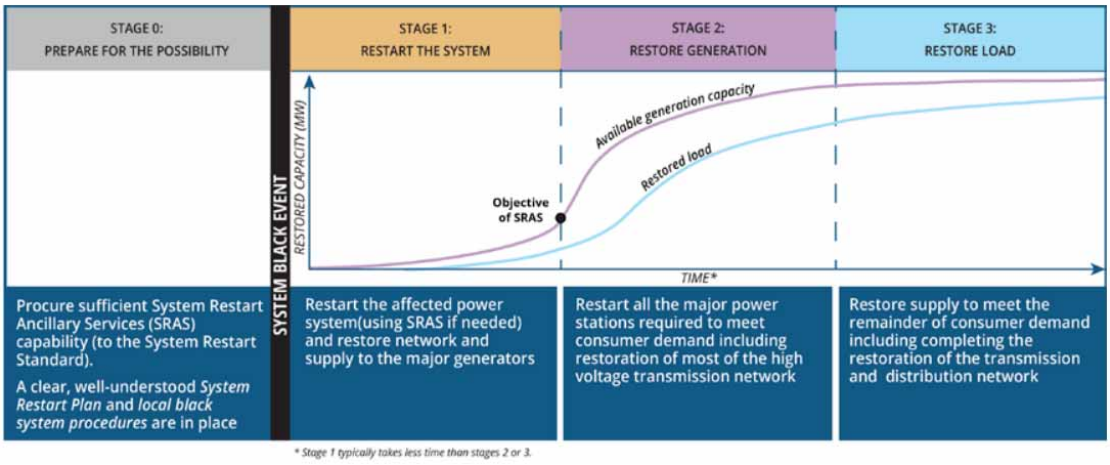
Note: 2. The emergency diesel generator provides power supply to all auxiliaries of the main generating unit that supplies the SRAS. The main generating unit at Mintaro cannot start without these auxiliary supplies.

Note: 3. AEMO, *Integrated Final Report SA Black System 28 September 2016*, 2017.

Note: 4.AER, *The black system compliance report*, December 2018, p. 103.

Figure 2.1 illustrates the stages in preparing for and responding to a major supply disruption using SRAS.

Figure 2.1: Stages in preparing for and responding to a major supply disruption



Source: Reliability Panel, *Review of the System Restart Standard* - final determination, December 2016. Available at: https://www.aemc.gov.au/markets-reviews-advice/review-of-the-system-restart-standard.

2.4 What other governance arrangements currently apply to SRAS?

2.4.1 System restart standard

The Reliability Panel's key responsibility within the SRAS frameworks is to review and determine the system restart standard. The system restart standard is the key document that guides AEMO's procurement of SRAS. Clause 8.8.3(aa) of the NER sets out the matters that must be included in the system restart standard, which currently includes the maximum timeframes for restoration of a given level of supply in each sub-network, the aggregate reliability of restart services, and guidance on boundaries of electrical sub-networks and the diversity requirements for SRAS. The system restart standard must be determined under the assumption that supply (other than that provided under an SRAS contract for that electrical sub-network) will not be available from any neighbouring electrical sub-network.

Given the requirements set out in clause 8.8.3(aa) of the NER, the current system restart standard includes the following:

- Restoration timeframes: The system restart standard requires AEMO to procure SRAS sufficient to restore generation and transmission in each electrical sub-network to a specified level within a specified timeframe. The restoration timeframe represents the 'target time-frame' to be used by AEMO in the SRAS procurement process. It is not a specification of any operational requirement that should be achieved in the event of a major supply disruption.
- Aggregate reliability of SRAS: Aggregate reliability is the probability that the generation and transmission in a sub-network is expected to be restored to the specified level within the specified time. The system restart standard provides detail regarding the aggregate reliability for procured SRAS in each electrical sub-network, which is to be determined by AEMO having regard to the combination of the individual reliabilities of the SRAS procured in that electrical sub-network, together with an assessment of the impact of potential points of failure. AEMO will determine the manner in which reliability will be assessed in accordance with the requirements in the NER.
- Guidance for the determination of electrical sub-networks: The system restart standard defines the matters that AEMO must consider when establishing electrical sub-networks, including the length and strength of transmission corridors between areas and generation centres.
- Guidance for specifying diversity and strategic location of services: The system restart standard defines the matters that AEMO must consider in order to maintain a degree of independence between the various restart services that it procures, including electrical, geographical and energy source diversity in procured SRAS. AEMO is required to procure SRAS and develop its SRAS Guidelines on the basis of meeting the requirements of the system restart standard and the NER.

Table 2.1 provides the time, level and reliability standards for restoring the generation and transmission capacity in each electrical sub-network determined by the Reliability Panel in the current system restart standard.

Table 2.1: **System Restart Standard - Time, Level and Aggregate Reliability by Electrical Sub-Network**

1. ELECTRICAL SUB-NETWORK[1]	2. LEVEL OF RESTORATION (MW)	3. RESTORATION TIME[2] (HOURS)	4. REQUIRED AGGREGATE RELIABILITY
North Queensland	825	3.5	90%
South Queensland	825	3.0	90%
New South Wales	1500	2.0	90%
Victoria	1100	3.0	90%
South Australia	330	2.5	90%
Tasmania	300	2.5	95%

Source: Reliability Panel, *The System Restart Standard*, July 2018, p. 4.

Note: 1. The electrical sub-network boundaries are defined in AEMO's 2014 SRAS Guideline.

Note: 2. The restoration time in column 3 is the maximum time allowed to restore supply (generation and transmission capability) to the level in column 2, subject to the aggregate reliability. This restoration time does not refer to the time required to restore supply to all customers in the affected electrical sub-network, which could be significantly longer.

2.4.2 SRAS testing

SRAS agreements between AEMO and SRAS providers include provisions that require testing of the SRAS equipment. In addition, the SRAS Guideline states that an SRAS test will generally be required by AEMO:[50]

- within the 6 months prior to the intended commencement date of the SRAS agreement, unless exceptional circumstances apply[51]
- within 20 business days after maintenance causing any major component of the SRAS equipment or SRAS transmission components to be out of service for seven days or more[52]
- at one additional date and time per year, to be nominated by AEMO on no less than five business days' notice to the SRAS provider (termed a "short notice test").

The SRAS Guideline also provides that AEMO can request an SRAS test if AEMO has reasonable grounds to believe that SRAS equipment may not be capable of delivering contracted services.[53] SRAS providers are required to submit test reports to AEMO detailing the steps in, and results of, such tests.

NSPs are not parties to SRAS Agreements but have obligations under the NER to negotiate in good faith with a prospective SRAS provider and participate in, or facilitate, testing of SRAS

50 SRAS Guideline, clauses 4.3.1 and 4.3.2.

51 The existence of exceptional circumstances will be determined by AEMO.

52 The SRAS provider schedules this test with the network service provider, subject to AEMO's approval.

53 SRAS Guideline, clause 4.3.3 (c). This is not a short notice test. The SRAS provider arranges this test with the network service provider.

proposed to be provided by a prospective SRAS provider.[54] The NER do not expressly set out requirements relating to NSPs' involvement in the ongoing testing of SRAS. This current limited involvement of NSPs in SRAS testing is relevant to both the AEMO and AER rule change requests.

2.4.3 SRAS reporting

The NER require AEMO to report annually on:[55]

- whether it has met the system restart standard in each sub-network and, if not, the reasons why the system restart standard was not met
- what processes it has followed to procure SRAS in each sub-network
- the total cost of SRAS in each sub-network.

AEMO's most recent report on these matters was published in September 2019 and noted that:[56]

- AEMO currently has 12 SRAS contracts (four in Queensland and two each in New South Wales, Victoria, South Australia and Tasmania)
- for the 2018-19 year, AEMO acquired sufficient SRAS to meet the SRS for all electrical sub-networks
- the actual availability of one service was less than the required availability for that service under the terms of the relevant contract - although every SRAS has a contractual availability requirement of 90% or more, in 2018-19 that level was not achieved for one SRAS acquired for South Australia.

2.4.4 Local black system procedures

Complementing AEMO's obligation to prepare a system restart plan is the requirement for each generator and NSP to develop Local Black System Procedures (LBSPs).[57] LBSPs are an important set of documents used by AEMO to develop its regional restoration options. The rules require LBSPs to:[58]

- provide sufficient information to enable AEMO to understand the likely condition and capabilities of plant following any major supply disruption, such as a black system event, so that AEMO is able to effectively co-ordinate the safe implementation of the system restart plan, and
- appropriately incorporate any energy support arrangements to which a generator or NSP may be a party.

54 NER, clause 3.11.9(i)(2)-(3).

55 NER, clause 3.11.10.

56 AEMO, *Non-market ancillary services (NMAS) cost and quantity report 2018-19,* September 2019. Available at: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Data/Ancillary_Services/2019/NMAS-Cost-and-Quantities-Report-2018-19-for-publication.pdf.

57 NER, clause 4.8.12(d).

58 NER, clause 4.8.12(f).

AEMO has an obligation to develop and publish guidelines for the preparations of LBSPs and is responsible for approving LBSPs submitted by generators and NSPs.[59] The LBSP Guidelines set out the information to be provided to AEMO covering the technical requirements and limitations in a restart environment regarding generation and network plant.[60]

The Commission identified in the issues and approach paper for its *Review of the System Black Event in South Australia on 28 September 2016* that, based on the findings of the AER's investigation into the event, there is currently some uncertainty regarding the role and function of LBSPs.[61] Under the NER, there is an obligation for LBSPs to be consistent with SRAS agreements and there is an obligation for NSPs and generators to comply with their LBSP as quickly as practicable.[62]

Recently, the AER considered that this provision indicates that LBSPs were intended to encompass procedures such as the actions generators (including SRAS Providers) and NSPs will undertake when a major supply disruption is declared at their local level.[63] AEMO however consider the LBSP Guidelines focus on eliciting information to identify the conditions and capabilities of power system assets after a total loss of supply and are not, in fact, procedures. In AEMO's view, the purpose of the LBSP is to inform AEMO of the likely capability of the asset in re- energising and maintaining a stable operating state on a potential restart path.[64]

Consistent with the principles for effective governance, the Commission considers that arrangements should have clearly defined objectives and provide adequate operational scope to meet those objectives within the overarching governance framework. Arrangements should also include accountability mechanisms such that participants are kept accountable for how they have met their objectives. On this basis, the Commission considers that the role and function of the LBSP should be clarified and the integrity, consistency, and completeness of the information being provided by generators and NSPs in their LBSPs should be subject to clear obligations. The draft rule addresses the role and function of LBSPs and how this is dealt with in the NER. This is discussed further in appendix E.

59 NER, clause 4.8.12(g).

60 AEMO, *Guidelines for preparing Local Black System Procedures*. Available at: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation.

61 AEMC, *Review of the System Black Event in South Australia on 28 September 2016* - issues and approach paper, April 2019. Available at: https://www.aemc.gov.au/markets-reviews-advice/review-of-the-system-black-event-in-south-australi.

62 NER, clauses 4.8.12(d) and 4.8.14(b).

63 AER, *The black system compliance report*, December 2018, p. 192.

64 Ibid.

3 DRAFT RULE DETERMINATION

3.1 The Commission's draft rule determination

The Commission's draft rule determination is to make a more preferable draft rule. The changes proposed under the draft rule and the Commission's rationale for these changes are summarised in Table 3.1.

Table 3.1: Changes proposed under the draft rule

ISSUE	PROPOSED CHANGE AND RATIONALE
Definition of SRAS (discussed in detail in appendix A)	The draft rule: • amends the definition of SRAS to include both black start capability and system restoration support services • provides for the system restoration support services captured by the definition of SRAS to be defined by AEMO in the SRAS Guideline • amends the definition of black start capability to allow for this capability to be provided by both generating units and other plant or combination of plant. These changes: • make sure that emerging technologies, such as batteries with 'grid-forming' inverters, or other combinations of plant are able to be procured by AEMO to provide black start capability in the future • increase competition for the provision of black start capability from an expanded range of facilities • allow AEMO to procure system restoration support services as SRAS, thereby making sure that the capability to support the grid during a restart process is valued and available when required • provide AEMO with the flexibility to determine what capability is needed to support system restoration at any given time and to revise these services as required to adapt to changing system conditions.
SRAS Procurement Objective (discussed in detail in appendix C)	The draft rule makes a minor amendment to the SRAS Procurement Objective to make clear that AEMO can take *overall* costs (including short-term and long-term costs) into account when procuring SRAS to meet the SRS at lowest cost. The amended SRAS Procurement Objective makes clear that AEMO has the flexibility to consider entering into long term SRAS contracts or procuring specific combinations of services if this will result in the lowest long term costs for consumers. This is consistent with the view expressed by the Commission in its final determination on the 2015 SRAS rule change.

ISSUE	PROPOSED CHANGE AND RATIONALE
SRAS testing and communication protocols (discussed in detail in appendix D)	The draft rule: • introduces a framework for the physical testing of restart paths which clarifies the roles and responsibilities of AEMO, NSPs and affected participants in relation to this process • sets out the process for NSPs and affected participants to be consulted by AEMO in relation to the design of the test program • requires a minimum timeframe of six months between the test program being finalised and the test being undertaken (subject to circumstances which necessitate a change to the timing of the test) • allows participants to claim compensation for any direct costs incurred as a result of participation in a test • requires AEMO to report on the outcomes of a test, including how AEMO sought to minimise the costs and operational impacts • clarifies the scope, form and content of the SRAS communication protocols to be prepared by AEMO and NSPs • clarifies the obligations of NSPs and AEMO with respect to SRAS and system restoration. These changes: • establish regulatory arrangements that facilitate testing required to verify that the system restart plan is able to meet the requirements of the system restart standard • provide clarity and transparency to participants about the roles and responsibilities of the parties involved in such testing • make sure that affected participants are provided with adequate notice of such tests • reduce any regulatory uncertainty or investment risk associated with testing by allowing affected participants to recover their direct costs • make sure that information regarding the efficiency and effectiveness of such testing will be made publicly available by AEMO • enhance the effectiveness and utility of the SRAS communication protocols, thereby improving communication and coordination processes relating to SRAS.

The draft determination does not propose any changes to the generator technical performance standards (see appendix B for further detail on this issue).

More detail on the various aspects of the draft rule is also provided in the appendices. The Commission's reasons for making this draft determination are set out in section 3.4.

This chapter outlines:

- the rule making test for changes to the NER
- the assessment framework for considering the rule change request
- the Commission's consideration of the more preferable draft rule against the national electricity objective.

Further information on the legal requirements for making this draft rule determination is set out in Appendix F.

3.2 Rule making test

3.2.1 Achieving the NEO

Under the NEL the Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national electricity objective(NEO).[65] This is the decision-making framework that the Commission must apply.

The NEO is:[66]

> to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system.

Under the Northern Territory legislation adopting the NEL, the Commission must regard the reference in the NEO to the "national electricity system" as a reference to whichever of the following the Commission considers appropriate in the circumstances having regard to the nature, scope or operation of the proposed rule[67]:

(a) the national electricity system

(b) one or more, or all, of the local electricity systems[68]

(c) all of the electricity systems referred to above.

3.2.2 Making a more preferable rule

Under section 91A of the NEL, the Commission may make a rule that is different (including materially different) to a proposed rule (a more preferable rule) if it is satisfied that, having regard to the issue or issues raised in the rule change requests, the more preferable rule will or is likely to better contribute to the achievement of the NEO.

In this instance, the Commission has made a more preferable rule. The reasons are summarised below.

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65 Section 88 of the NEL.

66 Section 7 of thence.

67 Section 14A of Schedule 1 to the *National Electricity (Northern Territory) (National Uniform Legislation) Act* 2015 (referred to here as the NT Act), inserting section 88(2a) into the NEL as it applies in the Northern Territory.

68 These are specified Northern Territory systems, defined in schedule 2 of the NT Act.

3.2.3 Rule making in the Northern Territory

The NER, as amended from time to time, apply in the Northern Territory, subject to derogations set out in regulations made under the Northern Territory legislation adopting the NEL.[69] Under those regulations, only certain parts of the NER have been adopted in the Northern Territory.[70]

As the rule relates to parts of the NER that currently do not apply in the Northern Territory, the Commission has not assessed the rule against the additional elements required by the Northern Territory legislation.[71]

3.3 Assessment framework

In assessing whether the proposed rules are likely to promote the NEO, the Commission has considered the impact the proposed rules would have on:

- efficient price and investment outcomes
- promoting a secure system
- effective governance arrangements
- flexibility of the framework
- minimising administrative and implementation costs
- resilience of the power system to high impact, low probability events.

These principles are discussed in more detail below.

3.3.1 Efficient investment and operation

Price signals are central to driving the efficient use, operation of and investment in electricity services. There is typically a relationship between prices and levels of investment over time, with an efficient outcome occurring where prices reflect costs yet drive sufficient investment to meet consumers' long term needs. The Commission has assessed whether changes to the SRAS framework are expected to lead to more efficient price and investment outcomes.

3.3.2 Promoting a secure system

The security and reliability of electricity supply underpins the effective operation of the NEM. Measures to enhance security would therefore deliver a number of benefits, including reducing the risk of load shedding, as well as being in the long-term interests of consumers.

However, there is a trade-off between enhancing the security of the power system, and the costs of providing this enhanced security.

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69 The regulations under the NT Act are the National Electricity (Northern Territory) (National Uniform Legislation) (Modifications) Regulations.

70 The version of the NER that applies in the Northern Territory is available on the AEMC website.

71 From 1 July 2016, the NER, as amended from time to time, apply in the NT, subject to derogations set out in regulations made under the NT legislation adopting the NEL. Under those regulations, only certain parts of the NER have been adopted in the NT. (See the AEMC website for the NER that applies in the NT.) National Electricity(Northern Territory) (National Uniform Legislation) Act2015.

The Commission has considered these trade-offs when proposing changes to the SRAS frameworks.

Making such an assessment is not straightforward. SRAS is procured to manage the risk of black system events, which are highly uncertain in terms of both their frequency and severity, making a traditional cost-benefit assessment very difficult. This difficulty is already accounted for in the NER frameworks for system restart processes, through the allocation of different roles and responsibilities between various organisations, and the development of deterministic requirements and guidance within which more probabilistic cost benefit trade-offs are made.

The Commission has developed our proposed changes with these existing frameworks in mind, and consider they are consistent, or enhance, the existing processes to assess the costs and benefits of additional security services.

3.3.3 Effective governance arrangements

Clearly defined governance arrangements, including well-defined organisational roles and responsibilities, drive more effective operational and regulatory outcomes, allow different parties to exercise their expertise in meeting their regulatory obligations and objectives, and foster confidence in the governance arrangements. Governance arrangements also encompass the opportunity for stakeholders to be consulted and the transparency of the decision-making.

These rule changes raise a number of issues regarding the appropriate oversight of SRAS frameworks, coordination between participants involved in the procurement, testing and provision of SRAS and transparency in decision-making. In assessing these rule changes we considered the extent to which the proposed governance arrangements are expected to lead to efficient outcomes and provide for the appropriate delineation of responsibilities which reflect the expertise of the different parties involved in system restart. This has included consideration of the appropriate objectives which should apply to these parties and ensuring that the governance arrangements deliver transparency through appropriate reporting obligations.

3.3.4 Flexibility of regulatory framework

Regulatory arrangements must be flexible to changing market conditions. They should not be implemented to address issues specific to a particular time period or jurisdiction, or the prevailing technology or business model of the day. Regulatory frameworks should support the right mix of resources over time, encompassing technological developments and changes in behaviour.

When considering the proposed changes to the SRAS frameworks, the Commission has considered how these changes relate to the changing market environment and whether they are capable of supporting the dynamic efficiency of the NEM.

3.3.5 Minimising administrative and implementation costs

Changes to regulatory frameworks come with associated costs. These costs include both those imposed to implement change and the ongoing costs associated with making the change. These costs result from necessary changes to equipment, information technology systems and other market process. Generally, costs should be attributed to the party who is best able to reduce the extent of the costs over time. However, where costs are imposed in implementation and cannot be mitigated through market mechanisms, these costs should be minimised relative to the benefits of the regulatory changes.

The Commission has assessed these rule changes with a view to supporting lowest cost implementation. This is necessary so that the implementation and ongoing costs, ultimately borne by consumers, do not exceed the benefits of making the relevant changes to the SRAS frameworks.

3.3.6 Resilience of the power system to high impact, low probability events

The Commission has previously characterised power system security resilience as the ability to avoid, survive, recover and learn from major disturbances, known as high impact, low probability (HILP) events.[72] As the name entails, these events occur rarely, but can have major impacts on the supply of energy to consumers.

SRAS is critical to system resilience, by supporting the restoration of the power system as rapidly as possible following a HILP that causes a black system event. Expanding and enhancing the provision of system restart and restoration services helps to make the power system more resilient, enabling it to better recover from a HILP event. Similarly, by introducing better SRAS and system restoration communications protocols and processes, resilience is enhanced by improving the likelihood of timely recovery from a HILP event.

3.4 Summary of reasons

The more preferable draft rule made by the Commission is attached to and published with this draft rule determination. The key features of the more preferable draft rule are outlined at the start of this chapter. Further detail on the more preferable draft rule can be found in the appendices.

The changes to the SRAS frameworks proposed under the draft rule reflect the fact that technological changes, including the reduction in the number of traditional sources of SRAS in some regions and the high penetration of asynchronous, intermittent grid-connected generation with no black start capability and no active capability to support grid stability during restoration, are creating a number of challenges in managing the security and reliability of the power system. As flagged by AEMO in its rule change request, sustainable long-term solutions to these issues will need to involve the asynchronous generation fleet and other inverter-connected resources.[73]

72 AEMC, *Review of the System Black Event in South Australia, Final report*, 12 December 2019.

73 AEMO, rule change request, p. 5.

Having regard to the issues raised in the rule change requests and during consultation, the Commission is satisfied that the more preferable draft rule will, or is likely to, better contribute to the achievement of the NEO for the following reasons:

- **Efficient investment and operation:**
  - Making sure that the procurement and testing of SRAS is undertaken efficiently is a key objective of the draft rule.
  - The amendment to the SRAS Procurement Objective under the draft rule clarifies that AEMO can take overall costs, including long term costs, into account when procuring SRAS to meet the SRAS Procurement Objective. This clarification ensures that AEMO can consider long-term cost efficiencies which may be gained by entering into long-term contracts for the provision of SRAS from new providers, even where this may result in higher upfront costs.
  - Expanding the definition of SRAS to include black start capability provided by facilities other than generating units can be expected to increase the pool of available service providers, which may in turn lead to greater competition and lower prices for this service in the medium to long term.
  - The draft rule imposes a range of obligations on AEMO to make sure that the physical testing of system restart paths is undertaken efficiently, including requirements that AEMO:
    - minimise the costs and operational impacts of such testing to AEMO and market participants
    - report on how it has sought to satisfy the above obligation, and the extent to which the test achieved the purpose of verifying that the system restart plan is capable of meeting the requirements of the system restart standard
    - provide guidance to market participants about the types of considerations and changes in power system conditions that might necessitate a test being undertaken.
  - In addition, the draft rule makes clear that generators can use the existing compensation process to recover the direct costs they incur as a result of participation in such tests. The Commission considers that this will reduce the extent of potential investment risk or regulatory uncertainty associated with the proposed testing framework. The Commission notes that only a small subset of generators, mainly peaking units like diesel or open cycle gas turbines (OCGTs) located along restoration pathways, are likely to be affected by mandated participation in a system restart test; however, this may have a disproportionate cost impact on those participants. These costs are likely to be infrequent and uncertain, and so it is important that these parties can potentially claim compensation otherwise these costs may impact on the willingness of parties to invest in this type of plant.
- **Promoting a secure power system:**
  - Expanding the definition of SRAS to include system restoration support services and black start capability provided by non-generators will increase the available pool of

such services. This will improve AEMO's access to the services required to promptly restore the power system in a stable manner following a major supply disruption.

- The draft rule would introduce processes to facilitate the physical testing of components of the system restart plan in response to changing power system conditions. This would enhance power system security and reliability by allowing issues which may delay system restoration to be identified and addressed ahead of time, thereby improving the likelihood that supply can be restored in a timely and efficient manner in an actual power system restoration scenario.
- Recognising that the process of a system restart test itself carries some risk of causing a security issue, the draft rule expressly requires AEMO to consider and minimise any risks to power system security when preparing for a system restart path test.

- **Governance arrangements:**
  - The draft rule clarifies various aspects of the existing governance arrangements applying to SRAS, including:
    - the roles and responsibilities of AEMO, NSPs and other registered participants in relation to system restoration
    - the arrangements applying to the preparation and undertaking of physical testing of system restart paths
    - the scope, form and content of the SRAS communication protocols
    - the requirements applying to the procurement of SRAS by AEMO
    - the types of services which fall within the definition of SRAS and how these services are to be determined.
  - The proposed changes enhance the transparency of these frameworks in a number of ways, including by:
    - providing greater certainty to participants about how the processes applying to SRAS procurement and testing will occur
    - requiring AEMO to consult with affected parties and incorporate their feedback when designing a system restart path test
    - requiring AEMO to provide six months' notice of the test period to participants prior to a test being undertaken
    - imposing reporting obligations on AEMO in relation to the steps taken to prepare for a restart path test and whether the test achieved its objectives.
  - The draft rule also supports the principle that the roles and responsibilities of different parties in relation to SRAS should be allocated on the basis of their expertise and broader function. This is achieved by maintaining the delineation between the roles of the Reliability Panel and AEMO in relation to SRAS procurement and by more clearly defining the responsibilities of AEMO and NSPs with respect to the testing and deployment of SRAS.
- **Flexibility of regulatory frameworks:**

- The draft rule clarifies the flexibility AEMO has in meeting the SRAS Procurement Objective. In particular, the draft rule makes it clear that AEMO can have regard to the overall costs (including short-term and long-term costs) of SRAS, which includes efficiencies which may be gained by entering into long-term agreements with new SRAS providers, when procuring SRAS to meet the system restart standard at the lowest cost. This ensures that AEMO is not constrained to only procuring SRAS from existing providers of this service where other sources of SRAS may result in lower costs over the long-term.
- The framework under the draft rule for the testing of system restart paths seeks to provide AEMO with the flexibility necessary to undertake such testing when required to verify that, following a material change in power system conditions, the system restart plan will still be capable of effectively restoring supply in accordance with the requirements of the system restart standard. The draft rule balances the flexibility afforded to AEMO with the need to make sure that the testing arrangements are efficient and transparent and that adequate notice is provided to affected participants.

- **Administrative and implementation costs:**
  - In making changes to the SRAS frameworks under the draft rule, the Commission has sought to balance any administrative and implementation costs against the benefits to power system security and the likelihood of such changes reducing the duration of a black system event.
  - The framework for physical testing of restart paths introduced under the draft rule would result in some administrative costs for AEMO, NSPs and participants to prepare for and carry out these tests. However, these costs are justified on the basis that this testing is likely to provide valuable learnings and opportunities to verify the effectiveness of the system restart plan, thereby enhancing the prospects of supply being restored in a timely manner following a major supply disruption. The Commission therefore considers these administrative costs are outweighed by the economic benefits associated with improved effectiveness of restart pathway testing, particularly a faster restoration of supply for customers.

The Commission also considers the draft rule is likely to better contribute to the achievement of the NEO than the proposal set out in AEMO's rule change request for the following reasons:

- The proposal set out by AEMO would have imposed additional costs on new connecting generators by introducing a generator technical performance standard requiring them to be capable of providing one or more restoration support services. Given that AEMO would separately be able to procure these services through the existing SRAS frameworks (subject to the proposed changes to the definition of SRAS and black start capability), the Commission considers that introducing a new performance standard would be duplicative and would result in inefficient investment. New connecting generators would also have limited ability to manage these costs, as the relevant services would be specified in the SRAS Guideline rather than in the NER. The draft rule provides AEMO with the flexibility to procure restoration support services through the SRAS frameworks without imposing

the additional costs on generators associated with introducing a new performance standard.

- AEMO's proposal to replace the SRAS Procurement Objective with a reference to the NEO guiding AEMO's procurement of SRAS would have introduced ambiguity into this process and blurred the existing delineation between the roles of AEMO and the Reliability Panel in relation to SRAS. The draft rule clarifies that AEMO has the flexibility to take long-term costs into account when procuring SRAS while maintaining an appropriate allocation of responsibilities between AEMO and the Panel.
- AEMO's proposed framework for the testing of system restart paths would impose direct costs on some affected participants which they would have limited ability to manage. This would have resulted in increased regulatory uncertainty and investment risk. The draft rule utilises an existing compensation framework in the NER to allow participants to recover the costs they directly incur as a result of participating in such tests. The testing framework under the draft rule also provides greater transparency and certainty to participants about the arrangements that apply to restart path tests, thereby allowing the costs and operational impacts of these tests to be managed more effectively.

3.5 Implementation

The Commission understands that AEMO intends to commence the process of procuring new SRAS contracts in late 2020, as most of the existing contracts expire in mid-2021 and this will allow sufficient time for the procurement process to be undertaken. The commencement of the procurement process, as well as the commencement of the substantive changes to the SRAS frameworks under the draft rule, are subject to the SRAS Guideline being amended to account for these changes. As such, the draft rule would require AEMO to amend the SRAS Guideline by 1 October 2020 to make sure this process is completed prior to the next round of SRAS procurement commencing.

3.6 Climate change related issues

As discussed above, the Commission makes its decisions on rule changes with reference to the NEO. The NEO does not specifically require the Commission to have regard to the long-term interests of consumers with respect to climate change or the environment.

However, in order to make decisions that meet the NEO, the Commission considers whether its decisions are robust to any impacts on price, quality, safety, reliability and security of supply of energy or energy services, if these matters are impacted by ***mitigation*** or ***adaptation*** risk,[74] that manifests due to the issue of climate change.

For this rule change, the Commission has considered climate change adaptation and mitigation risks in the ways set out below.

Adaptation

74 ***Mitigation*** refers to measures associated with actively reducing the extent of the impacts of climate change. ***Adaptation*** refers to measures taken to manage and adapt to the consequences of climate change.

The Commission considers that the draft rule is robust to climate change adaptation risks, in that the changes proposed in the draft rule are designed to make the power system more adaptable to the likely future impacts of climate change.

One of the key modelled impacts of anthropogenic climate change is an increase in the frequency and severity of extreme weather events.[75] In Australia, these extreme events may drive high temperatures and drought conditions, which in turn increase the risk of extreme bushfires. Climate change will also drive an increased risk of "compound events", where extremes of variables like windspeed and rainfall occur at the same time.[76]

Extreme weather is likely to impact the power system by increasing the extent to which generation and network assets may be damaged or removed from service, and by driving uncertainty around generation availability from an increasingly weather dependent generation fleet. It may also impact on demand patterns, such as through more extreme heat events driving increases in peak demand, while simultaneously placing additional stress on the system.

The Commission considers that the changes proposed under the draft rule are robust to the adaptation risks of climate change. The proposed enhancements to the existing SRAS frameworks would ensure that AEMO, NSPs and market participants are better able to prepare for, and respond to, a major supply disruption (which could occur as a result of an extreme weather event) and restart the power system in a timely and effective manner should such an event occur.

These recommendations will therefore support the ongoing efficiency of the operation of the power system and maintenance of system security, as they are robust to the adaptation risks associated with anthropogenic climate change.

Mitigation

The Commission considers that the changes proposed under the draft rule are robust to climate change mitigation risks, in that they are specifically designed to account for the consequences of the main mitigation measure being utilised in the NEM, specifically the shift in the generation mix to being predominantly variable and asynchronous.

Amongst the various economy wide measures being used to mitigate the impacts of climate change, the rollout of asynchronous, variable renewable generation is the primary measure adopted in the NEM power system.

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75 See: Seneviratne, S.I., N. Nicholls, D. Easterling, C.M. Goodess, S. Kanae, J. Kossin, Y. Luo, J. Marengo, K. McInnes, M. Rahimi,M. Reichstein, A. Sorteberg, C. Vera, and X. Zhang, 2012: Changes in climate extremes and their impacts on the natural physical environment. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen,M. Tignor, and P.M. Midgley (eds.)]. *A Special Report of Working Groups I and II of the Intergovernmental Panel on ClimateChange (IPCC)*. Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 109-230.

76 Australian Bureau of meteorology, *State of the Climate*, 2018.

The specific characteristics of asynchronous generation means that, historically, it has not automatically provided the same kinds of system stabilising services that were provided by thermal, synchronous generators, including SRAS.[77] As noted in the Commission's final report for the *Review of the System Black Event in South Australia on 28 September 2016*, synchronous generators are also operating less, which results in a withdrawal of many of these system stabilising services. Other factors, such as the utilisation of special protection schemes and increased penetration of DER, have also made the system more complex and unpredictable.

In combination, these trends are directly impacting the risk profile of the power system, and making it more vulnerable to the impacts of HILP events, including during the restoration process following a major supply disruption.

The Commission therefore considers that the changes proposed under the draft rule are robust to these mitigation impacts, being the reduction in availability of system services, coupled with an increasingly complex system. By allowing for the ongoing testing of processes designed to respond to the risks associated with these changes in the generation mix, and allowing AEMO to access the services required to manage these risks, the draft rule will support the continued security of the power system, at the lowest cost to consumers, in the presence of the mitigation risks posed by climate change.

77 This is not to say that all variable, asynchronous generation cannot provide some system services; historically however, not many of these types of generators have elected to do so. The Commission notes recent trials by various wind farms to offer some system services, and the capability of asynchronously connected battery storage to do so. This could include system restoration services and possibly black start services in future.

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
Commission	See AEMC
GTPS	generator technical performance standards
LBSP	local black system procedures
MCE	Ministerial Council on Energy
NEL	National Electricity Law
NEO	National electricity objective
NSP	network service provider
SRAS	system restart ancillary services
SRS	system restart standard
SSP	system switching procedure

A DEFINITION OF SRAS

A.1 Overview

This appendix considers the proposal from AEMO to:

- expand the definition of SRAS to include system restoration support services
- amend the definition of black start capability to remove the limitation that this service can only be provided by generating units.

The draft rule proposes a number of changes in relation to these issues. These are summarised in Box 2.

BOX 2: SUMMARY OF DRAFT RULE

The draft rule amends the definitions of SRAS and black start capability to allow AEMO to:

- procure black start capability from plant other than generating units (e.g. battery storage systems or technologies utilising grid-forming inverters)
- define and procure system restoration support services under the procurement framework for SRAS.

The Commission considers that these changes are appropriate to allow new technologies to compete with traditional providers of SRAS and to ensure that AEMO can procure the services needed to deliver a successful and stable restoration of the power system following a major supply disruption. Providing for restoration support services to be specified in the SRAS Guideline would also provide AEMO with the flexibility to determine what services are needed to support system restoration at any given time, taking into account changing system conditions.

The remainder of this appendix outlines:

- the background to the proposed changes
- the proponents' and stakeholders' views on the changes to the definition of SRAS and black start capability
- the Commission's assessment of the materiality of the issues raised by AEMO
- the Commission's analysis and conclusions.

A.2 Background

The current definition of SRAS is limited to facilities with black start capability. This is defined as a capability provided by generating units to deliver power to a connection point, or to a point in the network that allows power to be supplied to other units.[78] As such, the definition

78 Black start capability is defined in full in chapter 10 of the NER as: A capability that allows a *generating unit*, following its disconnection from the *power system*, to be able to deliver electricity to either: (a) its *connection point*; or (b) a suitable point in the *network* from which *supply* can be made available to other *generating units*, without taking *supply* from any part of the *power system* following *disconnection*.

does not encompass other ancillary services beyond black start capability, as well as black start capability which may be provided by facilities other than generators.

The definition of SRAS was most recently amended in 2015. In its final determination on the *System Restart Ancillary Services* rule change (2015 SRAS rule change),[79] the Commission agreed with a proposal by AEMO to remove the concepts of "primary restart services" and "secondary restart services" from the definition of SRAS.[80], on the basis that this would expand the range of service providers and enhance AEMO's flexibility to procure necessary services.

A.3 Proponents' views

AEMO's rule change request contends that the NER imposes limitations on the scope of SRAS services because the definition of SRAS prescribes that:[81]

- SRAS is currently only capable of being provided by generating units
- the service is limited to the delivery of electricity to (or energisation of) a particular point on the network.

The proponents' comments in relation to this issue are set out below.

A.3.1 AEMO's rule change request

Alternative sources of system restart capability

The current definition of SRAS does not allow for AEMO to procure SRAS from facilities other than generators. AEMO's proposal to modify the definition of SRAS is intended to facilitate alternative technologies or plant combinations providing these services in the future. For example, AEMO noted in its rule change request that 'grid-forming' inverter technologies, which exhibit similar performance to that of a synchronous generator from a system restoration perspective and could be capable of restarting the power system, are currently being developed and deployed by some battery manufacturers.[82]

AEMO's submission to the consultation paper suggests that allowing black start capability to be provided by non-generation sources in the future may increase competition in the provision of this service.[83]

Alternative sources of system restoration support

AEMO's rule change request suggests there is currently no requirement on, or incentive for, asynchronous generators to enable or maintain the capability to provide services such as voltage support (i.e., the provision of reactive power to stabilise system voltage) or frequency

79 AEMC, *System Restart Ancillary Services* rule change - final determination, April 2015. Available at: https://www.aemc.gov.au/rule-changes/system-restart-ancillary-services.

80 Previously, the System Restart Standard specified primary SRAS as services with a reliability of 90 per cent, while secondary services were defined as those with a reliability of 60 per cent. AEMO was responsible for developing an approach for measuring the reliability of restart services.

81 AEMO, *System restart services, standards and testing* rule change request, p. 9.

82 Ibid, p. 5.

83 AEMO, submission to consultation paper, p. 4.

control to support the progressive restoration of the power system, which requires modifications to generator settings and controls.[84] AEMO asserts that the capability to provide such system restoration support services is currently neither required nor valued under the NER, given that:

- the definition of SRAS currently only encompasses black start capability and does not refer to other support services, meaning AEMO is unable to procure such services for the provision of SRAS
- even if AEMO could procure system restoration support services under the SRAS framework, there is no explicit requirement that generators be capable of providing these services.

AEMO notes that these circumstances arise because these services are inherent properties of large synchronous generating units and have therefore not needed to be valued historically.[85] While inverter-connected generators may be capable of providing these services during normal system operation, they do not inherently do so under conditions associated with a major supply disruption (i.e. when there is little synchronous generation online). AEMO considers that changes are therefore necessary to ensure this restoration support capability remains available as the generation mix continues to evolve.

AEMO also suggests that, even where asynchronous generators are capable of providing system restoration support services, there is no basis for AEMO to test the effectiveness of such capabilities under extreme operating conditions as they are not captured by the current definition of SRAS and are therefore not subject to the existing SRAS testing requirements under the NER.

AEMO considers that it is appropriate for these system restoration support services to be defined in the SRAS Guideline, on the basis that the nature of these supporting services can be expected to change over time and between SRAS sub-networks depending on the characteristics of the power system within that sub-network.[86]

A.3.2 AER's rule change request

The AER's rule change request did not comment on this issue.

A.3.3 Proponents' submissions

In its submission to the consultation paper, AEMO noted that similar approaches have been taken with respect to frequency control ancillary services (FCAS) and network support control ancillary services (NSCAS), for which the NER prescribe high-level outcomes but specific technical attributes and capabilities are defined by AEMO in separate documents.[87]

AEMO also noted that the System Restart Standard may require amendment to recognise the role of system restoration support services in the provision of SRAS, and that this may need

84 Ibid.
85 Ibid.
86 AEMO, rule change request, p. 14.
87 AEMO submission to consultation paper, p.4.

to be addressed through a transitional rule until such time that the System Restart Standard is amended.[88]

In relation to the issue of whether NSPs should be able to provide SRAS, AEMO noted that it does not have any current intention to procure SRAS directly from NSPs, but that NSPs have an increasingly important role in maintaining and investing in the network capability necessary to make system restart and supply restoration work in practice.[89] AEMO also noted that some equipment installed by NSPs , such as synchronous condensers, could be used as part of a black start service for energy storage systems and other inverter-connected generation and that those arrangements could be accommodated within the current framework, but currently require the SRAS provider and the NSP to reach agreement.[90]

In its submission to the consultation paper, the AER supported the principle of technology neutrality and considered that there is no need for SRAS to be provided strictly by generators and that the ability to provide these services should be open to other technologies that are capable of providing restart capability.[91]

A.4 Stakeholder comments

In submissions to the consultation paper, most stakeholders expressed support for the concept of expanding the definition of SRAS and acknowledged that there may be value in SRAS capturing black start capability provided by non-generators and system restoration support services.

However, stakeholders expressed a range of views about how this change should be given effect.

Relevant stakeholder comments on this issue included:

- **EnergyAustralia** supported AEMO's suggestion as it enables AEMO to broaden its options for system restart and increases the range of assets able to provide support, which will serve to increase competition, provide a means of valuing beneficial services and supporting investment in the required services. EnergyAustralia suggested that the new services will be in addition to the current services, resulting in a moderate increase in SRAS costs, but that these additional costs will generate value for AEMO and market customers in providing system security and reliability.[92] EnergyAustralia also suggested that, at a minimum, the rules should prescribe high level requirements on AEMO to ensure the processes used to identify system restoration support services are clear and transparent.[93]
- **Mondo Energy** supported the expanded definition of SRAS and suggested that the technical detail of the restoration support services could be set out in the SRAS Guideline

88 Ibid, p. 5.
89 Ibid, p. 4.
90 Ibid, p. 5.
91 AER, submission to consultation paper, p. 1.
92 EnergyAustralia, submission to consultation paper, p. 1.
93 Ibid, p. 2.

to give AEMO a degree of flexibility in the specifications for service delivery and measurement, but that the services themselves should be defined in the NER.[94] Mondo also noted that it will be important that proponents considering making these new services available for procurement have a degree of regulatory certainty to encourage investment and that having services defined in a guideline that is subject to change with relatively little regulatory rigour does not provide sufficient certainty to potential new investors.[95]

- **AGL Energy** also supported a technology neutral approach to the provision of SRAS and considered that if system restart services are able to be safely and reliably provided by a non-generator, there is no reason to restrict SRAS provision to generators.[96] However, AGL suggested that a number of services which may be captured by the restoration support services defined by AEMO, such as reactive power and voltage control, are already required to a certain extent by the generator technical performance standards and it is therefore unclear why AEMO would procure these services separately as SRAS.[97] AGL also queried whether these services would be procured along system restart paths, as changes to these restart paths over time may then impact on investment decisions which relied on SRAS contracts with AEMO.[98]
- The **Clean Energy Council (CEC)** supported the expanded definition, noting that it recognises that the generation mix is changing and that alternative sources of system restart capability and system restoration support already exist and are emerging.[99] The CEC also considered that the SRAS definition must be technology neutral and flexible for different capabilities that may emerge into the future and this should be reflected in the rules and AEMO's SRAS Guideline.[100]
- **Origin Energy** supported AEMO having the flexibility to procure SRAS from a broader a group of technologies given the ongoing market transition in the NEM and considered that AEMO should also be able to use SRAS to contract for restoration support if this would improve the ability of the system to recover after a black system event.[101]
- **Delta Electricity** noted that additional support services may become increasingly necessary if intermittent generation and loads cannot be easily isolated in the lowest possible complexity of overall restart action.[102] Delta also suggested that system restoration services should be the subject of a third party agreement between the provider of those services and existing SRAS providers (rather than being separately procured by AEMO). Delta asserted that allowing both black start capability and restoration support services to be coordinated by the SRAS provider, thereby providing a

94 Mondo Energy, submission to consultation paper, p. 2.
95 Ibid.
96 AGL, submission to consultation paper, p. 2.
97 Ibid.
98 Ibid.
99 CEC, submission to consultation paper, p. 1.
100 Ibid, p. 2.
101 Origin Energy, submission to consultation paper, p. 1.
102 Delta Electricity, submission to consultation paper, p. 2.

single point of contact for AEMO and NSPs, would minimise the complexity of communications during stressful periods on insecure networks.[103]

- **ERM Power** supported AEMO's proposed expansion of the definition to include black start capability provided by plant other than generating units and restoration support services.[104]
- **PIAC** supported the expansion of the definition of SRAS. However, PIAC noted that increasing competition in provision is not a goal in itself – but rather an intermediate step in achieving the most efficient outcome for consumers.[105]
- **Snowy Hydro** submitted that there is insufficient clarity regarding the expanded definition of services and further details as to what an expanded range of services might encompass are needed to comment on this proposal.[106]
- **TasNetworks** supported expanding the definition of SRAS to include system restoration support services but suggested a focus on economically efficient outcomes must remain so that robust cost benefit decisions can be made to provide certainty to customers that proposed changes will be in their interests.[107] TasNetworks also suggested that the application of additional services should be limited to those restart paths that will achieve the restart standard to ensure total SRAS costs are minimised.[108]
- **TransGrid** supported broadening the definition of SRAS and noted that removing the limitation of only generation providing SRAS and also including additional ancillary services is likely to help diversify the potential sources of SRAS. Transgrid also noted that any changes should be consulted on transparently under the rules consultation procedures to reduce risks and delays associated with changing testing procedures.[109]
- **ERM Power**, **Major Energy Users** and **TasNetworks** opposed the services being defined in the SRAS Guideline and submitted that these services should instead be defined in the NER to promote transparency and certainty.[110]
- The **Public Interest Advocacy Centre (PIAC),** the **South Australian Government** and **Delta Electricity** supported these services being defined in AEMO's SRAS Guideline.[111]

A number of stakeholders also commented on the question of whether the rules should be amended to provide for SRAS to be procured from NSPs. Relevant comments on this matter included:

103 Ibid, p. 3.
104 ERM Power, submission to consultation paper, p. 2.
105 PIAC, submission to consultation paper, p. 1.
106 Snowy Hydro, submission to consultation paper, p. 2.
107 TasNetworks, submission to consultation paper, p. 1.
108 Ibid, p. 3.
109 TransGrid, submission to consultation paper, p. 2.
110 Submissions to consultation paper: ERM Power, p. 2; Major Energy Users, p. 2; TasNetworks, p. 1.
111 Submissions to consultation paper: PIAC, p. 2; South Australian Government, p. 1; Delta Electricity, p. 3.

- The **AEC** noted that any offering of SRAS by NSPs would need to be done on a competitive basis, and their arrangements would need to be ring-fenced from the regulated part of their businesses[112]
- **Delta Electricity** submitted that if NSPs are enabled to provide energy and other market services during a restart, it will be important to appropriately separate the dispatch and market revenue from such assets.[113]
- **EnergyAustralia** supported further assessment of this issue, noting that it has the potential to increase the range of providers and improve market competition, thereby reducing overall costs for customers. However, EnergyAustralia stressed that the inclusion of NSPs must be on a competitive basis (including ringfencing requirements) whereby the NSP participates in the same tender process as generators and are considered on equal merits.[114]
- **Energy Networks Australia** suggested that if an NSP's equipment is able to deliver other services and this is economically efficient then these services should be able to be utilised.[115]
- **ERM Power** noted that it would have no objection to NSPs providing SRAS, provided that provision of these services is demonstrated to be ringfenced and receive no cross subsidy from the NSP's regulated revenue.[116]
- **Mondo Energy** suggested that allowing regulated NSPs to compete with businesses in the competitive areas of the NEM could undermine the separation of regulated and competitive elements of the NEM if it is not carefully considered. However, they also submitted that where an NSP has existing facilities already in place that are capable of providing restoration services that are sought by AEMO, there should not be unnecessary regulatory barriers imposed to prevent the NSP from providing these services.[117]
- **Origin Energy** submitted that NSPs should not be called upon to provide SRAS as there is a conflict of interest between their role informing AEMO of the capability of SRAS providers, and providing the service themselves. Origin also suggested that the introduction of regulated entities as potential suppliers of SRAS will distort the competitive market.[118]
- **PIAC** noted that allowing NSPs to provide SRAS would expand the range of potential providers and technologies for SRAS and improve diversity. However, PIAC also noted that there are a number of issues that should be explored further in examining this option, including what the impact on SRAS provision would be on the regulated expenditure requirements and Regulated Asset Base. PIAC submitted that it is important to consider what impact this may have on the competitive provision of SRAS.[119]

112 AEC, submission to consultation paper, p. 2.
113 Delta Electricity, submission to consultation paper, p.3.
114 EnergyAustralia, submission to consultation paper, p. 2.
115 Energy Networks Australia, submission to consultation paper, p. 4.
116 ERM Power, submission to consultation paper, p. 2.
117 Mondo Energy, submission to consultation paper, p. 2.
118 Origin Energy, submission to consultation paper, p. 1.
119 PIAC, submission to consultation paper, p. 2.

- **TasNetworks** and **TransGrid** supported AEMO being able to procure SRAS from NSPs but considered that there are a number of factors that require further deliberation so an operable and equitable framework results, including to resolve how to clearly identify which services are prescribed transmission services, and which are non-prescribed.[120]

A.5 Assessment of materiality of issue

The electricity sector transition that is currently under way is changing the dynamics of the power system. Traditional thermal plants are closing, and more renewable and asynchronous generators are being integrated into the power system. Distributed energy generation capacity is expected to double or even triple by 2040 while the NEM will replace most of its current generation stock over a similar time period.[121]

The Australian Energy Market Operator's (AEMO's) Integrated System Plan (ISP) shows that by 2040 over 15,000 MW of Australia's coal-fired generation is expected to retire and in the 'central' modelling scenario be replaced by approximately 34,000 MW of variable renewable generation and 11,000 MW of dispatchable capacity.[122] If a faster and bigger transformation occurs, then these values will increase and occur sooner.[123]

These changes give rise to a number of challenges in managing the security and reliability of the power system. AEMO's rule change request identifies the reduction in the number of traditional sources of SRAS in some regions, and the declining reliability of remaining SRAS providers, as one such challenge. The high penetration of asynchronous, intermittent grid-connected generation with no black start capability and no active capability to support grid stability during restoration is cited as a key contributor to this issue. Other factors identified by AEMO include:

- large synchronous generators, which were traditionally assumed to be available to be energised to support system restoration, are becoming less reliable as they age or are being indefinitely mothballed or retired, leading to a lack of system support needed to continue the restoration process after initial restart
- many of the synchronous generators that remain in service are increasingly offline for commercial reasons, which can result in delays to the restoration process or an inability to provide any restoration support services
- the combination of fewer static loads (i.e. loads not connected via power electronic inverters) being available for grid stabilisation and a very high uptake of distributed energy resources makes it increasingly difficult to restore supply in a stable manner.

AEMO suggests that sustainable long-term solutions to these issues will need to involve the asynchronous generation fleet and other inverter-connected resources.

The Commission agrees with AEMO's assertion that the existing definition of SRAS:

120 Submissions to consultation paper: TasNetworks, p. 2.; TransGrid, p. 2.
121 AEMO, *Draft 2020 Integrated System Plan*, December 2020, p. 10.
122 Ibid, p. 40. Dispatchable capacity sourced from ISP Generation Outlooks.
123 Ibid, p. 28.

- limits this service to black start capability provided by generating units, thereby precluding other types of plant, such as batteries, from providing black start capability
- doesn't account for the provision of services other than black start, which may be used to contribute to power system restoration following a major supply disruption.

A.6 Commission's analysis and conclusions

BOX 3: DRAFT RULE

The draft rule amends the definition of SRAS and black start capability under the NER in accordance with AEMO's rule change request. Specifically:

- the definition of SRAS is amended to refer to both black start capability and system restoration support services
- these system restoration support services would be defined by AEMO in the SRAS Guideline
- the definition of black start capability is amended to allow for this capability to be provided by both generating units and other facilities.

Benefits of draft rule

The expanded definitions of SRAS and black start capability under the draft rule would:

- allow emerging technologies, such as batteries with 'grid-forming' inverters, or plant combinations (e.g. an asynchronous generator combined with a battery storage system) to be procured by AEMO to provide black start capability in the future
- increase competition for the provision of black start capability from an expanded range of facilities, reducing the costs of these services for consumers
- allow AEMO to procure system restoration support services , providing for the capability to support the grid during a restart process to be valued under the NER and available when required
- provide AEMO with the flexibility to define the specifics of system restoration support services in the SRAS guideline, allowing AEMO to determine what capability is needed to support system restoration at any given time and within different electrical sub-networks, and to revise these services as required to adapt to changing system conditions.

Given the role of SRAS in enhancing the resilience of the power system by enabling it to recover from major disturbances, it is critical that AEMO has access to the services required to re-energise the grid and support the process of system restoration. AEMO is well-placed to determine the types of services required to achieve this and whether existing sources of SRAS are capable of meeting the requirements set out in the System Restart Standard. The Commission considers that expanding the definitions of SRAS and black start capability in the NER as proposed by AEMO to be a pragmatic and timely change to the SRAS frameworks that would enhance power system resilience.

The remainder of this section sets out:

- the changes to the definitions of SRAS and black start capability under the draft rule and the associated benefits these changes are expected to provide
- consideration of SRAS being provided by NSPs
- consequential changes to the definition of SRAS
- potential future changes to the System Restart Standard and how these are addressed under the draft rule.

A.6.1 Black start capability

Under the draft rule, the definition of black start capability is amended to remove the limitation that this capability can only be provided by generating units. The amended definition under the draft rule allows for black start capability to also be provided by plant or a combination of plant other than generating units. This may include, for example, an asynchronous generator combined with a battery storage system.

This change would enable emerging technologies to offer SRAS in the form of black start capability where they are capable of doing so.

The Commission also agrees with AEMO's suggestion that expanding the pool of potential providers of black start capability to include non-generating units may increase competition for this service in the medium to long term, thereby reducing overall SRAS costs. Allowing other types of plant to provide this service will also enhance power system security outcomes by facilitating investment in newer, and potentially more reliable, sources of SRAS. These benefits associated with this change were highlighted by a number of stakeholders in submissions to the consultation paper.

Under the draft rule, new (i.e. non-generator) providers of black start capability would be subject to the same obligations under the NER as existing SRAS providers. However, AEMO would retain the discretion to include provisions in its SRAS Agreements with such providers which account for any differences in their technical capabilities or operating requirements.

A.6.2 System restoration support services

The draft rule amends the definition of SRAS to include both:

- black start capability
- the restoration support services specified in AEMO's SRAS Guideline.

The amended definition of SRAS under the draft rule is consistent with AEMO's rule change proposal.

AEMO notes that changes in power system dynamics are contributing to it becoming increasingly difficult to restore supply in a stable manner following major supply disruptions. A lack of sufficient restoration support capability can therefore render black start capability of little value or utility. Allowing AEMO to procure the services that are needed to support the stable restoration of the power system will help to address this challenge.

The Commission considers that this would, in turn, enhance the overall resilience of the power system by improving the system's ability to quickly and effectively recover from high impact, low probability events. The Commission notes that stakeholders were generally supportive of this proposal.

Further the physical capability to provide some of these services may already be present for some currently installed asynchronous generators, but is not currently activated as the relevant generator controls and settings have not been tuned to enable the response. Allowing these services to be valued under the SRAS framework could provide an incentive for participants to activate this capability. This would also provide AEMO with a basis to define and test the capability of asynchronous generators to provide specific services under extreme operating conditions. The Commission also notes that, while the current generator technical performance standards may include standards relating to the types of services that might be defined as system restoration support services, the standards do not require generators to be capable of providing these services in the types of power system conditions that would be expected following a major supply disruption. As such, the capability to provide these services is not already provided for by the generator technical performance standards.

The Commission considers that it is appropriate and efficient for the new restoration support services falling within the definition of SRAS to be specified in AEMO's SRAS Guideline. The Commission acknowledges that some stakeholders expressed a preference for these services to be defined in the NER.[124] However, it is important to recognise that the capabilities required to support system restoration are likely to change over time as the power system continues to evolve.

Under the draft rule, the high-level outcomes these restoration support services are required to achieve, namely to be capable of supporting 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, would be set out in the NER. However, the Commission considers that AEMO is best-placed to assess the specific technical capabilities needed with respect to these services and to periodically review these requirements. Providing AEMO with the flexibility to specify these technical requirements in the SRAS Guideline and modify them as required is consistent with the objective of developing regulatory frameworks that are adaptable to changing market and power system conditions. This view was reflected by a number of stakeholders in submissions to the consultation paper.[125]

In contrast, if the relevant restoration support services were to be defined in the NER rather than the SRAS Guideline, a rule change process would be required each time AEMO (or any other person) identifies that these services need to be modified or expanded. The Commission does not consider that this would be a necessary or efficient outcome in this context.

124 Submissions to consultation paper: ERM Power, p. 2; Major Energy Users, p. 2; TasNetworks, p. 1.

125 Submissions to consultation paper: PIAC, p. 2; South Australian Government, p. 1; Delta Electricity, p. 3.

Any amendments to the SRAS Guideline (other than minor and administrative amendments) are already subject to the rules consultation procedures under the NER.[126] This will ensure the new restoration support services are developed in a transparent manner and stakeholders have the opportunity to provide input on the types of services that should fall within the definition of SRAS and how these should be defined.

The draft rule does not provide for the restoration support services procured by AEMO under an SRAS agreement to be used for any purpose other than those relating to the restart of the power system following a major supply disruption.

A.6.3 Provision of SRAS by NSPs

AEMO's rule change request suggested that the Commission may wish to consider whether the procurement of SRAS from regulated NSPs needs to be addressed in the rule.[127] As noted in the consultation paper (and raised by many stakeholders in submissions), procurement of SRAS from NSPs would represent a significant departure from the current design of the SRAS frameworks in the NER and would require a number of complex regulatory issues to be addressed, including the appropriate separation of the regulated and competitive components of the electricity supply chain.

The Commission understands based on consultation with NSPs that they would generally already provide the types of services that might be defined as system restoration support services , as part of their normal operations, and that this would already form part of their prescribed transmission services. Accordingly, the expanded definition of SRAS under the draft rule does not include services provided by NSPs, as the Commission does not consider that such a change would result in additional services being provided by NSPs following a major supply disruption beyond what they already provide as part of their standard operational practices.

A.6.4 Consequential changes to the definition of SRAS

The amendments to the definition of SRAS under the draft rule also remove unnecessary duplication of the concept of supplying energy to a connection point in order to restart other generating units, as this is already captured by the definition of black start capability (which is referenced in the definition of SRAS). The definition also incorporates changes to more clearly tie the definition to the intended outcomes of AEMO's power system security responsibilities (i.e. facilitating the restoration and maintenance of power system security).

A.6.5 Transitional arrangements applying to the System Restart Standard

As discussed in chapter 2, the system restart standard sets out requirements relating to the reliability of SRAS. AEMO has noted that some of these requirements would not be applicable to restoration support services that would fall within the definition of SRAS under the draft rule. For example, the system restart standard discusses how the reliability of any individual SRAS provider would be determined, which includes by having regard to "the availability of

126 NER, clause 3.11.7(f).

127 AEMO, rule change request, p. 12.

that service, the expected start-up performance and the reliability of the transmission components between the SRAS source and the first transmission substation to which it is connected".[128]

Under the NER, the Reliability Panel is responsible for determining and reviewing the system restart standard.[129] The Commission considers that changes to the system restart standard may be necessary to account for the inclusion of restoration support services in the definition of SRAS, when the SRS is next reviewed. The draft rule includes a transitional provision which:

- requires the Panel to review the system restart standard as soon as practicable following the commencement of the final rule
- clarifies how the system restart standard is to be interpreted until such time as it is amended to reflect the new definition of SRAS.

If the final rule reflects the draft rule, the Commission will issue terms of reference to the Panel requesting that the Panel review the system restart standard to take account of the changes to the SRAS frameworks.

128 Reliability Panel, The System Restart Standard, December 2016, p. 2.

129 NER, clause 8.8.1(a)(1a).

B GENERATOR TECHNICAL PERFORMANCE STANDARDS

B.1 Overview

This appendix considers AEMO's proposal to amend the technical access standards in the NER to include new minimum and automatic access standards in relation to restoration support services, in particular:

- a minimum access standard to require generating units to have the capability to provide at least one of the restoration support services specified in the SRAS Guideline
- an automatic access standard to apply where the capability of the generating unit extends to all of those restoration support services.

BOX 4: SUMMARY OF THE DRAFT RULE

The draft rule does not propose any changes to the existing generator technical performance standards under the NER.

The Commission considers it would not be appropriate to make changes to the performance standards in relation to the capability to provide restoration support services since this may impose higher costs on new generators and ultimately lead to higher costs for all consumers.

Furthermore, setting access standards to mandate at least one of the restoration support services for all new or modified generators would be duplicative, given AEMO already has the ability to procure an efficient amount of restoration services. This has been facilitated through the expansion of the definition of SRAS to include restoration support services as part of this draft rule, and which is discussed in appendix A. Under the draft rule AEMO would have the ability to determine what restoration support services are appropriate given changing system conditions for each network and so could procure an efficient mix of black start capability and restoration support services to meet the system restart standard.

The remainder of this appendix outlines:

- the background to the proposed changes
- the proponents' and stakeholders' views on the changes
- the Commission's assessment of the materiality of the issues raised by AEMO
- the Commission's analysis and conclusions.

B.2 Background

Under the Chapter 5 connections framework in the NER, connection applicants are able to negotiate with a network service provider (who is advised on some matters by AEMO) on the

level of performance for the equipment they are seeking to connect to the power system.[130] For each technical requirement, the negotiation occurs within a range bounded by an:

- automatic access standard, where a connection cannot be denied access on the basis of that technical requirement) and
- a minimum access standard, below which a connection must be denied access, that are each set out in the NER.

The access standards for generators connecting to the power system relate to a wide range of technical requirements and are set out in Schedule 5.2 to the NER. These access standards can be viewed as the reference points used for negotiations between connection applicants, the network service provider and, where relevant, AEMO, to set the specific levels of technical performance of equipment that connects to the power system.

In 2018 the Commission made the *Generator technical performance standard rule* (GTPS rule)[131], which made changes to the way levels of technical performance are negotiated for equipment connecting to the power system, and to improve the technical requirements for new generating systems. In making changes to the performance standards, the Commission considered a range of issues which are relevant to AEMO's current proposal, including:

- the extent to which requiring new capabilities from connecting generators aligns with the existing connection charging concepts, whereby a generator is only required to bear costs associated with its own connection
- the interaction between mandating a capability in the access standards, and the role played by market price signals in providing incentives to generators to include given capabilities when investing in new plant.

B.3 Proponents' views

AEMO's rule change request proposed the addition of a new access standard mandating the capability of generating units to provide active and reactive power in system restart conditions. Under AEMO's proposed rule, the minimum access standard would require generating units to be capable of providing at least one of the restoration support services specified in the SRAS Guideline, while the automatic access standard would apply where the generating unit can provide all the specified restoration support services.

AEMO's comments in relation to this issue provided in its rule change request and submission to the consultation paper are set out below.

B.3.1 AEMO's rule change request

AEMO's new access standard under the proposed rule relates specifically to restoration support services and would not mandate black start capability. AEMO also suggested in their rule change request that:

130 Embedded generators are subject to a separate connections framework set out in Chapter 5A of the NER.

131 AEMC, *Generator technical performance standards, rule determination*, 27 September 2018. Available at: https://www.aemc.gov.au/rule-changes/generator-technical-performance-standards

- the system restoration support services required for a particular connection location would be dependent on the characteristics of that part of the network.[132]
- most current inverter connected generation technologies are already capable of reactive power response at low or no active power output, noting that this is already a requirement for generating units in South Australia[133]
- the new access standard be prescribed as an AEMO advisory matter - the NER allow AEMO to refuse to agree to a proposed negotiated access standard in relation to AEMO advisory matters if, among other things, the connecting equipment would adversely affect system security or the quality of power supply to other network users.

B.3.2 AER's rule change request

The AER's rule change request did not comment on this issue.

B.3.3 Proponents' submissions

AEMO's submission to the consultation paper acknowledged that the AEMC sought information about costs related to additional generator performance standards requirements, as set out in the consultation paper, and made the following observations in response:

- Several generators are already proposing to connect at weak locations in the network, with a low available fault level or short circuit ratio (SCR). These conditions are similar to what could be observed during system restoration, where minimal synchronous machines are online. If new generators do successfully connect to the grid at those low SCR locations, they will have had to demonstrate compliance with requirements for continuous uninterrupted operation, as well as voltage and frequency control capabilities in the conditions that are present at the connection point. This would allow the same generating system to offer one or more restoration support services with no or minimal control system changes.
- The South Australian generator licence conditions, set by the Essential Services Commission of South Australia (ESCOSA), require all generating systems to be capable of operating in low system strength conditions (including down to a minimum SCR of 1.5).
- If new generation technologies are already incorporating these capabilities in their design, it is likely they could be tuned to provide restoration support services. However, retrofitting that capability will be significantly more expensive.
- The capability to provide a service need not be active at all times. It is envisaged that the necessary tuning would be performed only as required by an SRAS contract.[134]

AEMO stated that it is open to alternative approaches that would have the effect of delivering the necessary latent capability. It also noted that any technical requirements specified in the NER may need to distinguish between synchronous and inverter-based generation, given their different characteristics.

132 AEMO, System restart standards, services and testing rule change request, p. 13.
133 Ibid.
134 AEMO submission to consultation paper, p.5

The AER's submission to the consultation paper did not comment on this issue.

B.4 Stakeholder comments

Stakeholders that commented on AEMO's proposed introduction of a new performance standard requiring generators to be capable of providing one or more restoration support services generally opposed this change. Relevant comments are included below.

The Australian Energy Council noted strong opposition to the imposition of additional technical obligations on new generation (and generation which has been altered according to National Electricity Rule 5.3.9) when such services could be more efficiently acquired in the SRAS market.[135]

Origin expressed that mandating new requirements through the generator performance standards was not the most cost-effective means of ensuring timely system restoration. Origin suggested that the proposed new performance standards would result in added costs and are unnecessary given AEMO should be able to use the revised SRAS definition to procure an appropriate mix of SRAS services for system restoration.[136]

The CEC noted that the addition of a new access standard was an overly conservative and onerous blanket approach of mandating a capability on all new generators. The CEC expressed that SRAS should remain a service and sufficient incentive to provide the service should come from the changed definition and the payments for such services through AEMO's procurement process. It also noted that the requirement to reopen a plant's agreed generator performance standards when modifications are made was already proving to be a challenge and will be exacerbated by a new access standard.[137]

Delta Electricity expressed the view that it was not appropriate to require all new generation technologies to provide SRAS services suggested by the proposed Rules. Delta Electricity expects that the new standard would add further expense to the process for new and altered connections and would rely on further modelling reports rather than testing that would cost further tens to hundreds of thousands of dollars and not categorically confirm that the black system conditions a unit faces would permit the performance delivery expected even if modelling suggests it would.[138]

EnergyAustralia expressed concern about the efficiency and efficacy of AEMO's proposal to mandate system restart support service capability for new plants. It noted that mandating the provision of support services, and raising the bar for the automatic standard was likely to increase barriers to entry for new plants by slowing down the connection negotiation process. EnergyAustralia also identified that by mandating the provision of services, the costs of provision will be concealed within the energy price making it difficult to assess whether services are over or under procured and whether customers are receiving value for money. [139]

135 AEC, submission to consultation paper, p. 1
136 Origin, submission to consultation paper, p. 1
137 CEC, submission to consultation paper, p. 2
138 Delta Electricity, submission to consultation paper, p. 6
139 EnergyAustralia, submission to consultation paper, p.3

Mondo stated that if the proposed access standard were defined outside of the rules it would impose an unmanageable regulatory risk on generators. It expressed that services should be competitively sourced, and therefore should not be required to be included in the generator access standards. Mondo also noted that a further reason not to include restoration services in the access standards was that SRAS and restoration services should not be the sole domain of generators, but rather, should be open to other categories of market participants.[140]

Snowy Hydro expressed the view that as SRAS is an ancillary service subject to its own guidelines and specifications, it should not be included as a performance standard under the NER noting the ancillary service specification and the contractual obligation to provide the services are sufficient. Snowy Hydro also noted that by including SRAS services as a performance standard under Schedule 5.2 of the NER, AEMO was seeking to obtain SRAS for free whilst imposing costs on all new-entrant generators, and those generators seeking to upgrade plant under clause 5.3.9 of the NER. Snowy Hydro also stated that the benefits to system strength are unlikely to be commensurate with the additional cost burden, which would be borne by all users in the form of higher prices.[141]

Hydro Tasmania stated that there was a lack of detail on the proposed access standard making it difficult to make a realistic assessment of the impacts of the proposed change. Hydro Tasmania noted concern that new access standards focussing on new asynchronous generation may be incompatible with existing generators undergoing upgrades or modification. Hydro Tasmania proposed that any consideration of changes to access standards should occur through the rigour of the normal rules change process rather than AEMO's proposal to use a consultation during the SRAS Guideline process.[142]

TransGrid noted that changes to the generator performance standards may discourage new investment and further slow down connections.[143]

TasNetworks considered that, in some cases, it may be that mandating enhanced generation connection standards to include other SRAS capabilities was the best solution to a given restart problem and would not impose unnecessary barriers to entry. In other cases, however, mandating increased generation connection and compliance standards may be a sub-optimal solution. TasNetworks suggested, rather than increase costs in general by having all proponents meet a new standard, it may be more cost effective to have one party install and operate a synchronous condenser along a given restart path. TasNetworks stated this would provide SRAS support under system black conditions but could also provide other network services during system normal conditions.[144]

AGL expressed that this proposal should be considered carefully, given the risk that such requirements cause unnecessary costs for new connecting generators and create barriers to entry. AGL also suggested that the AEMC carefully consider the interactions between a

140 Mondo, submission to consultation paper, p. 3
141 Snowy Hydro, submission to consultation paper, p. 1
142 Hydro Tasmania, submission to consultation paper, p. 3
143 TransGrid, submission to consultation paper, p. 3
144 TasNetworks, submission to consultation paper, p. 5 & 6

mandatory mechanism through the generator technical performance standards and AEMO's proposal for procuring system restoration services. AGL noted that at face value these proposals appear duplicative and may lead to higher costs compared to relying solely on the market mechanism to drive an efficient level of services being available during system restart events.[145]

ERM Power supported AEMO's proposed change to require new generating systems to provide at least one system restart support service as part of their agreed generator performance standards. ERM Power noted concerns with AEMO's proposed rule change where an existing generator could be required to meet the proposed new generator performance standards following any plant upgrades to meet the requirements of clause 5.3.9.[146]

B.5 Assessment of materiality of issues

AEMO suggests that lack of voltage and frequency control and available fault current are becoming increasingly problematic as the generation mix changes and thermal, synchronous generators withdraw from the market. These are vital for stability during the early stages of system restoration. AEMO has highlighted that there is no requirement for generating systems either to have black start capability, or to provide the electrical support that is required for successful system restoration. AEMO proposed an expansion to the technical access standards in Chapter 5 of the NER, specifically Schedule 5.2.5 with the addition of a new clause S5.2.5.15, addressing the capability to provide active and reactive power in system restart conditions.

Given generation roughly equal to the current size of the NEM, around 50GW, is foreshadowed for connection to the grid over the next 10 years it is important that any changes to generator access standards be carefully evaluated given the flow on consequences will be material. The Commission considers AEMO's recommended changes to access standards would impose unnecessary additional requirements on connecting generators. These changes are not needed, given other changes the Commission have proposed that will provide AEMO with the flexibility required to address potential lack of black start or restoration support capability.

B.6 Commission's analysis and conclusions

Given the role of SRAS in enhancing the resilience of the power system by enabling it to recover from major disturbances, it is critical that AEMO has access to the services required to re-energise the grid and support the process of system restoration. The Commission considers it would not be efficient to make changes to the performance standards in relation to the capability to provide restoration support services as it represents an unnecessary new cost imposed on connecting generators, which will lead to higher costs for all consumers.

145 AGL, submission to consultation paper, p. 4

146 ERM Power, submission to consultation paper, p. 3

AEMO has scope to determine the types of services required to meet the requirements set out in the SRS. The Commission considers that the changes made in the draft rule accompanying this draft determination, including expanding the definition of SRAS and amendments to the SRAS procurement objective would allow AEMO to procure the amount and type of SRAS services required to meet the SRS.

The Commission has therefore decided to not include AEMO's proposed SRAS additions to the minimum and automatic access standards as part of this draft rule. The remainder of this section sets out the Commission's analysis and conclusion on this issue.

B.6.1 Analysis

The Commission recognises the importance of having sufficient resources available to support the grid during a restart process. AEMO notes that the reduction in static loads and the increase in the uptake of distributed energy resources make a stable restoration process increasingly difficult. A lack of sufficient restoration support capability can therefore render black start capability of little value or utility.

The Commission agrees with the majority of stakeholders that increasing the requirements on generator access performance standards could lead to a higher cost and delays to the connection process for generators. There is also the risk, as highlighted in submissions, that this new clause could add costs to existing generators who make a modification causing their GPS to be reopened through clause 5.3.9.

The Commission considers that there is little to suggest that a market based approach to sourcing SRAS cannot meet system needs, particularly given this has served the NEM well for its existence. AEMO have the ability to procure the necessary and efficient level of SRAS through the normal SRAS tender process to meet the requirements of the SRS. Furthermore, these procurement abilities have been enhanced through changes to the definition of SRAS and to the SRAS procurement objective as set out in the draft rule.

The expansion of the definition of SRAS change enables AEMO to include a wider range of system restoration support services within the definition of SRAS and to specify these services within the SRAS guidelines. The SRAS procurement objective within the NER for AEMO has changed to enable AEMO to consider a wider suite of short and long term costs in determining the overall lowest cost SRAS mix. Given the market based abilities in sourcing SRAS AEMO already has and the changes within the draft rule to enhance them, setting SRAS support within the access standard is unnecessary and could lead to an inefficient overbuild of capacity, imposing higher costs on generators and ultimately consumers.

The Commission also acknowledges that if restoration support services are to be specified in AEMO's SRAS guideline instead of the NER, as noted by a number of stakeholders, it would create significant regulatory risk for generators. Providing AEMO with the flexibility to specify these technical requirements in the SRAS Guideline and modify them as required is consistent with the objective of developing regulatory frameworks that are adaptable to changing market and power system conditions. However, if this were coupled with new connecting generators being required to meet standards that can be periodically changed by AEMO, this would increase risk and ultimately the cost of new connections.

B.6.2 Conclusion

The Commission recognises the intention of the proposed new access standard is to increase confidence that the market will be able to provide the right mixture of services to enable a secure restart of the system in light of the energy transition that is ongoing and changing power system dynamics. AEMO is best positioned to determine the exact mix of services, providing they are available, necessary to restart the system in a secure and stable manner. If specific services are not available in a location to support a restoration restart pathway, AEMO has the ability to specify these services in the SRAS Guideline and subsequently procure the services from those generators that are capable of offering them.

The Commission considers that given the amendment to the definition of SRAS, detailed in appendix A which widens the potential pool of SRAS providers, and to AEMO's procurement objective, detailed in appendix C which provides AEMO clarity it can procure for the overall lowest cost, any changes to the generator performance standards are unnecessary and duplicative.

C SRAS PROCUREMENT OBJECTIVE

C.1 Overview

AEMO proposed to amend the SRAS Procurement Objective, so that AEMO is expressly guided by the NEO in its procurement of SRAS rather than being required to procure SRAS to meet the system restart standard (SRS) at lowest cost.

The change proposed under the draft rule in relation to this issue is summarised in Box 5.

BOX 5: SUMMARY OF DRAFT RULE

The draft rule makes a minor amendment to the SRAS Procurement Objective to clarify that AEMO can take overall costs (including short-term and long-term costs) into account when procuring SRAS to meet the system restart standard at lowest cost.

The Commission does not agree that the SRAS procurement objective should be altered to refer to the NEO, as proposed by AEMO, on the basis that the objective already makes it clear that AEMO has scope to procure efficient levels of SRAS at the lowest overall costs. However, the Commission considers that it is appropriate to make minor changes to the SRAS procurement objective, to clarify that AEMO has the flexibility to take into account all of the costs when procuring SRAS, which includes long-term efficiencies that may be gained over time by entering into long-term contracts for the provision of SRAS.

This is consistent with the reasoning set out by the Commission in its final determination on the *System restart ancillary services* rule change in 2015 (2015 SRAS rule change), which introduced the current SRAS Procurement Objective.[147]

The remainder of this appendix outlines:

- the background to the proposed changes
- the proponents' and stakeholders' views on the changes
- the Commission's assessment of the materiality of the issues raised by AEMO
- the Commission's analysis and conclusions.

C.2 Background

The NER prescribe two "objectives" for the SRAS frameworks, which relate to the Reliability Panel and AEMO, respectively:

1. Reliability Panel: The "SRAS Objective" provides that the objective for SRAS is to minimise the expected costs of a major supply disruption to the extent appropriate, having regard to the NEO. The SRAS Objective guides the Reliability Panel in its setting of the parameters of the system restart standard. It requires the Panel to consider all matters

147 AEMC, *System Restart Ancillary Services* rule change - final determination, April 2015. Available at: https://www.aemc.gov.au/rule-changes/system-restart-ancillary-services.

relevant to meeting the long-term interests of consumers, which involves consideration of various economic factors, including the trade-offs that exist between the cost of procuring restart services against the short term costs of a loss of supply and the longer term costs of economic disruption.[148]

2. AEMO: the "SRAS Procurement Objective" is currently defined as a requirement that "*AEMO must use reasonable endeavours to acquire system restart ancillary services to meet the system restart standard at the lowest cost*".[149]

The existing SRAS Procurement Objective, which applies directly to AEMO, was introduced by the *National Electricity Amendment (System Restart Ancillary Services) Rule 2015* as part of the Commission's final determination for the 2015 SRAS rule change.[150] In developing the SRAS Procurement Objective the Commission considered a number of issues which are relevant to AEMO's current rule change request, including:

- **Clarification of purpose**: The Commission considered that the existing requirement on AEMO to use reasonable endeavours to acquire SRAS should be preserved under the new SRAS Procurement Objective.
- **Focus on cost of SRAS**: The Commission considered that the broader assessment of economic costs relating to SRAS is best undertaken by the Reliability Panel when it develops the System Restart Standard (SRS) and that AEMO's focus should therefore be solely on procuring SRAS that matches the requirements of the system restart standard, at the lowest cost possible. This distribution of responsibilities between the Panel and AEMO was designed to deliver an efficient quantity of SRAS, at an efficient cost.
- **Consideration of net benefit**: The Commission considered that effective SRAS frameworks must provide a clear separation of organisational roles and responsibilities. The Commission noted that it is the sole responsibility of the Reliability Panel to consider all relevant economic factors, including the benefits of SRAS and the cost of sourcing those services, in order to determine the efficient level of restart service for each sub-network. The Commission considered that AEMO's focus should be procuring the required quantities of SRAS to meet the system restart standard, as defined by the Panel, and that AEMO should not be procuring any more SRAS, or any less, than is required to meet the system restart standard.

C.3 Proponents' views

AEMO's rule change request aims to address the perceived barrier the SRAS Procurement Objective poses to the development of new SRAS and the acquisition of a combination of services that delivers the best value in terms of reliability, by proposing that the concept of the SRAS Procurement Objective be removed from the NER. AEMO proposed that AEMO's procurement of SRAS instead be expressly guided by the NEO.[151] AEMO suggests that this

148 Ibid, p. 60.
149 NER, clause 3.11.7(a1).
150 AEMC, *System Restart Ancillary Services* rule change - final determination, April 2015.
151 AEMO, System restart standards, services and testing rule change request, July 2019, p. 12

would ensure a focus on efficient operation in the long-term interests of consumers with respect to price, reliability and security of supply.

Comments in relation to this issue provided in AEMO's rule change request and AEMO's and the AER's submissions to the consultation paper are set out below.

C.3.1 AEMO's rule change request

AEMO's rule change request acknowledges that, at the time of the 2015 SRAS rule change, AEMO agreed with the Commission's intent of providing clear and distinct objectives for the Reliability Panel and AEMO in fulfilling their roles in the SRAS framework.[152] However, AEMO considers that it has since become clear that the lowest-cost procurement objective does not allow AEMO to take into account non-cost factors that may lead to more efficient outcomes in the long term interests of electricity consumers.

AEMO argues in its rule change request that the existing definition of the SRAS Procurement Objective constrains its ability to underwrite new SRAS capability, or to take account of "non-cost factors" which may allow it to procure a combination of SRAS which is slightly more expensive but provides a higher level of confidence in its ability to meet the relevant reliability requirements.[153]

To address this, AEMO has proposed that the concept of the SRAS Procurement Objective as a defined term be deleted and the existing requirement in clause 3.11.7(a1) of the NER be amended to state that: "AEMO must use reasonable endeavours to acquire system restart ancillary services to meet the system restart standard, having regard to the national electricity objective". AEMO contends that this change would ensure that SRAS is procured in a manner which ensures a focus on the long term interests of consumers with respect to price, reliability and security of supply.

C.3.2 AER's rule change request

The AER's rule change request did not comment on this issue.

C.3.3 Proponents' submissions

AEMO states in their submission to the Consultation Paper that in a situation where AEMO has already contracted sufficient SRAS to meet the system restart standard in a region, the current procurement objective would prevent AEMO from acquiring additional amounts during the contract term. If AEMO were to negotiate for future capability to be provided once existing contracts expire, at the point of contracting it will often be difficult to establish whether the procurement objective is met. If AEMO cannot commit to a contract that will underwrite the cost of investing in black start capability then, in the absence of alternative funding, it is less likely to be developed. They note that the consultation paper canvassed the possibility that this restriction could arise from AEMO's particular interpretation of the NER.

152 AEMO, System restart standards, services and testing rule change request, July 2019, p. 9
153 AEMO, System restart standards, services and testing rule change request, July 2019, p. 9

Even if that were the case, AEMO suggested it would be desirable for the NER to clearly establish that no such restriction exists.[154]

The AER submitted that any framework for the procurement of SRAS should not unfairly discriminate in favour of incumbent sources of SRAS and must incorporate a strong level of governance so that investment is efficient and in the long-term interests of consumers. They consider that the current obligation for AEMO to use reasonable endeavours to procure SRAS at least cost remains appropriate. In the AER's view, this provides AEMO with sufficient flexibility in the procurement process and is, in principle, technology neutral and there is sufficient flexibility in the SRAS Procurement Objective for AEMO to consider extending the timeframe over which SRAS costs are assessed, in which case the longer term efficiencies of higher up-front cost contracts may be realised.[155]

C.4 Stakeholder comments

Stakeholders that commented on AEMO's proposed amendment to the SRAS Procurement Objective generally opposed this change or considered that the SRAS Procurement Objective already provides AEMO with sufficient flexibility in how it assesses the costs of SRAS procurement. Relevant comments are included below.

The **Australian Energy Council** stated that AEMO should identify the services it requires, and pay the market price for such services, striving to minimise the costs, in accordance with the SRAS Procurement Objective. They note that AEMO already has the power to contract well ahead of time and offer longer-term competitive contracts and saw no need for AEMO to distort the market by offering incentives or underwriting facility development.[156]

AGL Energy considered the current decision-making frameworks to be robust and did not support fundamental changes. AGL considered that if a long-term arrangement is a more cost-effective option than other options, AEMO would be able to justify that contract. They do not consider the Procurement Objective to be the issue and are concerned its removal would allow AEMO to prioritise reliability and/or security over cost. AGL also expressed concern with AEMO underwriting investment in new black start technologies should there be existing capability that is available at lower cost. If the definition of SRAS were to be expanded to include restoration services, AGL envisaged that the Reliability Panel would set out requirements in the system restart standard, and AEMO would procure these services at minimum cost.[157]

ERM Power noted that they do not support AEMO's proposed change to the SRAS procurement framework. They considered that the Reliability Panel remains best placed to consider the long term interests of consumers which will include the assessment of the required economic trade-offs. ERM stated it is unclear whether the Rules themselves or

154 AEMO, submission to consultation paper, p. 6.
155 AER, submission to consultation paper, p. 1.
156 AEC, submission to consultation paper, p. 1
157 AGL Energy, submission to consultation paper, p. 2

AEMO's interpretation of the Rules is leading to barriers in AEMO's view of what would constitute efficient long term SRAS procurement.[158]

Origin Energy expressed concern that any deviation from the current least cost approach in applying the SRAS procurement objective will reduce transparency around AEMO's SRAS contracting activities. They also noted that AEMO already procures SRAS with regard to the NEO; and that the SRAS standard already sets out views on what would be considered the timely restoration of the system. On this basis, Origin considered that a change to the procurement objective is unlikely to be necessary. Origin also submitted that it is unclear on what basis contracting decisions will be made if the SRAS objective was amended as suggested by AEMO.[159]

Snowy Hydro stated that they contractually warrant the availability of a minimum number of units at all times in order to provide enough generation to re-energise the grid. On this basis, they disagreed with AEMO's reasoning in proposing to replace the procurement objective with the NEO. Snowy Hydro suggested that any decision to prefer new, more expensive providers over existing generators will reduce incentives to invest in current and, by definition, more efficient capability. Snowy Hydro also submitted that an alternative to amending the SRAS objective is to amend the System Restart Standard to reflect a higher level of service needed.[160]

Major Energy Users stated AEMO is already obliged by the Rules to ensure that its actions are bound by the NEO but the SRAS procurement objective imposes a tighter and less flexible requirement on the acquisition of these services. They expressed that constraining AEMO to the NEO and not the SRAS Procurement Objective would reduce the role of the Reliability Panel in setting the standards for reliability in the NEM.[161]

Mondo Energy noted that removing the SRAS Procurement Objective could undermine the important role distinctions between AEMO and the Reliability Panel. They expressed that it is not immediately apparent how the SRAS Procurement Objective is acting as a barrier as AEMO claim. Mondo suggested that AEMO could propose alternative wording to the SRAS Procurement Objective, rather than delete it altogether.[162]

Delta Electricity agreed that lowest-cost procurement has not allowed AEMO to take into account non-cost factors which can have a material impact on the robustness of the service provided.[163]

EnergyAustralia noted concerns around AEMO's proposed changes. They considered that AEMO needs to provide more information on the compromise AEMO are making between costs and capability. EnergyAustralia stated that industry must have confidence that AEMO will have appropriate processes in place to structure its use of discretion and judgement to

158 ERM Power, submission to consultation paper, p. 3
159 Origin Energy, submission to consultation paper, p. 1
160 Snowy Hydro, submission to consultation paper, p. 2
161 Major Energy Users, submission to consultation paper, p. 2
162 Mondo Energy, submission to consultation paper, p. 3
163 Delta Electricity, submission to consultation paper, p. 4

ensure they are providing value for money for customers and not merely seeking to minimise their own risks by obtaining greater control.[164]

PIAC supported AEMO procuring SRAS in a way that delivers the interests of consumers in both the short- and long-term. They supported improving the incentives for generators to invest in SRAS capabilities to the extent that it achieves the former by providing new SRAS sources and delivering lower prices in the long-term. PIAC noted it is not clear yet whether the change proposed by AEMO would be the most preferable way to achieve this and suggested it could be addressed through a principles-based direction of how AEMO should balance the short-term and long-term costs of SRAS procurement.[165]

TasNetworks considered that having regard to the NEO may provide too broad a definition to ensure that the standard is met in an economically efficient manner. They also noted that a too literal interpretation of the lowest cost objective in the current definition would seem unlikely to serve customers well. TasNetworks expressed that the use of the term 'reasonable endeavours' in the current definition fulfils the intent to provide sufficient flexibility to AEMO to take account of non-cost factors when procuring SRAS. They also suggested that the AEMC clarify the extent to which the term 'reasonable endeavours' covers non-cost factors. If a less literal interpretation of the current SRAS procurement objective supports non-cost factor considerations, TasNetworks suggested amending the procurement objective as AEMO has proposed would seem redundant. If a change to the procurement objective is deemed necessary to incentivise the provision of SRAS and related system restoration services in Mainland states, TasNetworks would support this subject to there being no impact on Tasmanian SRAS processes.[166]

TransGrid expressed support in replacing the SRAS Procurement Objective. However, they noted replacing it with the NEO may not provide sufficient guidance on the objective of procuring SRAS. They suggested a specific set of criteria should be developed to guide SRAS procurement and give more clarity to potential suppliers of SRAS to make investments in equipment that can assist in restarting the power system. Such criteria could include obligations on AEMO to consult transparently, minimise overall costs to consumers, and to set out a clear process in its SRAS Guidelines for how it will apply these principles.[167]

The **South Australian Government** supported AEMO's proposal to amend the SRAS Procurement Objective to align with the NEO. They suggested the proposal would provide more scope to procure SRAS from a wider source of potential providers while still balancing the overall costs to consumers.[168]

C.5 Assessment of materiality of issues

AEMO noted that it has observed that there are fewer traditional sources of SRAS in some regions over recent SRAS procurement cycles, and those that remain are potentially less

164 EnergyAustralia, submission to consultation paper, p. 2
165 PIAC, submission to consultation paper, p. 2
166 TasNetworks, submission to consultation paper, p. 4
167 TransGrid, submission to consultation paper, p. 2
168 The South Australian Government, submission to consultation paper, p. 2

capable of reliably restoring generation and transmission to a point from which load can ultimately be restored within a reasonable time frame. AEMO also stated that in almost all cases, unless appropriate obligations or incentives are applied to encourage initial investment, existing facilities will be able to provide SRAS at a lower price point in the immediate term than the cost of developing new capability.

It has also been highlighted that in two of the past three financial years, the actual availability of the contracted services would not have met the system restart standard in two regions.[169] AEMO can generally terminate an SRAS contract for sustained failure to meet reliability levels, but this means short notice procurement of another SRAS service for that region. In this scenario there could be significant delays before either the original SRAS capability can be re-established or a replacement can be tested and contracted.

AEMO's view is that some of these challenges can be overcome by:

- developing new system restart services necessary to support restoration in the future power system
- acquiring a combination of services that delivers the best value in terms of reliability over the contract term, accounting for reasonably foreseeable contingencies.

However, AEMO considers that the current SRAS procurement objective presents a barrier to them taking the approaches described above.

The Commission recognises the challenges that technological changes and market conditions present in relation to the availability of traditional SRAS providers, and for the procurement of reliable sources of SRAS. The Commission agrees that in procuring SRAS AEMO should have the flexibility to take into account the longer term efficiencies that could be gained by entering into long-term contracts with new SRAS providers, and that this may result in a more reliable combination of SRAS sources being procured. This view was reflected in the Commission's final determination on the 2015 SRAS rule change.[170] Given that AEMO have identified some uncertainty in relation to whether the SRAS Procurement Objective allows them to take such an approach when procuring SRAS, the Commission considers it appropriate to make a minor amendment to the rules to make sure that they reflect the intended policy position.

C.6 Commission's analysis and conclusions

BOX 6: DRAFT RULE

The draft rule makes a minor amendment to the SRAS Procurement Objective to clarify that AEMO can take *overall* costs (including short-term and long-term costs) into account when procuring SRAS to meet the SRS at lowest cost.

169 AEMO, *Non Market Ancillary Services Cost and Quantity Report 2017-18*, September 2018, p.5; *Non Market Ancillary Services Cost and Quantity Report 2016-17*, September 2017, p.5

170 AEMC, *System Restart Ancillary Services* - final determination, April 2015.

Benefits of draft rule

The amended SRAS Procurement Objective would provide clarity that AEMO has the flexibility to consider entering into long term SRAS contracts or procuring specific combinations of services if this would result in the lowest long term costs for consumers. This is consistent with the view expressed by the Commission in its final determination on the 2015 SRAS rule change, and so clarifies the intent of the Commission expressed in that rule change determination.

AEMO notes that acquiring SRAS only from those currently available sources that meet the system restart standard results in lower costs for the immediate procurement. However, AEMO suggest that the existing SRAS Procurement Objective makes it impossible for AEMO to acquire services with much higher reliability value at a slightly increased cost, or hold a prudent level of SRAS reliability reserve.

The Commission acknowledges AEMO's concern that in some regions it is already a challenge to meet the system restart standard using existing sources of SRAS. The long term impact on the NEM is less competition from a smaller pool of system restart service providers and therefore higher than necessary overall short and long term procurement costs.

In contrast to current frameworks, under its proposed rule AEMO would have greater flexibility and discretion in respect of its procurement process for SRAS. In acquiring SRAS from certain providers, AEMO would only need to establish that its procurement decisions are consistent with the NEO.

The Commission highlights that when making the 2015 SRAS rule, the prescriptive framework for SRAS procurement previously set out in the NER was removed. The purpose of so doing was to expand the range of options available to AEMO to procure SRAS, with the Commission noting that it considered "AEMO could make use of this capability to enter into contracts with longer lead times or longer term."[171]

The Commission has therefore previously indicated that the NER are intended to explicitly allow AEMO to utilise whatever process it considers most appropriate to procure SRAS, which could include entering into long-term contracts to underwrite new investment in SRAS capability. In support of this position, a number of stakeholders have expressed that the existing SRAS Procurement Objective already provides AEMO with sufficient flexibility to enter into long-term SRAS contracts and take into account non-cost factors when procuring SRAS.[172]

AEMO's proposed rule drafting would require AEMO to make sure that procurement decisions to be consistent with the NEO. The NEO is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

171 AEMC, *System Restart Ancillary Services* - final determination, April 2015, p. 100.

172 Submissions to consultation paper: AEC, p. 1; AGL Energy, p. 2; ERM Power, p. 3; Mondo Energy, p. 3; TasNetworks, p. 4.

- price, quality, safety, reliability and security of supply of electricity; and
- the reliability, safety and security of the national electricity system.[173]

The Commission agrees with the view expressed by a number of stakeholders that if the SRAS Procurement Objective were amended to refer to the NEO (as proposed by AEMO), this would markedly reduce the clarity around AEMO's obligations when procuring SRAS, as it would have a very broad discretion in terms of how it interprets and applies the NEO.[174] This could create the risk of inefficient procurement of SRAS, as a reference to the NEO would not provide sufficient clarity on the economic considerations applying to such procurement. Stakeholders that commented on this change noted that if the SRAS Procurement Objective were to be modified, some form of economic constraint should still apply to AEMO's procurement processes.[175]

The Commission notes that, consistent with the view expressed in its final determination on the 2015 SRAS rule change, the broader assessment of economic costs relating to SRAS is better undertaken by the Reliability Panel through the determination of the system restart standard. This is an open and transparent process, that allows for effective assessment of the full range of costs and benefits associated with the system restart process. The Commission considers that AEMO's focus should therefore be solely on procuring SRAS that meets the requirements of the system restart standard, at the lowest overall cost. It is important for this distribution of responsibilities between the Panel and AEMO to be maintained, to support the delivery of an efficient quantity of SRAS at an efficient cost.

The Commission acknowledges AEMO's concerns regarding confidence in the reliability of current and future SRAS sources. The Commission notes that the changes proposed under the draft rule, including the expansion of the definition of SRAS and the establishment of a framework for system restart path testing, will contribute to improving the reliability of SRAS sources. This was noted by some stakeholders in submissions to the consultation paper, which suggested that the "higher level of confidence" in SRAS sources sought by AEMO could be achieved by additional testing rather than changes to the SRAS Procurement Objective.[176] The changes under the draft rule will make sure AEMO has the flexibility to procure SRAS from a wider range of providers and the ability to regularly validate the system restart plan.

Given the importance of maintaining the distribution of responsibilities between the Panel and AEMO within the SRAS procurement framework, the draft rule proposes an alternative amendment to the SRAS Procurement Objective, to clarify its intent, consistent with the final determination of the *System restart ancillary services rule*. The draft rule amends the SRAS Procurement Objective to require AEMO to procure SRAS to meet the SRS at the lowest *overall* cost. This includes both short-term and long-term costs, thereby allowing AEMO to balance potentially higher up-front costs with long-term efficiencies. The Commission considers that this will provide sufficient clarity that AEMO can enter into long-term contracts,

173 Section 7 of the NEL.

174 Submissions to consultation paper: AGL Energy, p. 2; Origin Energy, p. 1; TasNetworks, p. 4, TransGrid, p. 2.

175 Submissions to consultation paper: TransGrid: p. 2; PIAC, p. 2; AGL Energy, p. 2.

176 AEC, submission to consultation paper, p. 1.

or procure specific combinations of services, when procuring SRAS if this will result in the lowest long-term costs for consumers.

D SRAS TESTING AND COMMUNICATION PROTOCOLS

D.1 Overview

This appendix considers the proposals to:

- introduce a framework in the NER to facilitate the physical testing of SRAS and system restart paths on a periodic basis
- clarify the form, scope and content of the SRAS communication protocols
- clarify the roles and responsibilities of AEMO and NSPs with respect to the testing of SRAS.

The draft rule proposes a number of changes in relation to these issues. These are summarised in Box 7.

BOX 7: SUMMARY OF DRAFT RULE

The draft rule introduces a regulatory framework for the physical testing of system restart paths. This framework provides that AEMO is responsible for designing and implementing such tests and must consult with affected participants and incorporate their feedback into this process. AEMO would also need to provide guidance to participants on the frequency with which the tests may occur and give at least six months' notice to participants prior to a test occurring. The draft rule also makes clear that participants could use the existing compensation framework to claim compensation for the direct costs incurred as a result of being instructed to participate in a test. Reporting obligations would also apply to AEMO to make sure that the processes undertaken to minimise the costs and operational impacts of the test are transparent to participants.

The draft rule also proposes changes to clarify the roles and obligations of AEMO, NSPs and other participants with respect to the SRAS communication protocols and system restart more broadly.

The Commission considers that the proposed changes to the SRAS testing framework are necessary to ensure that the effectiveness of the system restart plan can be validated through physical testing when required. This would enable identification and resolution of issues which could delay system restoration following a major supply disruption. Clear and appropriate processes for coordination and communication between parties involved in preparing for and responding to such a disruption would also increase the effectiveness of this response at a relatively low cost.

The remainder of this appendix outlines:

- the background to the proposed changes
- the proponents' and stakeholders' views on the frameworks for SRAS testing
- the Commission's assessment of the materiality of the issues raised by AEMO and the AER

- the Commission's analysis and conclusions.

D.2 Background

SRAS agreements between AEMO and SRAS providers include provisions that require testing of the SRAS equipment. In addition, the SRAS Guideline states that an SRAS test will generally be required by AEMO:[177]

- within the 6 months prior to the intended commencement date of the SRAS agreement, unless exceptional circumstances apply[178]
- within 20 business days after maintenance causing any major component of the SRAS equipment or SRAS transmission components to be out of service for seven days or more[179]
- at one additional date and time per year, to be nominated by AEMO on no less than five business days' notice to the SRAS provider (termed a "short notice test").

The SRAS Guideline also provides that AEMO can request an SRAS test if AEMO has reasonable grounds to believe that SRAS equipment may not be capable of delivering contracted services.[180] SRAS providers are required to submit test reports to AEMO detailing the steps in, and results of, such tests.

NSPs are not parties to SRAS Agreements but have obligations under the rules to negotiate in good faith with a prospective SRAS provider and participate in, or facilitate, testing of SRAS proposed to be provided by a prospective SRAS provider.[181] The NER do not expressly set out requirements relating to NSPs' involvement in the ongoing testing of SRAS. This current limited involvement of NSPs in SRAS testing is relevant to issues raised by both AEMO and the AER. The NER also do not include a framework for the extended testing of system restart paths and the obligations of AEMO, NSPs and affected participants with respect to such testing.

The NER also requires NSPs and AEMO to jointly develop "communication protocols" in relation to SRAS.[182] These protocols are intended to facilitate the drafting, disseminating and verification of information which may be critical to system restoration. As discussed in chapter 1, the AER's rule change request identifies a number of issues arising from a lack of clarity about the form and content of the communication protocols.

177 SRAS Guideline, clauses 4.3.1 and 4.3.2.

178 The existence of exceptional circumstances will be determined by AEMO.

179 The SRAS provider schedules this test with the network service provider, subject to AEMO's approval.

180 SRAS Guideline, clause 4.3.3 (c). This is not a short notice test. The SRAS provider arranges this test with the network service provider.

181 NER, clause 3.11.9(i)(2)-(3).

182 NER, clause 4.8.12(j)

D.3 Proponents' views

D.3.1 AEMO's rule change request

AEMO's rule change request noted that it is increasingly difficult to validate the integrity of system restart paths through modelling and generator-level testing due to ongoing material changes in the power system.[183]

To address this issue, AEMO proposed the inclusion of a new provision in the NER governing the arrangements that would apply to physical testing of system restart paths, which would be used to verify whether a component of the system restart plan is capable of meeting the requirements of the system restart standard.

AEMO noted that, subject to the need to maintain power system security and reliability, testing would be expected to require outages or partial outages of multiple transmission elements and may involve the participation of one or more non-SRAS generators and distribution network service providers.[184]

AEMO suggested that the proposed testing framework would provide the benefit of clarifying:[185]

- are part of the functions of AEMO and NSPs under the NER, and therefore subject to the liability and cost recovery regimes in the national energy legislation
- are only conducted when AEMO determines reasonably necessary to verify the viability of a system restart plan to meet the system restart standard or AEMO's power system security responsibilities.
- would be required by AEMO, and as such under the current structure of transmission network incentive schemes their market impact would be excluded
- may require the cooperation and participation of any registered participant, subject to obligations to minimise the operational impacts on all parties.

D.3.2 AER's rule change request

The AER's rule change request highlighted a number of issues relating to communication processes and SRAS governance arrangements that were identified in its investigation of the black system event in South Australia in 2016. In particular, the AER noted that the lack of clarity surrounding the SRAS communication protocols and the roles and responsibilities of different parties involved in the testing and deployment of SRAS delayed system restoration following that event.

To address these issues, the AER proposed that the rules be amended to clarify:

- the scope, form and content of the SRAS communication protocols
- the roles and obligations of AEMO and NSPs with respect to system restart.

183 AEMO, rule change request, p. 6.
184 Ibid, p. 13.
185 Ibid, p. 14.

D.3.3 Proponents' submissions

AEMO's submission to the consultation paper suggested that:[186]

- the occasional physical testing of system restart paths in each region is now a necessity to be able to establish that system restoration can be sustained beyond the initial restart and "allow progressive reconnection of a critical mass of generation and load in a timeframe that is acceptable from a safety, social and economic perspective"
- obligations on NSPs and, where necessary, non-SRAS generators to facilitate and participate in these tests are integral to their success and effectiveness
- this testing would not involve the involuntary disconnection of customer loads.

AEMO has also highlighted that its extended network testing will require substantial planning, in consultation with the relevant NSP, to minimise disruption, cost and threats to power system security and its proposed rule changes would require any departures from the expected dispatch and operation of affected participants to be minimised.[187]

The Commission understands from AEMO that the need to undertake extended network testing in a particular electrical sub-network may arise as a result of a number of factors, including for example:

- the retirement of large synchronous generators and/or commissioning of new generators
- the installation of additional reactive support devices
- the commissioning of new synchronous condensers
- changes to system protection schemes in the relevant region.

As such, AEMO considers that flexibility is needed in the timing and frequency of such tests to ensure that it is able to verify the ongoing integrity of system restart paths in response to changes in the power system.

AEMO also commented on a number of the AER's proposed rule changes, noting that:

- while the matters described in the AER's proposed expansion of AEMO's power system security responsibilities are all things that practically fall within those responsibilities, AEMO suggested this should be expressed more generally, allowing the relevant rules in chapters 3 and 4 of the NER to provide the detail[188]
- AEMO considers that the AER's proposal to prescribe that the SRAS Guideline include a process for comparing the arrangements used in the testing of SRAS with those to be used in the deployment of SRAS is too specific for inclusion in the NER and AEMO's preference is for the SRAS Guideline to specify a more general objective that SRAS testing requirements should be designed to achieve.[189]

The AER was broadly supportive of AEMO's proposed changes to the SRAS testing framework in its submission to the consultation paper, noting that the evolving power system provides

186 AEMO, submission to consultation paper, p. 2.
187 Ibid.
188 Ibid, p. 7.
189 Ibid.

significant uncertainty to planning for system restart and as such extending the scope of SRAS testing is likely to be necessary[190]

D.4 Stakeholder comments

Most stakeholders commented in submissions to the consultation paper on AEMO's proposal to introduce a framework to facilitate the ongoing testing of SRAS providers and extended testing of system restart paths.

While the majority of these stakeholders acknowledged the potential value of such tests to validate the performance of SRAS providers and the integrity of restart paths, a number of concerns were raised in relation to this proposal, including regarding the cost implications, operational impacts and governance arrangements for such testing.

In particular, many stakeholders expressed concern about third party participants (i.e non-SRAS providers) being obliged to participate in SRAS testing without an entitlement to claim compensation for the costs they would incur as a result. **AGL Energy**, the **Australian Energy Council (AEC)**, **Delta Electricity** and **Hydro Tasmania** identified general types of costs which may be incurred by participants required to participate in such testing, including:[191]

- additional resources required to participate in and facilitate the tests
- lost opportunity costs due to participation in testing
- risk of damage to equipment from the conduct of the test
- increased risk of tripping of generators, possibly leading to effects on the wider market
- impact on spot prices due to multiple transmission lines being out of service simultaneously to facilitate the test.

Some stakeholders noted that it is difficult to identify or quantify specific costs that may be incurred without further detail on the nature, frequency and scope of the testing proposed by AEMO.[192]

Many stakeholders commented that any changes to the SRAS testing regime should include an avenue for affected third party participants to claim compensation for the costs they incur as a result of being required to participate in such testing.[193]

Delta Electricity considered that this could occur through a mandatory requirement for SRAS providers to enter into financial agreements directly with such third parties which provide for compensation to be paid by the SRAS provider.[194] Delta Electricity suggested that the SRAS provider is best placed to manage the risks associated with testing through the design of testing procedures and timing decisions.[195]

190 AER, submission to consultation paper, p. 1
191 Submissions to consultation paper: AGL Energy, p. 3; AEC, p. 2; Delta Electricity, p. 5; Hydro Tasmania, p. 2.
192 Submissions to consultation paper: AGL Energy, p. 3; ERM Power, p. 3.
193 Submissions to consultation paper: EnergyAustralia, p. 3; AEC, p. 2; Delta Electricity, p. 5; ERM Power, p. 3; Mondo Energy, p. 3.
194 Delta Electricity, submission to consultation paper, p. 1.
195 Ibid.

Mondo Energy suggested that the costs of such testing could be spread across all participants and NSPs in the relevant region, similar to the current cost allocation for SRAS procurement.[196]

Snowy Hydro highlighted that the testing framework must take into account the need for NSPs, as regulated entities, to pass on associated testing costs to generators, and must also balance the cost of generator outages during the scheduled test periods.[197]

In addition to the costs discussed above, stakeholders noted that participating in testing of system restart paths would have operational impacts which would need to be managed. Stakeholders suggested that the framework for SRAS testing set out in the NER should address the following issues to ensure that such operational impacts are able to be managed appropriately and efficiently:

- affected participants and NSPs should be able to provide meaningful input into the testing process, including by negotiating the timing and design of SRAS tests with AEMO[198]
- the rules should address the frequency with which AEMO can direct that such tests be undertaken[199]
- outages for testing purposes should be excluded from Service Target Performance Incentive Scheme (STPIS) calculations.[200]

It was also suggested that AEMO's role as the owner and manager of SRAS tests should be addressed in the NER, with NSPs having obligations to facilitate and participate in such tests in consultation with AEMO.[201]

Some stakeholders submitted that it is not clear that testing of system restart paths is required and that similar outcomes may be able to be achieved through modelling and paper-based walk throughs.[202]

There was broad support from stakeholders for the AER's proposed changes regarding SRAS communication protocols and clarification of the roles of AEMO and NSPs in relation to SRAS testing.[203]

Transgrid and Mondo Energy also expressly supported the AER's proposal to mandate in the rules that the SRAS Guideline include a process for comparing SRAS testing procedures with deployment procedures.[204]

196 Mondo Energy, submission to consultation paper, p. 3.

197 Snowy Hydro, submission to consultation paper, p. 2.

198 Submissions to consultation paper: AGL Energy, p. 3; Clean Energy Council, p. 3; Hydro Tasmania, p. 2; TasNetworks, p. 5; TransGrid, p. 1.

199 Submissions to consultation paper: AGL Energy, p. 3; Clean Energy Council, p. 3; Hydro Tasmania, p. 2.

200 Submissions to consultation paper: TasNetworks, p. 2; Transgrid, p. 2; Energy Networks Australia, p. 3.

201 Submissions to consultation paper: TransGrid, p. 1; Energy Networks Australia, p. 2.

202 Submissions to consultation paper: EnergyAustralia, p. 2; Energy Networks Australia, p. 3; TransGrid, p. 1.

203 Submissions to consultation paper: AGL Energy, p. 4; Delta Electricity, p. 8; EnergyAustralia, p. 4; Energy Networks Australia, p. 3; ERM Power, p. 3; Hydro Tasmania, p. 4; Mondo Energy, p. 4; Origin Energy, p. 1; South Australian Government, p. 1; TasNetworks, p. 2; TransGrid, p. 3.

204 Submissions to consultation paper: TransGrid, p. 3; Mondo Energy, p. 4.

TasNetworks submitted that TNSPs should be immune from liability for actions taken to conduct testing, consistent with section 116 of the National Energy Law (NEL).[205]

D.5 Assessment of materiality of issue

Given the significant social and economic impacts of major blackouts it is critical that, when such scenarios occur, SRAS providers and the broader network to which they are connected respond as anticipated in order to restore supply to consumers in a timely manner. Physical testing of SRAS is a process that can provide confidence to AEMO and market participants that this will occur. Equally, such testing can reveal previously unforeseen issues or arrangements that could delay restoration or result in failure of a system restart path. The consequences of such an outcome occurring during an actual restoration scenario are difficult to measure, but are likely to result in considerable cost and potentially public safety issues.

AEMO currently undertake modelling of system restart scenarios to simulate the response of SRAS generators to deliver electricity to a defined point on the network and sustain stable output for a specified period. Such simulations are also used by AEMO and TNSPs to train operational staff in between physical testing. The Commission understands that there are limitations on the ability of such modelling to verify how an SRAS provider will interact with the wider network in order to validate that the relevant system restart path can be successfully re-energised. This exercise is made more challenging by the dynamically changing nature of the power system, with the ongoing emergence of new issues reducing the utility of modelling outcomes which have not been validated by the undertaking of physical restart path tests. Such models also necessarily incorporate a range of assumptions to account for uncertain variables or system conditions. As such, the results of this modelling will inevitably be less robust than the observations and information obtained from a physical "real-world" test. Other potential benefits of physical testing compared to simulated models include:

- obtaining a more reliable estimate of the time required to accomplish certain steps during restoration
- providing operators with practical experience and training in the coordination required between organisations and teams in a system restoration scenario
- enhancing power system security and resilience by ensuring that services are available and appropriate procedures are in place to respond should a major supply disruption occur, thereby increasing the likelihood that a system restoration will succeed

Embedding a framework for such testing in the NER would also provide greater transparency and certainty for participants about the scope and purpose of such testing and the governance framework which would apply.

D.6 Commission's analysis and conclusions

205 TasNetworks, submission to consultation paper, p. 2.

BOX 8: DRAFT RULE

The draft rule:

- introduces a framework for the physical testing of restart paths which clarifies the roles and responsibilities of AEMO, NSPs and affected participants in relation to this process
- provides that AEMO is responsible for the preparation of a test program, in consultation with NSPs and affected participants
- requires the SRAS Guideline to provide guidance on the frequency with which such tests may occur and the types of considerations or power system conditions which may necessitate a test being undertaken
- sets out the process for NSPs and affected participants to be consulted by AEMO in relation to the design of the test program
- requires a minimum timeframe of six months between the test program being finalised and the test being undertaken (subject to circumstances which necessitate a change to the timing of the test)
- clarifies that participants are allowed to claim compensation for any direct costs incurred as a result of participation in a test, through the existing compensation framework
- requires AEMO to report on the outcomes of a test, including how AEMO sought to minimise the costs and operational impacts and any issues with the relevant component of the system restart plan identified as a result of the test
- clarifies the scope, form and content of the SRAS communication protocols to be prepared by AEMO and NSPs
- clarifies the obligations of NSPs and AEMO with respect to SRAS and system restoration.

Benefits of the draft rule:

The draft rule would have a number of benefits, including:

- establishing regulatory arrangements that will facilitate testing required to verify that the system restart plan is able to meet the requirements of the system restart standard
- providing clarity and transparency to participants about the roles and responsibilities of the parties involved in such testing
- requiring that affected participants are provided with adequate notice of such tests occurring such that they can adjust their operations as required to minimise the cost and operational impacts of a test
- reducing regulatory uncertainty or investment risk associated with participation in testing by allowing affected participants to recover their direct costs
- requiring that information regarding the efficiency and effectiveness of such testing will be made publicly available by AEMO
- enhancing the effectiveness and utility of the SRAS communication protocols, thereby improving communication and coordination processes relating to SRAS.

Improvements to the existing frameworks applying to SRAS testing, communication processes and the allocation of responsibilities in relation to SRAS can help to significantly increase the likelihood that a system restoration will be successful, should the need arise. This section sets out the changes proposed under the draft rule in relation to these matters, including:

- the establishment of a regulatory framework for the preparation and conduct of physical system restart path testing by AEMO
- changes to clarify the scope, form and content of the SRAS communication protocols required to be developed under the NER
- other changes to clarify the roles and responsibilities of various parties in relation to SRAS.

D.6.1 System restart path testing

The Commission considers that physical testing of system restart paths is a valuable tool for AEMO, and other market participants, to be able to adequately prepare for a system restoration scenario and have confidence that such restoration will succeed based on the System Restart Plan and the services that have been procured for this purpose.

Given that this testing has commercial and operational implications for affected participants, it is important that the NER sets out a clear regulatory framework governing the preparation and conduct of such tests in order to allow participants to adjust their operations and minimise the costs and risks which may be associated with participation in testing. Accordingly, the Commission has sought to develop a testing framework which strikes an appropriate balance between making sure that such tests can occur as needed in response to changing power system conditions while still providing adequate notice and certainty to affected participants about the parameters of the test.

The remainder of this section sets out the elements of physical restart path testing which are addressed in the draft rule, including the:

- allocation of responsibilities in relation to such tests
- frequency with which such tests may occur
- timing and notice requirements
- process for consulting with affected participants on the design of a test
- cost recovery arrangements applying to participants required to participate in a test
- reporting requirements relating to a restart path test.

Responsibility for testing

AEMO's rule change request proposed that a TNSP would be responsible for:

- notifying registered participants in respect of plant connected to its network that are required to participate in the test
- preparing a test program in consultation with those registered participants
- conducting the test,

when notified by AEMO that a physical restart path test is required to be undertaken.

The Commission agrees that, as the system operator and the party responsible for preparing the system restart plan, AEMO is best placed to determine when such a test may be reasonably necessary. However, the Commission also considers it is appropriate for AEMO to be responsible for preparing and conducting these tests. While it is important that TNSPs assist with and facilitate this process, the Commission considers that AEMO is the party best placed to manage the testing process given its knowledge and expertise as the system operator. This aligns with the principle that the governance arrangements for SRAS should allocate responsibilities to the parties with the requisite skills and experience.

NSPs and other affected participants are required under the draft rule to provide any information reasonably requested by AEMO to inform the design of the test program. Those participants would be responsible for ensuring that any information they provide to AEMO as part of this process is prepared in accordance with good electricity industry practice.[206]

The draft rule also explicitly links AEMO's ability to require a test to be undertaken to the purpose of such testing. AEMO may only undertake a test if it determines that a test is reasonably necessary to verify whether a component of the system restart plan is consistent with the achievement of the SRS or the AEMO power system security responsibilities. This is consistent with AEMO's rule change proposal. AEMO may, for example, deem a test to be necessary if there are material changes in the power system or market conditions that mean it is necessary to reassess whether the existing system restart plan remains adequate to meet the SRS. As discussed below, AEMO would be required to provide guidance to participants on the types of conditions or changes which may lead to this conclusion.

Frequency of testing

Physical network testing of SRAS is a complex logistical exercise requiring affected participants to commit time and resources. Such tests may also involve disruption to the routine operations of such participants. Accordingly, the Commission considers it important that participants have some degree of certainty about the frequency with which such tests may be required so that this can be taken into account in operational and investment decisions.

At the same time, the Commission understands that it is likely to be impractical, and may be counter-productive, to prescribe minimum timeframes between such tests occurring. AEMO has advised that such tests would not be a routine occurrence at regular intervals (historically have been undertaken about once a year), but are instead likely to be undertaken in response to changes in power system conditions that necessitate a reassessment of the ability of the system restart plan to facilitate a successful restoration. Further, AEMO have advised that the frequency of physical testing of restart paths varies across regions. The draft rule provides that the need to undertake such an assessment of the system restart plan is the threshold for a test to be undertaken. Specifying timeframes in the NER in relation to limiting the frequency of such tests would therefore risk constraining AEMO's ability to undertake a test when needed. This could have significant implications if a major supply

206 Clause 4.3.6(j)(1) of the draft rule.

disruption were to occur in a region where a test (which may have revealed issues or shortcomings in the system restart plan) was not able to be undertaken due to limitations under the rules.

The draft rule seeks to address this by:

- requiring that AEMO amend the SRAS Guideline to include guidance as to the frequency with which physical system restart tests may be required, and the types of considerations or changes in power system conditions which may trigger the need to undertake such a test
- requiring that a system restart path test be undertaken in each electrical sub-network at least once every three years.

The Commission considers that this approach would provide transparency to participants about the potential frequency of such tests, while providing AEMO with the flexibility to undertake such tests more frequently than every three years, when it is deemed to be reasonably necessary. Given that changes to the SRAS Guideline are subject to the rules consultation procedures, participants would have the opportunity to provide input on these issues as part of this process.

Timing and design of restart path tests

The Commission understands from submissions to the consultation paper and additional discussions with stakeholders that having adequate notice of an upcoming physical restart path test would allow affected participants to adjust their operations and resourcing as required and thereby reduce the risks and costs associated with participating in such a test. AEMO's rule change request proposes that the minimum timeframe between the test program being provided to affected participants and the test being undertaken should be 30 business days. The Commission considers that a longer timeframe is required in order to allow affected participants to adequately prepare for such a test and ensure that the costs and risks can be appropriately managed. As such, the draft rule provides that AEMO:

- must consult with affected participants to determine the optimal timing for a test and take this into consideration when preparing the test program (to the extent reasonably practicable)
- must notify participants at the time the test program is provided that the test will be undertaken within a specified four-week period (the test period), which must be at least six months from that date
- must notify participants 20 business days from the commencement of the test period of the specific date within the test period on which the test will be undertaken
- may change the date of the test at any time if it considers this to be reasonably necessary, in which case AEMO must notify affected participants and reschedule the test as soon as reasonably practicable.

The Commission considers that this process will:

- provide affected participants with sufficient notice prior to a test being undertaken to allow those participants to adjust their operations as required to minimise the costs and operational impacts of the test
- provide AEMO with the necessary flexibility to take into account changes in power system or market conditions between the finalisation of the test program and the test being undertaken when determining an appropriate test date.

Stakeholders also noted that having the opportunity to provide input on the technical specifications applying a restart path test would also assist them in managing the associated risks. In particular, generators may have knowledge about limitations on the way any of their plant that will be involved in the test should be operated that is not available to AEMO or the TNSP. These participants should have the opportunity to provide this information to AEMO such that it is taken into consideration in the design of the test. The draft rule therefore sets out a clear process through which AEMO would be required to consult with affected participants on these issues and incorporate their feedback into the test program, to the extent that it is practicable to do so.

AEMO's rule change proposal also includes a general requirement that the test program seek to minimise the impact of the test on the operations of all parties involved. The Commission agrees with this proposal and this is reflected in the draft rule. The draft rule also imposes an obligation on AEMO to minimise risks to power system security when designing the test program.

The Commission understands that physical testing of the nature proposed may involve a number of generators coming offline and power lines being taken out of service. There is a risk that this situation could in itself lead to a major supply disruption, if a technical issue were to occur in the process of conducting the test, or unforeseen circumstances were to arise (such as a severe storm or bushfire). The Commission understands that AEMO would already take such considerations into account when designing the test program to ensure any impacts on power system security are minimised. The draft rule expressly includes a requirement on AEMO to do so in order to provide transparency and accountability in this regard.

Cost recovery for affected generators

As discussed above, AEMO's rule change request proposed that registered participants be required to bear their own costs associated with participation in a system restart path test and explicitly excluded any entitlement to compensation for such costs.[207] AEMO noted that its proposed arrangements for system restart tests, including the requirement that affected participants bear their own costs, were modelled on existing provisions which allows NSPs to require tests of generating units for power system modelling or performance assessment purposes.[208]

207 AEMO, rule change request, p. 25.

208 See clause 5.7.6 of the NER.

AEMO has advised that there may be circumstances in which participants that are not SRAS providers would be needed to participate in a physical restart path test. Accordingly, under AEMO's proposal generators participating in such a test would either:

- already be contracted SRAS providers and so be able to recover the costs of participating in the test under their contractual arrangement with AEMO; or
- be third party non-SRAS providers that are under a regulatory obligation to comply with instructions to participate in the test with no recourse to recover their costs.

The discussion below focusses on the second of these cases.

There are existing frameworks in the NER which allow participants to claim compensation for costs incurred as a result of a direction issued by AEMO. This includes directions to provide a service other than energy or market ancillary services. In those circumstances, the participant is entitled to be compensated for the relevant service at a "fair payment price" determined by an independent expert.[209]

The existing process for determining compensation in relation to directions to provide a service other than energy or market ancillary services is described in Box 9.

BOX 9: COMPENSATION FRAMEWORK - DIRECTIONS TO PROVIDE A SERVICE OTHER THAN ENERGY OR ANCILLARY SERVICES

Where a participant is directed by AEMO to provide a service other than energy or ancillary services, they may be entitled to compensation under clause 3.15.7A of the NER. The process for determining the compensation payable is as follows:

- AEMO must determine whether an independent expert could reasonably be expected to determine a "fair payment price" for the service provided by the participant
- if AEMO determines that an independent expert could be expected to determine a "fair payment price", AEMO must appoint an independent expert to do so
- in determining the fair payment price for the relevant service, the expert may take into account other relevant pricing methodologies in Australia and overseas, including other markets in which the relevant service may be utilised and relevant contractual arrangements
- the expert must publish a draft report setting out its determination of the fair payment price - interested parties may make submissions on the draft report
- the expert must publish a final report determining the fair payment price for the service provided and AEMO calculate the compensation payable to the directed participant based on this price

209 NER, clause 3.15.7A.

- the fair payment price determined by the expert is to be applied as the fair payment price in all compensation claims under clause 3.15.7A which relate to the same service and occur within 12 months of the expert's final report being published.

Examples of the types of services this framework has been utilised to determine compensation for include:

- separate directions issued by AEMO to generators in South Australia and Victoria to reduce output and shut down respectively following a separation event in South Australia on 1 December 2016[1]
- a direction issued to a generator in South Australia to operate in synchronous condenser mode on 24 January 2019 to increase the power flow into Victoria and reduce the amount of load shedding in that region.[2]

Note: 1. Synergies Economic Consulting, *Final report on compensation related to directions that occurred on 1 December 2016*, June 2017. Available at: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Market_Notices_and_Events/Market_Event_Reports/2017/Final-Determination-of-fair-payment-price-additional-AGL-claims.pdf.

Note: 2. IES Advisory Services, *AEMO Direction to a NSW Participant on24 Jan 2019 to Operate a Unit as a Synchronous Condenser*, July 2019. Available at: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Market_Notices_and_Events/Market_Event_Reports/2019/AEMO-Direction-to-a-New-South-Wales-Generator---IES-Final-Determination.pdf.

The Commission understands that the costs which may be incurred by third party generators required to participate in a system restart path test could vary significantly between generating units, depending on the technical characteristics of the relevant plant and the action the generator is required to undertake to facilitate the test. For example, some generators may be constrained off or required to adjust their control settings in a particular way to facilitate a test. It is not expected that these generators would incur significant direct costs as a result of taking such action.

However, other generators may be required to take action which does result in them incurring material direct costs, including starting up from cold, to provide active power when they would otherwise not have been operating. In those circumstances, the direct costs those generators could be expected to incur would include startup costs and fuel costs.

The Commission understands that third party, non-SRAS generators most at risk of incurring substantial direct costs due to being required to take part in tests are OCGT type generators that operate on gas and/or diesel fuel. For these types of generators, which primarily operate as peaking plants providing dispatchable generation at times of high demand, these costs could be significant. The Commission also understands that restart path testing is likely to be undertaken during periods of low demand when such plants are unlikely to be operating. Furthermore, these would not necessarily be one-off costs as the generator may incur such costs multiple times if it is required to participate in multiple tests of the same restart path over time (depending on the nature of the participation required).

AEMO has advised the Commission that the likelihood of a generator that is not an SRAS provider being required to provide active power as part of a restart path test would be relatively low.[210] The Commission considers that the potential for this type of testing nevertheless gives rise to a risk that specific generation types may be disproportionately affected by being required to participate in a test, in terms of the direct costs they incur as a result. For example, this could add investment risk to those particular types of flexible, dispatchable peaking generation identified here.

The draft rule addresses this risk by establishing a limited entitlement to compensation for the costs incurred by generators participating in a restart path test. This will be available under the existing directed participant compensation framework in the NER. Specifically, the draft rule provides that:

- an instruction given by AEMO or an NSP to a registered participant whose plant is included in a test to cooperate with, and comply with instructions given by, AEMO and the relevant TNSP in planning, preparing for and conducting a test is taken to be a direction to provide a service other than energy or market ancillary services[211]
- the relevant participant is taken to be a directed participant and is entitled to claim compensation for the direct costs it incurs as a result of participating in the test under the existing compensation framework for directions to provide a service other than energy or market ancillary services.[212]

The Commission considers that the existing compensation framework for directions to provide a service other than energy or market ancillary services is an appropriate process for generators that incur costs as a result of participation in a restart path test to claim compensation for those costs. The draft rule makes sure that, where a participant incurs direct costs as a result of an instruction from AEMO or an NSP in relation to a test, this would trigger an entitlement to claim compensation for those costs. This is achieved by providing that such instructions are taken to be directions for the purposes of the existing compensation framework.

The costs which may be incurred by a generator participating in a test fall broadly within two categories:

- Direct costs - these are the costs that are directly incurred as a result of being required to take certain action to facilitate a test, and may include fuel costs and startup costs.
- Opportunity costs - these would include lost market revenue resulting from being constrained off to participate in a test.

The Commission considers that expressly limiting such compensation to direct costs is appropriate and promotes administrative efficiency, since only those participants that are directly financially impacted by an instruction to participate in a test are entitled to

210 AEMO has advised the Commission that typically, it would be looking to re-energise the auxiliaries of non-SRAS providers, rather than requiring the plant itself to be energised.

211 Clause 4.3.6(l)(1) of the draft rule.

212 See NER clause 3.15.7A and clause 4.3.6(l)(2) of the draft rule.

compensation. Furthermore, the Commission consider that estimation of direct costs should be a more straightforward task than calculating opportunity costs.

The Commission does not consider that it is pragmatic or economically efficient to compensate generators for opportunity costs (particularly lost market revenue) resulting from participation in restart path testing. While it is necessary to address the risk that any specific generator may be disproportionately impacted (by allowing for direct costs to be claimed), it is also reasonable to expect that all generators may be required to take part in restart pathway testing, and that they may incur some costs in doing so. This is on the basis that participation is necessary to deliver the public good of confidence in the effectiveness of a restart pathway.

Cost recovery for NSPs

Given that restart path testing would be required by AEMO, the efficient costs TNSPs incur in association with this testing are expected to be recovered through charges for prescribed transmission services. However, assuming that the Commission makes a final determination that is consistent with this draft determination, the Commission understands that an NSP's approved revenues would not necessarily account for the costs of restart path tests undertaken in the period after the final rule commences but before the TNSP's next revenue determination. In those circumstances, the existing cost-pass through provisions in Chapter 6A of the NER may apply. These provisions allow TNSPs to apply to the AER to recover the costs incurred as the result of any significant events that were not forecast as part of their allowed revenues for the relevant regulatory control period from electricity consumers as a cost pass through. This includes changes in the TNSP's regulatory obligations or requirements (referred to as a "regulatory change event"). However, any application to recover the costs associated with system restart path testing as a cost pass through would need to meet the applicable regulatory thresholds. For TNSPs, the costs associated with a pass through event must constitute more than one percent of their maximum allowed revenue for that regulatory year. The Commission understands that participation in a restart path test by a TNSP is unlikely to trigger this materiality threshold. The Commission notes that cost-pass through provisions also exist for DNSPs.

Physical restart path testing has also previously been undertaken pursuant to negotiated arrangements between AEMO and NSPs.

Reporting obligations

As discussed above, the draft rule imposes obligations on AEMO to minimise the impacts on participants affected by a physical system restart test, as well as the risks to power system security. The draft rule also recognises the purpose of such testing, which is to verify whether a component of the system restart plan is consistent with the achievement of the SRS or the AEMO power system security responsibilities.

The Commission considers that it is important that participants have transparency about the extent to which AEMO is meeting these requirements when preparing for and conducting system restart path tests. In particular, the publication of information about this process is

necessary to provide the market with confidence that such testing is being undertaken efficiently and is achieving its stated purpose.

To achieve this, the draft rule includes a requirement on AEMO to report on the outcomes of a restart path test within three months of completion of a test. This report must include the following information:

- whether the system restart plan being tested was found to be consistent with the achievement of the SRS or AEMO's power system security responsibilities
- how AEMO sought to incorporate input from affected participants into the test program
- how AEMO sought to minimise the operational impacts of a test on affected participants
- how AEMO sought to minimise the costs of the test, both for AEMO and for affected participants.

This process would mean that the utility and efficiency of such testing can be assessed on a transparent basis and valuable learnings from the test are captured and made available to market participants. The Commission considers that this approach balances the need to protect the confidentiality of sensitive information relating to the details of the system restart plan with the aforementioned objectives.

D.6.2 SRAS communication protocols

A lack of clarity and mutual understanding regarding communication processes applying to SRAS can have significant consequences in a system restoration scenario. The AER has identified that this was a contributing factor to the inability of Quarantine Power Station to provide SRAS following the black system event in South Australia.[213]

The Commission therefore considers that the AER's proposed changes to the requirements applying to the SRAS communication protocols would enhance the ability of all parties involved a system restart to adequately prepare for and respond to a major supply disruption. Any measure which may reduce the probability of a delay or miscommunication during a system restart scenario will reduce the length of time before supply can be restored to customers and thereby the costs associated with the relevant supply disruption.

In particular, the changes under the draft rule would:

- require communication protocols to be in writing, thereby providing greater clarity and certainty for participants
- provide greater clarity regarding the processes that apply and the individual roles and responsibilities of various parties in relation both the preparation and implementation of the system restart plan
- facilitate the timely preparation and communication of information which may be critical to system restoration
- require the communication protocols to capture critical information possessed by parties other than AEMO and NSPs

213 AER, rule change request, p. 8.

- require parties to take reasonable steps to comply with the communication protocols.

These changes are largely consistent with the AER's rule change proposal. The Commission considers these changes to be a relatively low-cost measure which may substantially increase the likelihood of successfully restoring the power system in accordance with the system restart standard.

D.6.3 Other changes relating to SRAS testing

NSP obligations with respect to ongoing testing of an SRAS provider

As discussed in appendix d.2, the NER currently set out requirements relating to NSPs' involvement in the testing of prospective SRAS providers, but do not address NSPs' obligations with respect to the ongoing testing of SRAS providers once they have been procured by AEMO. TNSPs do however have certain obligations under the SRAS Guideline with respect to testing of contracted SRAS, including to make arrangements to facilitate the test with any registered participants (other than the SRAS provider) that may be affected.[214]

Given that NSPs have an important role in the ongoing testing of contracted SRAS, the Commission considers it appropriate that this be reflected in the rules. This ensures that the rules provide transparency regarding the obligations on NSPs in this context and are consistent with existing practices.

Accordingly, the draft rule clarifies that NSPs must:

- cooperate with contracted SRAS providers to identify and resolve issues that may prevent the delivery of effective SRAS
- participate in and facilitate testing of a contracted SRAS provider as required by AEMO
- comply with the SRAS Guideline.

These requirements are in addition to NSPs' existing obligations with respect to prospective SRAS providers.

The Commission considers that the immunity from liability under s 119(2) of the NEL would apply to acts or omissions by NSPs in relation to restart path testing (unless the NSP was negligent or acted in bad faith), as such actions would constitute a system operations function or power to which such immunity applies.

AEMO power system security responsibilities

The NER set out a range of obligations on AEMO which relate to the secure operation of the power system. These are referred to as the "AEMO power system security responsibilities" and require AEMO to, amongst other things, maintain power system security, maintain the operating status of the power system and to assess the impacts of technical and any operational plant on the operation of the power system.[215] AEMO has an obligation under the rules to use reasonable endeavours to achieve its power system security responsibilities.[216]

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214 AEMO, *SRAS Guideline*, December 2017, p. 13. Available at: https://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2017/SRAS/Final/SRAS-Guideline-2017.pdf.

215 Clause 4.3.1 of the NER.

216 Clause 4.3.2(a) of the NER.

These responsibilities currently include a reference to AEMO's obligations relating to the procurement of SRAS.

The Commission considers it appropriate for the NER to also expressly include reference to AEMO's obligations with respect to the testing of and deployment of SRAS in AEMO's power system security responsibilities. The AER's rule change proposal includes reference in AEMO's power system security responsibilities to AEMO's obligations to oversee the testing of SRAS and to manage and coordinate the effective restoration of supply.[217]

AEMO suggested in its submission to the consultation paper that any additions to AEMO's power system security responsibilities should be described in general, umbrella terms so as to minimise any potential conflict between the general responsibilities in clause 4.3.1 of the NER and the detailed rules that expand upon these responsibilities.[218] The Commission agrees in principle with this suggestion. However, given that AEMO would have a direct role in the preparation of the test program for a system restart path test, the Commission considers that it is appropriate for AEMO's power system security responsibilities to expressly refer to AEMO's role in SRAS testing.

Accordingly, the draft rule expands AEMO's power system security responsibilities to expressly include the management and coordination of activities required to prepare for and respond to major supply disruptions, including:

- overseeing the testing of SRAS
- managing and coordinating the effective restoration of supply, including the deployment of SRAS.

As noted by the AER in its rule change request, this change would also complement the existing obligation on NSPs to use reasonable endeavours to assist AEMO in discharging its power system security obligations.[219]

217 AER, rule change request, p. 10.
218 AEMO, submission to consultation paper, p. 7.
219 AER, rule change request, p. 7.

E LOCAL BLACK SYSTEM PROCEDURES

E.1 Overview

This appendix addresses the role and function of Local Black Start Procedures (LBSP) and how this is dealt with in the NER. The Commission considers that it is necessary to make changes to the LBSP requirements in the NER, to include any actions that must be taken following a major supply disruption, to maintain the integrity of system restart.

BOX 10: SUMMARY OF DRAFT RULE

The draft rule clarifies the nature of the information included in LBSPs by providing that an LBSP can include both:

- non-binding information about the likely condition and capabilities of plant following any major supply disruption
- any actions the Generator or Network Service Provider must take following any major supply disruption to assist the safe implementation of the system restart plan.

The remainder of this appendix outlines:

- background to consideration of LBSPs as part of this rule change
- the proponents' and stakeholders' views
- the Commission's assessment of materiality of identified issues
- the Commission's analysis and conclusions.

E.2 Background

Each generator and NSP is required to develop Local Black System Procedures (LBSPs).[220] LBSPs are an important set of documents used by AEMO to develop its regional restoration options. The rules require LBSPs to:[221]

- provide sufficient information to enable AEMO to understand the likely condition and capabilities of plant following any major supply disruption, such as a black system event, so that AEMO is able to effectively co-ordinate the safe implementation of the system restart plan, and
- appropriately incorporate any energy support arrangements to which a generator or NSP may be a party.[222]

220 NER, clause 4.8.12(d).

221 NER, clause 4.8.12(f).

222 An energy support arrangement is a contractual arrangement between a Generator or Network Service Provider and a customer or participating jurisdiction under which facilities not subject to an ancillary services agreement for the provision of system restart ancillary services are used to assist supply to a customer during a major supply disruption affecting that customer, or customers generally in the participating jurisdictions.

AEMO has an obligation to develop and publish guidelines for the preparation of LBSPs and is responsible for approving LBSPs submitted by generators and NSPs.[223] The LBSP Guidelines set out the information to be provided to AEMO covering the technical requirements and limitations in a restart environment regarding generation and network plant.[224]

The Commission identified in the issues and approach paper for its *Review of the System Black Event in South Australia on 28 September 2016* that, based on the findings of the AER's investigation into the event, there is currently some uncertainty regarding the role and function of LBSPs.[225]

The AER highlighted that under the NER, there is an obligation for LBSPs to be consistent with SRAS agreements and there is an obligation for NSPs and generators to comply with their LBSP as quickly as practicable.[226] The AER considered this provision indicates that LBSPs were intended to encompass procedures such as the actions generators (including SRAS Providers) and NSPs will undertake when a major supply disruption is declared at their local level.[228]

AEMO, however, considered the LBSP Guidelines focus on eliciting information to identify the conditions and capabilities of power system assets after a total loss of supply and are not, in fact, procedures. In AEMO's view, the purpose of the LBSP is to inform AEMO of the likely capability of the asset in re- energising and maintaining a stable operating state on a potential restart path.[229]

The Commission has previously identified this issue in its *Review of the System Black Event in South Australia on 28 September 2016*. In that review, we decided to progress this issue as part of the assessment of these rule change requests.

E.3 Proponents' views

AEMO reiterated its view, in their submission to the consultation paper, that based on the historic role of LBSPs, that their purpose is to inform, and in turn be informed by, the regional system restart plans. AEMO needs to know what a generating plant's capabilities are likely to be in black system conditions, and what contribution the plant may be able to make to sustaining the restoration process as the network is energised. For plant that is contracted for SRAS, the LBSP must be consistent with the minimum technical requirements SRAS requirements provided for in the SRAS contract.[230]

AEMO stated that in principle it would support NER changes that remove any perceived ambiguity about the nature and purpose of LBSPs and their relationship with SRAS and the

223 NER, clause 4.8.12(g).

224 AEMO, *Guidelines for preparing Local Black System Procedures*. Available at: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation.

225 AEMC, *Review of the System Black Event in South Australia on 28 September 2016* - issues and approach paper, April 2019. Available at: https://www.aemc.gov.au/markets-reviews-advice/review-of-the-system-black-event-in-south-australi.

226 NER, clauses and 4.8.14(b).

228 AER, *The Black System Event Compliance Report - Investigation into the Pre-event, System Restoration, and Market Suspension aspects surrounding the 28 September 2016 event*, December 2018, p. 192.

229 Ibid.

230 AEMO, submission to consultation paper, p. 8.

system restart plan. It is important for each of the processes and documents that supports system restart to have a clearly articulated purpose and content, with minimal overlap.[231]

The AER did not comment on this issue in its submission to the consultation paper.

E.4 Stakeholder comments

Relevant stakeholder comments on the role and function of LBSP's included:

EnergyAustralia states that it supports the position that the purpose of the LBSP is to provide information to AEMO about the likely performance of assets to consider when it develops its restart paths. EnergyAustralia suggest that if there is confusion in the NER then this should be clarified.[232]

Hydro Tasmania noted that the AEMO format for the LBSP appears to be primarily a checklist of items for AEMO in determining the System Restart Plan. Hydro Tasmania stated that as currently configured the LBSP does not include the procedure for the generator to reconnect to the system following a black start event. Hydro Tasmania also highlighted that as noted by the AER it would appear to be a logical step to incorporate an operational procedure for the generator, in the event of a major supply disruption, into the LBSPs. Hydro Tasmania encourages the AEMC's consideration of incorporating an operational procedure for generators into the LBSP.[233]

Delta Electricity considered the existing Rules and LBSPs to be adequate for the purposes they fulfil. Delta stated the LBSP information provided by participants should not be considered representations of mandated performance but be considered to be indicative. Delta noted that such rare conditions, of a system black, will carry a myriad of unexpected and highly stressful situations for operation personnel which may lead to non-conformance despite the best endeavours and intentions of participants.[234]

E.5 Assessment of materiality

The Commission agrees with the AER that the role and function of the LBSP is currently unclear in the regulatory framework and there are valid concerns as to the integrity and completeness of the information being provided by generators and NSPs in their LBSPs. The Commission considers that providing clarity around whether information in an LBSP is binding or not should better enable participants to fulfil the requirements of LBSPs and thereby assist AEMO in the process of system restoration.

E.6 Commissions analysis and conclusions

231 Ibid
232 EnergyAustralia, submission to consultation paper, p. 4
233 Hydro Tasmania, submission to consultation paper, p. 4.
234 Delta Electricity, submission to consultation paper, p. 7

BOX 11: DRAFT RULE

The draft rule amends the requirements as set out in the NER on what information LBSP's must contain. Specifically they must include any actions the generator or NSP must take following any major supply disruption to assist the safe implementation of the system restart plan.

Consistent with the principles for effective governance, the Commission considers that arrangements should have clearly defined objectives and provide adequate operational scope to meet those objectives within the overarching governance framework. The Commission considers that the role and function of the LBSP should be clarified and the required information that must be included by generators and NSPs in their LBSPs should be subject to clear obligations.

The Commission considers that the uncertainty around the role and function of LBSPs stems from the interaction between clauses 4.8.12(f)(1) and 4.8.14(b) of the NER.

- Clause 4.8.12(f)(1) states that the LBSPs must "provide sufficient information to enable AEMO to understand the likely condition and capabilities of plant following any major supply disruption such that AEMO is able to effectively co-ordinate the safe implementation of the system restart plan". This suggests that the information to be included in the LBSPs is of a high level nature and doesn't indicate that there are any procedural requirements that are binding on the relevant participants.
- Clause 4.8.14(b) requires a generator or NSP to comply with the requirements of the LBSP as quickly as possible if AEMO advises the generator or NSP of a major supply disruption or the terms of the relevant LBSP require the generator or NSP to take action. This clause suggests that there would be binding procedures within an LBSP, not just high level information, that a generator or NSP would have to comply with in the event of a black system.

The apparent contradiction between these two clauses has created some uncertainty of when a market participant would be required to comply with the requirements of their LBSP, if the intent of the document is only to provide general high-level information.

The Commission proposes to address this issue by including an additional subclause in clause 4.8.12(f) in the draft rule. The draft rule provides that LBSP's must include any actions that the Generator or Network Service Provider must take following any major supply disruption to assist the safe implementation of the system restart plan. The inclusion of any such information in an LBSP would be subject to the existing process under the rules for the preparation and approval of LBSPs. The Commission does not envision that all LBSPs would be required to include such information, but consider that providing for such information to be included will provide the flexibility for LBSPs to specify actions that must be taken by the relevant participants where necessary.

The Commission considers that this change will provide certainty in the NER around the role and function of LBSPs and provide guidance for compliance purposes on what information is binding for the purposes of clause 4.8.14(b) of the NER.

F LEGAL REQUIREMENTS UNDER THE NEL

This appendix sets out the relevant legal requirements under the NEL for the AEMC to make this draft rule determination.

F.1 Draft rule determination

In accordance with s. 99 of the NEL the Commission has made this draft rule determination in relation to the rules proposed by AEMO and the AER.

The Commission's reasons for making this draft rule determination are set out in section 3.

A copy of the more preferable draft rule is attached to and published with this draft rule determination. Its key features are described in section 3 and additional details are provided in the appendices.

F.2 Power to make the rule

The Commission is satisfied that the more preferable draft rule falls within the subject matter about which the Commission may make rules. The more preferable draft rule falls within s. 34 of the NEL as it relates to:

- the operation of the national electricity system for the purposes of the safety, security and reliability of that system[235]
- the activities of persons involved in the operation of the national electricity system[236].

Further, the more preferable draft rule falls within the matters set out in Schedule 1 to the NEL as it relates to the operation of generating systems, transmission systems, distribution systems or other facilities.[237]

F.3 Commission's considerations

In assessing the rule change request the Commission considered:

- its powers under the NEL to make the rule
- the rule change request
- submissions received during first round consultation
- the Commission's analysis as to the ways in which the proposed rule will or is likely to, contribute to the NEO.

There is no relevant Ministerial Council on Energy (MCE) statement of policy principles for this rule change request.[238]

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235 s. 34(1)(a)(ii) of the NEL

236 s. 34(1)(a)(iii) of the NEL

237 Clause 11 of Schedule 1 to the NEL

238 Under s. 33 of the NEL the AEMC must have regard to any relevant MCE statement of policy principles in making a rule. The MCE is referenced in the AEMC's governing legislation and is a legally enduring body comprising the Federal, State and Territory Ministers responsible for energy. On 1 July 2011, the MCE was amalgamated with the Ministerial Council on Mineral and Petroleum Resources. The amalgamated council is now called the COAG Energy Council.

The Commission may only make a rule that has effect with respect to an adoptive jurisdiction if satisfied that the proposed rule is compatible with the proper performance of AEMO 's declared network functions.[239] The more preferable draft rule is compatible with AEMO's declared network functions because it does not affect AEMO's performance of those functions.

F.4 Civil penalties

The Commission cannot create new civil penalty provisions. However, it may recommend to the COAG Energy Council that new or existing provisions of the NER be classified as civil penalty provisions.

The draft rule does not amend any clauses that are currently classified as civil penalty provisions under the NEL or National Electricity (South Australia) Regulations. The Commission does not propose to recommend to the COAG Energy Council that any of the proposed amendments made by the draft rule be classified as civil penalty provisions.

F.5 Conduct provisions

The Commission cannot create new conduct provisions. However, it may recommend to the COAG Energy Council that new or existing provisions of the NER be classified as conduct provisions.

The draft rule does not amend any rules that are currently classified as conduct provisions under the NEL or National Electricity (South Australia)Regulations. The Commission does not propose to recommend to the COAG Energy Council that any of the proposed amendments made by the draft rule be classified as conduct provisions.

239 Section 91(8) of the NEL.

G SUMMARY OF OTHER ISSUES RAISED IN SUBMISSIONS

This appendix sets out other issues raised in the first round of consultation on this rule change request which have not already been addressed in the draft determination and the AEMC's response to each issue.

Table G.1: Summary of other issues raised in submissions

STAKEHOLDER	ISSUE	AEMC RESPONSE
Australian Energy Council, p. 1	AEMO also argues that removing the SRAS Procurement Objective and replacing it with the National Electricity Objective will give it more latitude to acquire a combination of services which would deliver "a much higher level of confidence in the services". The Energy Council disagrees that there is a need for AEMO to seek an arbitrary "higher level of confidence". The Energy Council believes this can be addressed via additional testing, as suggested in AEMO's rule change request, and the SRAS Procurement Objective of meeting the system restart standard at the lowest cost should not be abandoned.	The Commission agrees that the lowest cost objective applying to the procurement of SRAS should not be abandoned. The draft rule clarifies that in meeting this objective, AEMO may take the overall costs of procuring SRAS into account, including the efficiencies which may be gained over time by signing long-term contracts for SRAS. The Commission does not consider that this would allow AEMO to procure SRAS to meet an arbitrary higher level of confidence in the services. The SRAS Procurement Objective still requires AEMO to meet the requirements of the system restart standard.
AEMO, p. 5	AEMO understands there are concerns about the potential for investment uncertainty if the technical capability required under the GPS is described in the SRAS Guideline, rather than in the NER themselves. However, should the relevant service requirements in the Guideline be amended after agreement of a generator's GPS, there is no intention that the GPS would be extended to any new or amended technical requirements	The draft rule does not propose any changes to the generator technical performance standards.

STAKEHOLDER	ISSUE	AEMC RESPONSE
	in the revised Guideline. This can be made clear in the NER drafting.	
AGL Energy, p. 3	It is likely that AEMO will seek participation from the same small group of participants that have the required equipment each time it carries out this testing, so if not compensated, the impacts on those participants could be unfair.	Under the draft rule, those participants would be entitled to claim compensation for any direct costs they incur each time they participate in a test.
Clean Energy Council, p. 3	The AEMC should consider the roles and responsibilities of the different parties, the extent to which risks are placed on these parties and the protections afforded to each of them, such as in the situation where a test does not go as planned. The AEMC should consider how a joint approach to testing that brings together all these parties can be facilitated.	The draft rule seeks to allocate risks and responsibilities associated with system restart path testing appropriately, having regard to the degree of control and information available to different parties. The Commission considers that the consultation requirements applying to the design of the test program would facilitate a cooperative and coordinate approach between the various parties involved.
Energy Networks Australia, p. 3	Testing full restart capability may not be practical from an operational perspective. A physical test on the network, while good practice, has costs and risks associated with it, elements of the generation and transmission system may experience equipment damage from inadvertent extremes of voltage and/or frequency, resulting in potentially significant costs and lengthy delays to recovery of systems from the test.	The Commission notes this comment. The draft rule imposes obligations on AEMO to minimise the costs and operational impacts of testing for AEMO and affected participants, as well as to ensure that power system security is maintained when preparing and undertaking a test.
Energy Networks Australia, p. 3	In directing TNSPs and registered participants to undertake tests, the potential impact of these tests on distribution and transmission connected load consumers	The Commission notes this comment. AEMO has noted in its submission to the consultation paper that testing would not involve the involuntary disconnection of

STAKEHOLDER	ISSUE	AEMC RESPONSE
	must be considered. This sort of testing necessarily places the power system in a less reliable and resilient state than it would otherwise be in. The performance of a physical test on the network has the potential to impact transmission or distribution load consumers not just specific generators testing their ability to provide a contract system restart service and earn additional revenue. These load consumers may experience outages and associated lost production.	customer loads.
ERM Power, p. 2	The Commission must ensure that the economic benefits derived by consumers are greater than any additional implementation and ongoing costs arising from the proposed changes compared to the current procurement framework. This will require a large level of detailed assessment by the Commission to determine the costs to consumers of both the existing framework and the proposed changes if the proposed rule changes are to be approved in a number of areas.	In considering any rule change request the Commission considers whether the change is in the long-term interests of consumers. The Commission considers that the changes proposed in the draft rule are in the long-term interests of consumers for the reasons set out in chapter 3. The Commission considers that any cost benefit assessment would be unlikely to robustly or comprehensively quantify the net benefits of the changes to the SRAS frameworks, given the difficulty of precisely estimating the potential benefits of avoiding, or reducing the duration of, a black system event. We therefore have considered it useful to consider a variety of inputs and considerations when determining whether the changes promote the long-term interests of consumers.
ERM Power, p. 3	We also reject AEMO's assertion that the proposed extended SRAS testing is in any way similar to the requirements of clause 5.7.6.	The Commission notes this comment. The draft rule makes changes to AEMO's proposed testing framework where necessary to ensure that risks and

STAKEHOLDER	ISSUE	AEMC RESPONSE
		responsibilities are allocated appropriately.
Hydro Tasmania, p. 2	Hydro Tasmania acknowledges that the robustness of a restart process is enhanced by testing the relevant paths and processes, noting that it is important to balance this consideration against any risks to the system due to this testing and the impact on any participants. In this context, one particular aspect to consider may be to ensure clarity between the boundaries of a Restart test associated with a contracted SRAS and broader aspects of a Restart path test.	The draft rule does not propose changes to the existing framework governing the testing of individual SRAS providers (other than to clarify that NSPs must facilitate such testing). The Commission understands that AEMO may seek to combine these tests with a broader restart path test where this is practicable and appropriate.
Mondo Energy, p. 2	It is noted that the AEMO proposal is to introduce these new restoration services by amending the current SRAS definition in the Rules to include both the traditional black start capability, and / or the new restoration service. Mondo suggests that since these are very different and distinct services, they should be defined and procured separately rather than within a single definition for SRAS.	The Commission considers it appropriate and efficient for the procurement of black start capability and system restoration support services to be dealt with under the same regulatory framework, given the nexus between these two categories of SRAS. While restoration support services may be utilised for other purposes in the future, consideration of the mechanisms to facilitate this is not within the scope of this rule change request. The Commission notes that this issue is being considered through other work programs.
TasNetworks, p. 3	In terms of the types of system restoration services that might be included under an expanded definition, TasNetworks considers these should encompass: • voltage and frequency control services including fast frequency response, • inertia services,	The Commission notes this comment. The draft rule provides for the new system restoration support services to be defined by AEMO in the SRAS Guideline.

STAKEHOLDER	ISSUE	AEMC RESPONSE
	• system strength services, • small and large signal stability requirements within the range of operations required under the black system definition, and in future, • the capability of grid forming inverters to operate in parallel with synchronous generators, e.g. hunting of frequency controllers or parallel operation of multiple isochronous controllers.	
TasNetworks, p. 5	It is important to note that present processes in Tasmania allocate SRAS testing costs to the SRAS provider. The assumption being that the costs of testing are built into the overall costs of SRAS service provision. Expanding the definition of SRAS services, or changing the allocation of SRAS responsibilities, may therefore impact the efficiency with which SRAS testing costs are apportioned and recovered.	The Commission understands that this is the standard approach taken to allocating the costs associated with testing of individual SRAS providers. The draft rule does not propose any changes to these arrangements. However, the costs associated with system restart path tests would be borne by affected generators (subject to any entitlement to compensation for direct costs incurred).
Transgrid, p. 2	The AEMC should consider how the limitation on liability in the proposed clause 5.7.7A(i) interacts with existing indemnities and liability limitations under the National Electricity Law.	The Commission considers that the immunity from liability under s 119(2) of the NEL would apply to acts or omissions by NSPs in relation to restart path testing, unless the NSP was negligent or acted in bad faith.