AEMC

RULE

Australian Energy Market Commission

RULE DETERMINATION

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

PROPONENTS

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

2 APRIL 2020

INQUIRIES

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

E aemc@aemc.gov.au
T (02) 8296 7800
F (02) 8296 7899

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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) is aware of the additional pressures being placed on the energy sector as the nation responds to the fast-moving COVID-19 threat. It is important in these times that Australia's energy systems and markets are operating in a safe and secure state with adequate consumer protections, including that mechanisms are available to overcome major disturbances or shocks to the power system. The implementation of this rule change is therefore critical in order to manage system security concerns.

2 The final rule makes changes to the frameworks for the procurement, testing and deployment of system restart ancillary services (SRAS) that need to take effect prior to the procurement of the next round of SRAS contracts by AEMO. These changes will allow AEMO, transmission network service providers (TNSPs) and other parties involved in the restoration of the power system to more effectively prepare for, and respond to, a major supply disruption, increasing the likelihood that energy supply can be restored promptly following a major blackout.

3 More generally, the AEMC is working closely with the market bodies, the Energy Security Board, jurisdictions and the energy industry on the implications of the COVID-19 threat for broader implementation timeframes.

4 Final rule

5 The Commission has made a more preferable final rule which is intended to enhance the resilience of the system by improving the provision and effectiveness of SRAS.

6 The final 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.

7 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 non-synchronous, 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.

8 The final 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 long-term costs into account when procuring SRAS, to help reduce the overall costs of sourcing SRAS

- establishing a transparent and fit-for-purpose framework for the physical testing of system restart paths, to enhance the likely physical effectiveness of a system restoration, should one ever occur
- clarifying the scope, form and content of the SRAS communication protocols, to improve the processes that underpin the effectiveness of a system restoration.

9 AEMO is required to update the SRAS Guideline to account for the changes to the SRAS frameworks under the final rule, by 2 November 2020. The Commission understands that existing SRAS contracts expire in mid-2021, with AEMO's process for procuring the next round of SRAS contracts to commence in late 2020. The commencement timeframes under the final rule are intended to allow for these critical enhancements to the SRAS frameworks to be in place, and ready to be used in this next procurement process. This is necessary to deliver the most effective mix of system restart and restoration services in coming years.

10 Background

11 The Commission's more preferable final 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.

12 What is SRAS?

13 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.

14 Why are changes to the SRAS frameworks needed?

15 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.

16 Overview of final rule

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

18 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.

19 The ***changes to the definition of SRAS*** and the ***clarification of the SRAS Procurement Objective*** are intended to provide AEMO with access to the services required to restore the power system in a timely manner.

20 ***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.

21 In addition, the final rule provides ***greater transparency and certainty to participants about the roles and responsibilities*** of the various parties involved in system restoration.

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

- **Changes to the definitions of SRAS and black start capability:** The final 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 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 final rule makes a minor amendment to the SRAS Procurement Objective to clarify that AEMO can take long-term costs into account when procuring SRAS to meet the SRS at lowest cost. 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. The Commission considers that the reference to "long-term costs" in the SRAS Procurement Objective provides greater certainty and transparency than the reference to "overall costs" which was proposed under the draft rule. The final rule also requires AEMO to provide guidance in the SRAS Guideline on how it will achieve the SRAS Procurement Objective.

- **System restart path testing:** The final rule establishes a transparent framework for the physical testing of system restart paths. A number of changes to the restart path testing framework have been incorporated between the draft and final rule to make sure this framework is practical, efficient and fit-for-purpose to facilitate the types of testing required to verify 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 final 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 a standalone compensation process applying specifically to restart path testing. This is considered necessary given that participants have limited ability to manage these costs and some participants may be disproportionately affected. The final rule also requires AEMO to:
  - provide guidance to participants on the frequency with which the tests may occur
  - provide at least six weeks' notice to participants prior to a test occurring - this timeframe has been reduced from six months to six weeks from the draft to the final rule, based on feedback from AEMO and stakeholders
  - 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 final 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 final rule clarifies the nature of the information included in LBSPs and how this relates to parties' compliance obligations under the rules.

23 The final 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.

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

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APPENDICES

TABLES

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1 THE RULE CHANGE REQUESTS

1.1 Rule change requests

The Australian Energy Market Commission (AEMC or Commission) 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 sought 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 proposed 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 that sought 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 have 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 suggested that it had 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 noted 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 considered 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 contended 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 suggested 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 suggested 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 considered 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 was 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 noted 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 noted 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 noted that AEMO has since amended the SRAS Guideline to address this scenario. However, the AER considered 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 considered 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 noted that, in relation to SRAS, the NER only explicitly required 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 suggested that the obligations imposed on NSPs under the NER did 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 definition of SRAS was previously limited to facilities with black start capability. This was 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 did not encompass other ancillary services beyond black start capability, which may be provided by facilities other than generators.

AEMO proposed 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 described, 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 proposed 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 proposed 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 was 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

AEMO proposed that the generator technical performance standards 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 focused on restoration support services and would not have mandated black start capability for generating units. The rule change request identified a number of indicative requirements for the proposed SRAS capabilities, which AEMO proposed 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 provide a minimum restart path to load restoration).

22 Ibid, p. 12.
23 Ibid.

TYPE OF SRAS	INDICATIVE REQUIREMENT
	• 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 included 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 posed to the development of new SRAS and the acquisition of a combination of services that delivers the best value in terms of reliability, AEMO proposed that the concept of the SRAS Procurement Objective be removed from the NER.

AEMO instead proposed that AEMO's procurement of SRAS instead be expressly guided by the NEO.[24] AEMO suggested 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

AEMO's proposed rule sought 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

24 Ibid.

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 was also proposed.

System restart path testing

AEMO's rule change request also proposed 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 included 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 were 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 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 acknowledged that the SRAS Guideline contained provisions for comparing the procedures used in SRAS testing with those used in response to a major supply disruption. However, the AER also considered that any misalignment between the two procedures may present significant challenges when seeking to restore the power system. As such, the AER proposed mandating in the NER that the SRAS Guideline include a process for comparing

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

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 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 were also 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 acknowledged 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 noted that the protocols should consider how any confidential information would be exchanged between parties.[31]

AEMO 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.

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.

On 19 December 2019, the Commission published a draft determination and draft rule in respect of the rule change request. Submissions closed on 20 February 2020. The Commission received 12 submissions in response to the draft determination.

The Commission considered all issues raised by stakeholders in submissions to the consultation paper, draft determination. 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 Structure of final determination

The remainder of this final determination is structured as follows:

- Chapter 2: Context
- Chapter 3: Final 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 of the NER 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, prior to this rule change the NER defined 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 definition of SRAS as providing black start capability only was 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 previously required 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, prior to this rule change, required AEMO to use its reasonable endeavours to acquire SRAS to meet the system restart standard at the lowest cost.[41]

Prior to this rule change, AEMO only acquired 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, revisions to AEMO's SRAS Guideline will need to be completed to reflect the changes under the final rule 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.

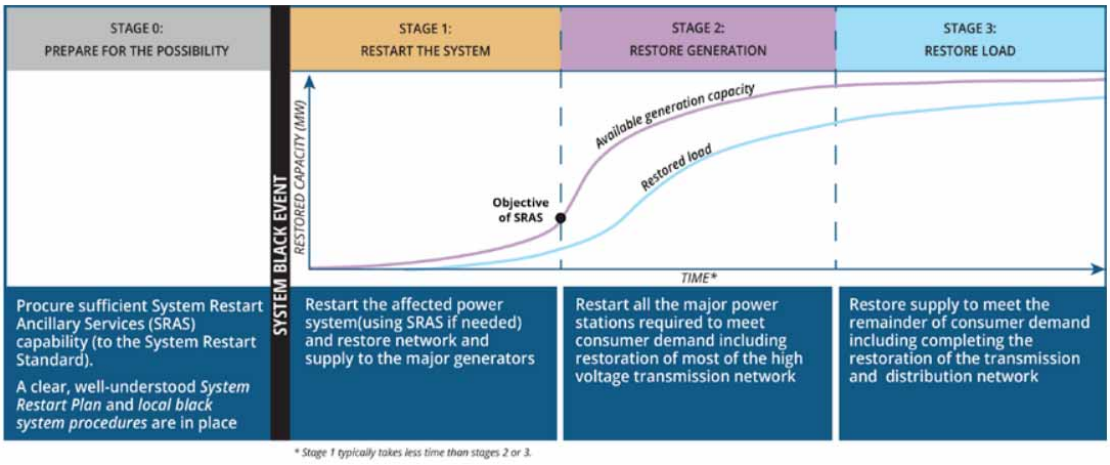
Note: 2. The emergency diesel generator provides power supply to all auxiliaries of the main generating unit that supplies the SRAS. The main generating unit at Mintaro cannot start without these auxiliary supplies.

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 report, 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 final 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 FINAL RULE DETERMINATION

3.1 The Commission's final rule determination

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

Table 3.1: Summary of changes under the final rule

ISSUE	SUMMARY OF CHANGE AND RATIONALE
Definition of SRAS (discussed in detail in appendix A)	The final 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 facilityor combination of facilities. 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 final rule makes a minor amendment to the SRAS Procurement Objective to make clear that AEMO can take 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	SUMMARY OF CHANGE AND RATIONALE
SRAS testing and communication protocols (discussed in detail in appendix D)	The final 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 weeks (30 business days) between the test program being finalised and the test being undertaken (subject to circumstances which necessitate a change to the timing of the test, or where an earlier date for the test has been agreed to by all test participants), as opposed to the six month notice period proposed under the draft rule • allows AEMO to identify sequential windows (of not more than four weeks) within which the test may be rescheduled if required • allows participants to claim compensation for any direct costs incurred as a result of participation in a test (or incurred in preparation for deferred 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 final 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 final rule is also provided in the appendices. The Commission's reasons for making this final 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 final rule against the national electricity objective
- the changes between the draft and final rule.

Further information on the legal requirements for making this final 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.

65 Section 88 of the NEL.

66 Section 7 of the NEL.

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.

3.2.2 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.

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 (in accordance with section 91A of the NEL), 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.

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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.

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.

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

The changes to the SRAS frameworks proposed under the final 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

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

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]

Having regard to the issues raised in the rule change requests and during consultation, the Commission is satisfied that the more preferable final 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 final rule.
  - The amendment to the SRAS Procurement Objective under the final rule clarifies that AEMO can take lowest long-term costs into account when procuring SRAS to meet the SRAS Procurement Objective.[74] 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 final 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[75]
    - report on how it has sought to satisfy the above obligation, how it has undertaken consultation on the scope and timing of restart path testing, 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[76]
    - provide guidance to market participants about the types of considerations and changes in power system conditions that might necessitate a test being undertaken.[77]
  - In addition, the final rule makes clear that generators can recover the direct costs they incur as a result of participation in such tests.[78] The Commission considers that this will reduce the extent of potential investment risk or regulatory uncertainty

73 AEMO, rule change request, p. 5.
74 Clause 3.11.7(a1) of the final rule.
75 Clause 4.3.6(g) of the final rule.
76 Clause 3.11.10(b) of the final rule.
77 Clause 3.11.7(3A) of the final rule.
78 Clause 4.3.6(m) of the final rule.

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. The final rule also provides that AEMO will pay reasonable compensation claims for less than $100,000 as soon as reasonably practicable.[79] 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 final rule would introduce processes to facilitate the physical testing of components of the system restart plan in response to changing power system conditions.[80] 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 final rule expressly requires AEMO to consider and minimise any risks to power system security when preparing for a system restart path test.[81]
- **Governance arrangements:**
  - The final 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[82]
    - the arrangements applying to the preparation and undertaking of physical testing of system restart paths[83]
    - the scope, form and content of the SRAS communication protocols[84]
    - the requirements applying to the procurement of SRAS by AEMO[85]

79 Clause 4.3.6(o) of the final rule.
80 Clause 4.3.6 of the final rule.
81 Clause 4.3.6(g)(1) of the final rule.
82 Clauses 4.3.1(p) and 4.3.4(a1) of the final rule.
83 Clause 4.3.6 of the final rule.
84 Clause 4.8.12(j) of the final rule.
85 Clause 3.11.7(a1) of the final rule.

  - the types of services which fall within the definition of SRAS and how these services are to be determined.[86]
- 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 weeks' 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 final 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 final rule clarifies the flexibility AEMO has in meeting the SRAS Procurement Objective. In particular, the final rule makes it clear that AEMO can have regard to the 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 final 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 final 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 final 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.

86 See amended definitions of "system restart ancillary services" and "black start capability" under the final rule.

- The framework for physical testing of restart paths introduced under the final 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 final 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 final 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 final 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 final 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 final 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.

3.4.1 Differences between draft and final rule

The final rule incorporates a number of changes from the draft rule which are intended to enhance the transparency and practicality of system restart frameworks and processes, particularly with respect to the testing of system restart paths.

The key changes between the draft and final rule, and the rationale for each, are summarised in the table below.

Table 3.2: Summary of changes between draft and final rule

ISSUE	SUMMARY OF CHANGE	RATIONALE
SRAS Procurement Objective (discussed in Appendix C)	The draft rule proposed amending the SRAS Procurement Objective to require AEMO to procure SRAS to meet the system restart standard at the "lowest overall cost". The final rule instead amends the SRAS Procurement Objective to require AEMO to procure SRAS to meet the system restart standard at the "lowest long-term cost". AEMO will also be required to provide guidance in the SRAS Guideline on how it will consider costs over different timeframes in its procurement of SRAS.	Some stakeholders, including AEMO, considered that the reference to the "lowest overall cost" proposed in the draft rule would not provide clear guidance as to the types of costs and timeframes which could be considered in the procurement of SRAS. The Commission considers that the term "lowest long-term cost" provides clearer guidance as to the cost considerations that should guide AEMO's procurement of SRAS, while also giving effect to the policy intent.
Timing of restart path testing (discussed in Appendix D)	The final rule: • removes the requirement proposed in the draft rule that AEMO undertake a restart path test at least once every three years in each electrical sub-network • reduces the minimum period between the finalisation of a test program and the test being undertaken from six months (proposed under the draft rule) to six weeks (30 business days) • allows AEMO to identify sequential windows (of not more than four weeks) within which the test may be rescheduled if required.	These changes have been incorporated in the final rule on the basis that: • It may not be practical, necessary or efficient to undertake a test once every three years in each electrical sub-network, as this will depend on the conditions of the power system in that region. • Further advice provided by AEMO on the nature of the restart path testing envisioned has made it clear that a six-month notice period could significantly restrict the utility and practicality of restart path tests. Further, participants involved in a test will be consulted by AEMO on the timing of a test and will therefore have an understanding well before the test program is finalised of

ISSUE	SUMMARY OF CHANGE	RATIONALE
		when the test is likely to occur. • Nominating test windows will provide greater transparency to participants as to the potential timing for rescheduling of a test, should this be necessary.
Compensation for restart path testing (discussed in Appendix D)	Under the draft rule, participants would have been able to recover their direct costs under the existing framework in the NER which allows participants to claim compensation for costs incurred as a result of a direction issued by AEMO to provide a service other than energy or market ancillary services. The final rule instead establishes a standalone framework for compensation relating to restart path testing. While the outcomes for such compensation claims should be the same in practice as those which would have resulted under the draft rule, the process for assessing these claims will be slightly different. In addition, the final rule provides that the cost of such compensation will be recovered in the same way as other SRAS costs.	The Commission understands that seeking to utilise the existing directions compensation framework in the NER would be unnecessarily administratively burdensome for both AEMO and market participants and would introduce additional complexity into this existing framework. It is therefore appropriate to introduce a more efficient, fit-for-purpose framework for the assessment of such claims.

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 final rule, are subject to the SRAS Guideline being amended to account for these changes. As such, the final rule requires AEMO to amend the SRAS Guideline by 2 November 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,[87] 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

The Commission considers that the final rule is robust to climate change adaptation risks, in that the changes proposed in the final 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.[88] 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.[89]

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 final 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.

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87 ***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.

88 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.

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

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 final 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 non-synchronous, variable renewable generation is the primary measure adopted in the NEM power system.

The specific characteristics of non-synchronous 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.[90] 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 final 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 final rule will support the continued security of the power system, at the lowest cost to consumers, in the presence of any mitigation risks posed by climate change.

90 This is not to say that all variable, non-synchronous 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 non-synchronously 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 request 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 final rule makes a number of changes in relation to these issues. These are summarised in Box 2.

BOX 2: SUMMARY OF FINAL RULE

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

- procure black start capability from facilities 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.

There are no substantive changes between the draft and final rule.

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 will 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 these 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 previous definition of SRAS was limited to facilities with black start capability. This was 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.[91] As such, the definition did 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),[92] 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.[93], 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 contended that the NER imposed limitations on the scope of SRAS services because the definition of SRAS prescribed that:[94]

- SRAS was only capable of being provided by generating units
- the service was 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 previous definition of SRAS did not allow for AEMO to procure SRAS from facilities other than generators. AEMO's proposal to modify the definition of SRAS was 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.[95]

Alternative sources of system restoration support

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91 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*.

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

93 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.

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

95 Ibid, p. 5.

AEMO's rule change request suggested that the rules did not impose any requirement on, or provide an 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 control to support the progressive restoration of the power system, which requires modifications to generator settings and controls.[96] AEMO asserted that the capability to provide such system restoration support services was neither required nor valued under the NER, given that:

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

AEMO noted that these circumstances arose because these services are inherent properties of large synchronous generating units and have therefore not needed to be valued historically.[97] 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 considered that changes are therefore necessary to ensure this restoration support capability remains available as the generation mix continues to evolve.

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

AEMO considered 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.[98]

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

Consultation paper

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

96 Ibid.
97 Ibid.
98 AEMO, rule change request, p. 14.

technical attributes and capabilities are defined by AEMO in separate documents.[99] AEMO suggested that allowing black start capability to be provided by non-generation sources in the future may increase competition in the provision of this service.[100]

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 to be addressed through a transitional rule until such time that the System Restart Standard is amended.[101]

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.[102] 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.[103]

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.[104]

Draft determination

AEMO noted in its submission to the draft determination that it appreciated the decision in the draft determination to amend the definitions of SRAS and black start capability in terms similar to those proposed in its rule change request.[105] AEMO also noted that it intends to commence consultation on the initial definition of the new system restart support services to be included in the SRAS Guideline in late March or early April 2020.

A.4 Stakeholder comments

A.4.1 Submissions to consultation paper

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.

99 AEMO submission to consultation paper, p.4.
100 Ibid, p. 4.
101 Ibid, p. 5.
102 Ibid, p. 4.
103 Ibid, p. 5.
104 AER, submission to consultation paper, p. 1.
105 AEMO, submission to draft determination, p. 4.

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.[106] 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.[107]
- **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 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.[108] 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.[109]
- **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.[110] 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.[111] 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.[112]
- 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.[113] The CEC also considered that the SRAS definition must be technology neutral and flexible for

106 EnergyAustralia, submission to consultation paper, p. 1.
107 Ibid, p. 2.
108 Mondo Energy, submission to consultation paper, p. 2.
109 Ibid.
110 AGL, submission to consultation paper, p. 2.
111 Ibid.
112 Ibid.
113 CEC, submission to consultation paper, p. 1.

different capabilities that may emerge into the future and this should be reflected in the rules and AEMO's SRAS Guideline.[114]

- **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.[115]
- **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.[116] 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 single point of contact for AEMO and NSPs, would minimise the complexity of communications during stressful periods on insecure networks.[117]
- **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.[118]
- **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.[119]
- **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.[120]
- **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.[121] 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.[122]
- **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

114 Ibid, p. 2.
115 Origin Energy, submission to consultation paper, p. 1.
116 Delta Electricity, submission to consultation paper, p. 2.
117 Ibid, p. 3.
118 ERM Power, submission to consultation paper, p. 2.
119 PIAC, submission to consultation paper, p. 1.
120 Snowy Hydro, submission to consultation paper, p. 2.
121 TasNetworks, submission to consultation paper, p. 1.
122 Ibid, p. 3.

any changes should be consulted on transparently under the rules consultation procedures to reduce risks and delays associated with changing testing procedures.[123]

- **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.[124]
- The **Public Interest Advocacy Centre (PIAC),** the **South Australian Government** and **Delta Electricity** supported these services being defined in AEMO's SRAS Guideline.[125]

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:

- 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[126]
- **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.[127]
- **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.[128]
- **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.[129]
- **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.[130]
- **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

123 TransGrid, submission to consultation paper, p. 2.
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.
126 AEC, submission to consultation paper, p. 2.
127 Delta Electricity, submission to consultation paper, p.3.
128 EnergyAustralia, submission to consultation paper, p. 2.
129 Energy Networks Australia, submission to consultation paper, p. 4.
130 ERM Power, submission to consultation paper, p. 2.

providing restoration services that are sought by AEMO, there should not be unnecessary regulatory barriers imposed to prevent the NSP from providing these services.[131]

- **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.[132]
- **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.[133]
- **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.[134]

A.4.2 Submissions to draft determination

In submissions to the draft determination, stakeholders generally supported the expansion of the definitions of SRAS and black start capability proposed in the draft rule.

Specific comments on this aspect of the draft determination included:

- **AGL** submitted that there is no reason to restrict the provision of SRAS to generators if this service can be safely and reliably provided by a non-generator.[135] However, AGL suggested that further consideration is needed of whether the requirements applying to the SRAS Guideline under the draft rule provide sufficient guidance on what the requirements for these services may be, including whether the SRAS Guideline should delineate between the duration of different service requirements.[136] AGL also suggested that AEMO should be procuring restoration support services if needed even when they are currently available from market participants through their generator performance standards or LBSP capabilities, on the basis that this is consistent with the current procurement of SRAS.[137]
- **ERM Power** expressed concern about the system restoration support services being defined by AEMO in the SRAS Guideline and suggested that this would be better prescribed as a separate service in the NER.[138]

131 Mondo Energy, submission to consultation paper, p. 2.
132 Origin Energy, submission to consultation paper, p. 1.
133 PIAC, submission to consultation paper, p. 2.
134 Submissions to consultation paper: TasNetworks, p. 2.; TransGrid, p. 2.
135 AGL, submission to draft determination, p. 2.
136 Ibid, p. 2.
137 Ibid.
138 ERM Power, submission to draft determination, p. 2.

- **Mondo** submitted that it would be preferable for the restoration support services to be described in the NER at a high level, with the detail to be outlined by AEMO in the SRAS Guideline.[139]
- **Snowy Hydro** submitted that the services prescribed as restoration support services need to be capable of ensuring the supply of electrical energy to generating unit auxiliaries occurs as reliably as possible.[140]
- A number of stakeholders, including **Origin Energy**, the **South Australian Government** and **TasNetworks**, expressly supported the proposed expansion of the definitions of SRAS and black start capability.[141]
- **Mondo** and **TasNetworks** submitted that the AEMC should give further consideration to whether AEMO should be able to procure SRAS from NSPs, potentially through a separate review of this issue.[142]

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.[143]

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.[144] If a faster and bigger transformation occurs, then these values will increase and occur sooner.[145]

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

139 Mondo, submission to draft determination, p. 2.
140 Snowy Hydro, submission to draft determination, p.1.
141 Submissions to draft determination: Origin Energy, p. 1; South Australian Government, p. 1; TasNetworks, p. 1.
142 Submissions to draft determination: Mondo, p. 2; TasNetworks, p. 2.
143 AEMO, *Draft 2020 Integrated System Plan*, December 2020, p. 10.
144 Ibid, p. 40. Dispatchable capacity sourced from ISP Generation Outlooks.
145 Ibid, p. 28.

- 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 previous definition of SRAS:

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

A.6 Commission's analysis and conclusions

BOX 3: FINAL RULE

The final 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 final rule

The expanded definitions of SRAS and black start capability under the final rule will:

- 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 will enhance power system resilience.

The remainder of this section sets out:

- the changes to the definitions of SRAS and black start capability under the final 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
- changes to the System Restart Standard required as a result of the final rule.

A.6.1 Black start capability

Under the final 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 final rule allows for black start capability to also be provided by a facility or a combination of facilities 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 facilities 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 and draft determination.

Under the final rule, new (i.e. non-generator) providers of black start capability will be subject to the same obligations under the NER as existing SRAS providers. However, AEMO will 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 final 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 final 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 will, 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 will 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 access standards may refer to capabilities relevant to the types of services that might be defined as system restoration support services, the access standards themselves 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 explicitly provided for by the generator access 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 in submissions for these services to be defined in the NER.[146] 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 final 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, will be set out in the NER. However, the Commission considers that AEMO is best-placed to assess the specific technical capabilities needed and the duration of different service requirements and to

146 Submissions to draft determination: Mondo, p. 2; ERM Power, p. 2.

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.[147]

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. While this approach was suggested by some stakeholders in submissions to the draft determination,[148] the Commission does not consider that this would be a necessary or efficient outcome in this context.

Any amendments to the SRAS Guideline (other than minor and administrative amendments) are already subject to the rules consultation procedures under the NER.[149] 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 final 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.

The Commission notes AGL's submission that AEMO should be procuring restoration support services if needed even when they are currently available from market participants through their generator performance standards or LBSP capabilities.[150] The Commission understands that:

- LBSP capabilities will continue to be utilised as they are now, whereby participants may be required to provide capabilities specified in their LBSP without compensation (including where the relevant capability is also defined as a restoration support service)
- restoration support services will only be procured by AEMO where a "gap" in such services exists along a restart path and the capability to provide that service is not specified in the LBSP of an existing generator on that path.

The Commission's understanding of the circumstances in which system restoration support services may be procured by AEMO is discussed further in Box 4.

147 Submissions to consultation paper: PIAC, p. 2; South Australian Government, p. 1; Delta Electricity, p. 3.
148 Submissions to draft determination: Mondo, p. 2; ERM Power, p. 2.
149 NER, clause 3.11.7(f).
150 AGL, submission to draft determination, p. 2.

BOX 4: PROCUREMENT OF SYSTEM RESTORATION SUPPORT SERVICES BY AEMO

The Commission understands that the process through which AEMO would procure system restoration support services would generally be as follows:

- When determining system restart paths as part of the development of the system restart plan, AEMO will assess whether there is sufficient support capability[1] available along the relevant path to enable an effective restoration. A "gap" in available capability along a restart path could arise if, for example:
  - a generator along the restart path that would historically have provided a restoration capability pursuant to the capabilities in its LBSP has been decommissioned and the service is therefore no longer available from that generator; or
  - if improved or more detailed network studies or modelling identify a gap that was not previously identified.
- If AEMO identifies a gap along a restart path, it will assess whether there are other generators in the vicinity which are capable of providing the relevant support service under their LBSP. If AEMO identifies a generator with that capability specified in its LBSP, it will require that generator to provide that support service.
- If AEMO does not identify any generator in the vicinity that has this capability specified in its LBSP, it will look for generators that have the capability to provide that service (but where this is not explicitly specified in their LBSP), or that have the ability to build this capability into their plant. AEMO may then offer such a generator a contract to provide the relevant system restoration support service (if there is no other generator nearby that already has that capability specified in its LBSP).

Note: 1. This would include the capabilities required to support the stable restoration of the power system in the conditions expected in the early stages of a system restoration process, such as dynamic voltage control and frequency control.

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.[151] As noted in the consultation paper and draft determination (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 final

151 AEMO, rule change request, p. 12.

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 final 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 are not applicable to restoration support services that fall within the definition of SRAS under the final 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 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".[152]

Under the NER, the Reliability Panel is responsible for determining and reviewing the system restart standard.[153] 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 final 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.

The Commission intends to 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.

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

153 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 5: SUMMARY OF THE FINAL RULE

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

There are no changes between the draft and final rule.

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 final rule, and which is discussed in appendix A. Under the final 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.[154] 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)[155], 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 and draft determination are set out below.

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

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

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:

- the system restoration support services required for a particular connection location would be dependent on the characteristics of that part of the network.[156]
- 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[157]
- 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 to consultation paper

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.[158]

156 AEMO, System restart standards, services and testing rule change request, p. 13.
157 Ibid.
158 AEMO submission to consultation paper, p.5

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.

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

B.3.4 Proponents' submissions to draft determination

AEMO's submission to the draft determination expressed an understanding of generator opposition to the proposed modification of the technical performance standards.[159] AEMO also acknowledged that there is reluctance to add new requirements relatively soon after the 2018 GTPS rule. However, AEMO did not agree with the AEMC's statement that this change would be duplicative of AEMO's ability to procure an efficient amount of restoration services.

AEMO stated that it cannot procure any service unless that service is offered, and a service cannot be offered if the capability has not been considered and assessed in the design of the plant. AEMO noted that unless a particular capability is a regulatory requirement, generators and equipment manufacturers are unlikely to invest effort in its development. Further, AEMO stated that it is even more unlikely that a generator would be willing to accept the risk involved in post-construction changes to established settings and control systems for the potential upside of a contract.

While AEMO stated it appreciated the rationale for the AEMC's decision, it also stated that without a regulatory impetus it is less likely that the improved system security outcomes contemplated by the rule change proposal will be achieved. Ultimately, AEMO noted that if this is borne out as the power system continues to transition, it may become timely to re-evaluate whether the contract market for SRAS in its current form remains appropriate for the procurement of system restart and restoration support services.[160]

The AER did not provide a submission to the draft determination.

B.4 Stakeholder comments

B.4.1 Consultation paper

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.[161]

159 AEMO, submission to draft determination, p. 4.
160 Ibid.
161 AEC, submission to consultation paper, p. 1

Origin Energy expressed that mandating new requirements through the generator performance standards was not the most cost-effective means of ensuring timely system restoration. Origin Energy 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.[162]

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.[163]

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.[164]

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. [165]

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.[166]

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

162 Origin Energy, submission to consultation paper, p. 1
163 CEC, submission to consultation paper, p. 2
164 Delta Electricity, submission to consultation paper, p. 6
165 EnergyAustralia, submission to consultation paper, p.3
166 Mondo, submission to consultation paper, p. 3

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.[167]

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.[168]

TransGrid noted that changes to the generator performance standards may discourage new investment and further slow down connections.[169]

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.[170]

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 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.[171]

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

167 Snowy Hydro, submission to consultation paper, p. 1
168 Hydro Tasmania, submission to consultation paper, p. 3
169 TransGrid, submission to consultation paper, p. 3
170 TasNetworks, submission to consultation paper, p. 5 & 6
171 AGL, submission to consultation paper, p. 4

performance standards following any plant upgrades to meet the requirements of clause 5.3.9.[172]

B.4.2 Draft determination

Most stakeholders supported the AEMC's draft decision not to introduce a new performance standard requiring generators to be capable of providing one or more restoration support services generally. Relevant comments are included below.

Origin Energy supported the Commission's decision to not include the capability to provide system restoration support services in the performance standards. Origin noted that requiring all new entrants to provide these services would be costly and lead to an inefficient barrier to entry.[173]

AGL agreed with the AEMC that the proposed changes to the SRAS definition and procurement objective will provide AEMO with sufficient market incentives to meet system restart requirements at an efficient level.[174]

The **Clean Energy Council** supported the Commission's decision not to accept the proposal to add a new performance standard requiring all new generators be capable of providing restoration support services.[175]

Snowy Hydro agreed with the Commission that the proposed changes to the performance standards were unnecessary and duplicative and stated that SRAS is subject to its own guidelines and specifications. Snowy Hydro also noted that the existing market ancillary service specification and the contractual obligation to provide these services are sufficient. Snowy Hydro submitted that incorporating this capability in a generator's refurbished plant, and the associated obligations under Schedule 5.2 of the NER, would add to the cost burden of a participant contemplating a refurbishment and may dissuade the participant from undertaking the refurbishment, to the detriment of plant reliability. Snowy Hydro also stated that AEMO's proposed changes would dissuade efficient investment and entrench allocative inefficiency, increasing the long-run costs of supplying the service, which would be inconsistent with the national electricity objective.[176]

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

172 ERM Power, submission to consultation paper, p. 3
173 Origin Energy, submission to draft determination, p. 1.
174 AGL, submission to draft determination, p. 3.
175 Clean Energy Council, submission to draft determination, p. 1.
176 Snowy Hydro, submission to draft determination, p. 2.

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 has made in the final rule 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.

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 final rule accompanying this final determination, including expanding the definition of SRAS and amendments to the SRAS procurement objective will 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 final 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 to the consultation paper and draft determination, 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 throughout 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 final 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 lowest long term cost SRAS mix. Given the market based mechanism AEMO already has to procure SRAS and the changes in the final rule to enhance these processes, including restoration support capability within the performance standards 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.

The Commission acknowledges AEMO's concern that generators may be less willing to accept the risk involved in post-construction changes to established settings and control systems to offer SRAS.[177] However, the Commission notes that the changes to the definition of SRAS and to the SRAS Procurement Objective under the final rule will provide AEMO with the ability to offer longer term contracts to potential SRAS providers, which increases incentives for such generators to be capable of offering this service and thereby capture an additional revenue stream.

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 any changes to the generator performance standards are unnecessary and duplicative, particularly given:

177 AEMO, submission to draft determination, p. 4.

- the amendment to the definition of SRAS detailed in appendix A, which widens the potential pool of SRAS providers
- the change to the SRAS Procurement Objective detailed in appendix C, which clarifies that AEMO can procure SRAS to meet the system restart standard at the lowest long term cost.

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 changes made under the final rule in relation to this issue is summarised in Box 6.

BOX 6: SUMMARY OF FINAL RULE

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

The final rule also introduces a requirement for AEMO to provide guidance to Registered Participants on how AEMO will achieve the SRAS Procurement Objective.

The final rule incorporates a minor change to the drafting proposed under the draft rule to refer to "lowest long-term costs" rather than "lower overall costs" in the SRAS Procurement Objective. The Commission considers this provides greater clarity as to the costs AEMO can take into account when procuring SRAS.

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 long term 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.[178]

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.

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

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 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.[179]
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*".[180]

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.[181] 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.

179 Ibid, p. 60.
180 NER, clause 3.11.7(a1).
181 AEMC, *System Restart Ancillary Services* rule change - final determination, April 2015.

C.3 Proponents' views

AEMO's rule change request aimed 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.[182] AEMO suggested 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.

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 acknowledged 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.[183] 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.[184]

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 to the consultation paper

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

182 AEMO, System restart standards, services and testing rule change request, July 2019, p. 12
183 AEMO, System restart standards, services and testing rule change request, July 2019, p. 9
184 AEMO, System restart standards, services and testing rule change request, July 2019, p. 9

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 noted that the consultation paper canvassed the possibility that this restriction could arise from AEMO's particular interpretation of the NER. Even if that were the case, AEMO suggested it would be desirable for the NER to clearly establish that no such restriction exists.[185]

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 considered that the current obligation for AEMO to use reasonable endeavours to procure SRAS at least cost remains appropriate. In the AER's view, this would provide 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.[186]

C.3.4 Proponents' submissions to the draft determination

AEMO stated in its submission to the draft determination that over several years AEMO has demonstrated very clearly its determination to keep SRAS costs to a minimum (to the extent possible in the current limited contract market framework).[187] AEMO noted that its remit does not, and within the NEO never could, extend to underwriting new investment for its own sake, or contracting new providers in lieu of existing lower cost plant that has both the capability and reliability to continue to contribute to the system restart standard.[188]

AEMO expressed that if the AEMC remains of the view that the NEO alone is insufficient to guide SRAS procurement, it suggests that the word "overall" does not convey any sense of the longer term, which was AEMO's objective in proposing this rule change.[189] AEMO suggested that "overall" does not add further meaning to the current SRAS Procurement Objective. In order to imply the intended meaning as expressed in the draft determination, AEMO considered it would be necessary to use the AEMC's determination as "rules extrinsic material" to interpret the objective and suggested that it is preferable for the meaning to be clearly articulated in the rules, for example by referring instead to the "lowest long-term cost".[190]

The AER did not provide a submission to the draft determination.

185 AEMO, submission to consultation paper, p. 6.
186 AER, submission to consultation paper, p. 1.
187 AEMO, submission to draft determination, p. 4.
188 Ibid.
189 Ibid, p. 5.
190 Ibid.

C.4 Stakeholder comments

C.4.1 Consultation paper

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.[191]

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.[192]

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 AEMO's interpretation of the Rules is leading to barriers in AEMO's view of what would constitute efficient long term SRAS procurement.[193]

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.[194]

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

191 AEC, submission to consultation paper, p. 1
192 AGL Energy, submission to consultation paper, p. 2
193 ERM Power, submission to consultation paper, p. 3
194 Origin Energy, submission to consultation paper, p. 1

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.[195]

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.[196]

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.[197]

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.[198]

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 ensure they are providing value for money for customers and not merely seeking to minimise their own risks by obtaining greater control.[199]

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.[200]

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

195 Snowy Hydro, submission to consultation paper, p. 2
196 Major Energy Users, submission to consultation paper, p. 2
197 Mondo Energy, submission to consultation paper, p. 3
198 Delta Electricity, submission to consultation paper, p. 4
199 EnergyAustralia, submission to consultation paper, p. 2
200 PIAC, submission to consultation paper, p. 2

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.[201]

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.[202]

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.[203]

C.4.2 Draft determination

Stakeholders that commented on this aspect of the draft determinations provided mixed views on the proposed change. Relevant comments are included below.

TasNetworks supported the clarification that AEMO is to procure SRAS at the "lowest overall cost" to meet the system restart standard, taking into account both long and short term costs. TasNetworks considered this would provide sufficient guidance and flexibility to AEMO to meet the SRS in a manner consistent with the long term interests of customers.[204]

AGL supported how the draft determination clarified the definition of the SRAS Procurement Objective and stated that clarity of AEMO's objective is essential, as AEMO should not be placed in the position where they are weighing up the level of SRAS required to meet the NEO. AGL noted that the separate roles of the Reliability Panel (defining the standard) and AEMO (procuring adequate services at least cost) remain appropriate. AGL also stated that with only a limited number of system restart capable generators available, it has previously been appropriate for AEMO to conduct the 'Direct request for offer process' in procuring SRAS. AGL expressed that given the importance of facilitating new entrant capacity, industry certainty and the added transparency that open tenders provide, the SRAS guideline

201 TasNetworks, submission to consultation paper, p. 4
202 TransGrid, submission to consultation paper, p. 2
203 The South Australian Government, submission to consultation paper, p. 2
204 TasNeworks, submission to draft determination, p.1.

requirements should be amended to restrict closed tenders to exceptional circumstances (such as a tight procurement time frame requirement).[205]

Snowy Hydro expressed understanding of the logic behind the draft determinations amendment to the SRAS Procurement Objective is 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. However, Snowy Hydro stated that the costs need to be balanced against diversity and the reliability of SRAS services. Snowy Hydro noted that the broader assessment of economic costs relating to SRAS should still be undertaken by the Reliability Panel through the determination of the system restart standard. Snowy Hydro also encouraged AEMO to provide more information regarding volume and location of services required to allow the market to respond to that information.[206]

Origin Energy expressed that it does not support the addition of the word "overall" into the procurement objective and considers that the current objective of procuring the lowest cost services to meet the system restart standard is clear and transparent. Origin Energy stated that the addition of the term "overall" reduces clarity of the objective and requires SRAS providers to structure their bids around how they consider AEMO will define the overall costs.[207]

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 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.[208] 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

205 AGL, submission to draft determination, p.3.

206 Snowy Hydro, submission to draft determination, p.2.

207 Origin Energy, submission to draft determination, p.1.

208 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

- 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.[209] 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 7: FINAL RULE

The final rule makes a minor amendment to the SRAS Procurement Objective to clarify that AEMO can take long-term costs into account when procuring SRAS to meet the SRS.

The final rule also introduces a requirement for AEMO to provide guidance to Registered Participants on how AEMO will achieve the SRAS Procurement Objective of acquiring SRAS at the lowest long-term cost.

Benefits of final rule

The amended SRAS Procurement Objective provides 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 and provides market participants transparency on how this will occur. 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.

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

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."[210]

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.[211]

AEMO's proposed rule drafting would have required 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:

- price, quality, safety, reliability and security of supply of electricity; and
- the reliability, safety and security of the national electricity system.[212]

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.[213] 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.[214]

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

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

212 Section 7 of the NEL.

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

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

The Commission notes that, consistent with the view expressed in its final determination on the 2015 SRAS rule change and supported in stakeholder submissions on this rule change[215], 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 Snowy Hydro's view that SRAS costs need to be balanced against diversity and reliability of SRAS services.[216] However, the Commission notes that already included in the current requirements of the system restart standard is a requirement that AEMO consider the diversity of SRAS resources when assessing the aggregate reliability of SRAS in each sub-network.[217]

The Commission notes that the 2015 SRAS rule removed the prescriptive framework for SRAS procurement, including the obligation on AEMO to procure SRAS solely through a prescribed tender process.[218] Consistent with this position, the Commission disagrees with AGL's view that the SRAS Guideline requirements should be amended to reduce AEMO's ability to used closed tenders for SRAS to exceptional circumstances[219] as this would restrict AEMO's flexibility to procure SRAS in whatever process it considers most appropriate. In addition, the Commission expects that AEMO will conduct an open tender process where multiple potential service providers are available and an open tender will produce the most cost-efficient outcome (as is required by the SRAS Procurement Objective).

The Commission acknowledges AEMO's concerns regarding confidence in the reliability of current and future SRAS sources. The Commission notes that the changes under the final 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.[220] The changes under the final 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.

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215 Submissions to consultation paper: Major Energy Users, p.2; ERM Power, p.3; AGL, p.2. Snowy Hydro, submission to draft determination, p. 2.

216 Snowy Hydro, submission to draft determination, p. 2.

217 Diversity is a reference to the electrical, geographical and energy source diversity between the sources of SRAS within an electrical sub-network. Reliability Panel, *Review of the System Restart Standard*, final determination, p. v, 15 December 2016, Sydney.

218 AEMC, *System Restart Ancillary Services* - final determination, April 2015, p. 10.

219 AGL, submission to draft determination, p.3.

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

The Commission acknowledges AEMO's concern with the reference to "overall" costs in the draft rule and agrees that the final rule should convey a clear sense of the costs of SRAS over the longer term, which was the intent of the draft determination.

Given the importance of maintaining the distribution of responsibilities between the Panel and AEMO within the SRAS procurement framework, the final 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 final rule amends the SRAS Procurement Objective to require AEMO to procure SRAS to meet the SRS at the lowest long term cost.[221] Long term costs by definition also capture short-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, or procure specific combinations of services, when procuring SRAS if this will result in the lowest long-term costs for consumers.

The Commission considers that it is important that market participants have confidence and clarity on how AEMO aims to achieve the SRAS Procurement Objective as amended by the final rule, including how it will balance short term and long term costs. To address this, the final rule requires AEMO to publish guidance in the SRAS Guideline on how the SRAS Procurement Objective will be achieved (i.e. how AEMO will acquire SRAS to meet the system restart standard at the lowest long-term cost).[222]

221 Clause 3.11.7(a1) of the final rule.

222 Clause 3.11.7(d)(5A) of the final rule.

D SRAS TESTING AND COMMUNICATION PROTOCOLS

D.1 Overview

This appendix considers the changes under the final rule 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 final rule proposes a number of changes in relation to these issues. These are summarised in Box 8.

BOX 8: SUMMARY OF FINAL RULE

The final 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 the design of the test program. AEMO will also need to:

- provide guidance to participants on the types of conditions or circumstances which may necessitate a test being undertaken
- provide at least six weeks' notice between a test program being finalised and a test being undertaken (unless an earlier date is otherwise agreed to by all test participants).

The final rule also establishes a fit-for-purpose compensation framework to allow participants to claim compensation for any 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 outcomes of a test are transparent to participants.

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

Changes from draft to final rule:

The final rule incorporates a number of changes to the restart path testing framework from those set out in the draft rule. These changes have been made so the framework is sufficiently flexible to accommodate all types of tests and reflect the physical realities of the power system, while also providing adequate notice and transparency to market participants regarding this testing.

The key changes from the draft rule to the final rule include:

- changing the minimum period between the finalisation of the test program and the test being undertaken from six months to six weeks (unless an earlier date is agreed to by all test participants)
- removing of the requirement that AEMO undertake a test in each electrical sub-network at least once every three years
- clarifying the requirements on test participants to provide information about the procedures for, and operation of, any plant that will be included in the test to AEMO and TNSPs within specified timeframes
- establishing a standalone compensation framework for participants to claim direct costs incurred as a result of participation in a test (rather than using the existing directions compensation framework under the rules) - under this framework the costs of compensation would be recovered in the same way as other SRAS costs.

The Commission considers that the changes to the SRAS testing framework are necessary so that the effectiveness of the system restart plan can be validated through physical testing, when required. This will 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 will also increase the effectiveness of this response at a relatively low cost.

The remainder of this appendix outlines:

- the background to the changes under the final rule
- 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:[223]

- within the 6 months prior to the intended commencement date of the SRAS agreement, unless exceptional circumstances apply[224]

223 SRAS Guideline, clauses 4.3.1 and 4.3.2.

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

- 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[225]
- 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.[226] 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.[227] 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.[228] 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 identified a number of issues arising from a lack of clarity about the form and content of the communication protocols.

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.[229]

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

225 The SRAS provider schedules this test with the network service provider, subject to AEMO's approval.
226 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.
227 NER, clause 3.11.9(i)(2)-(3).
228 NER, clause 4.8.12(j)
229 AEMO, rule change request, p. 6.

elements and may involve the participation of one or more non-SRAS generators and distribution network service providers.[230]

AEMO suggested that the proposed testing framework would provide the benefit of clarifying that restart path tests:[231]

- 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.

D.3.3 Proponents' submissions

Consultation paper

AEMO's submission to the consultation paper suggested that:[232]

- 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.

230 Ibid, p. 13.
231 Ibid, p. 14.
232 AEMO, submission to consultation paper, p. 2.

AEMO has also highlighted that restart path 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.[233]

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[234]
- 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.[235]

The AER was broadly supportive of AEMO's proposed system restart path testing framework in its submission to the consultation paper, noting that the evolving power system provides significant uncertainty to planning for system restart and as such extending the scope of SRAS testing is likely to be necessary[236]

Draft determination

AEMO commented on a number of aspects of the system restart path testing framework in its submission to the draft determination. General comments provided by AEMO on the intended purpose and scope of this testing noted that:[237]

- the aim of AEMO's proposal is to establish a consistent and certain framework for practical testing of the initial system restart path from the point of delivery of SRAS further into the transmission network, to a point where further transmission lines,

233 Ibid.
234 Ibid, p. 7.
235 Ibid.
236 AER, submission to consultation paper, p. 1.
237 AEMO, submission to draft determination, p. 4.

transformers and auxiliaries of key non-SRAS generators are energised, which could include sections of distribution network, to the extent the tests will not result in customer disruption

- AEMO's proposal explicitly recognised that these tests should occur with minimal variation from dispatch and no involuntary interruption of load
- the scope of system restart tests will continue to be relatively limited in several sub-networks.

AEMO submitted that the system restart path testing framework set out in the draft rule would not be practical to implement and was unnecessarily administratively burdensome.[238] AEMO proposed the following changes to the testing framework set out in the draft rule:

- Changes to the notification requirements applying to restart path tests.[239] AEMO submitted that a minimum six-month notice period between the finalisation of the test program and the test being conducted would be impractical and unnecessary, would potentially frustrate the purpose of the test and is significantly out-of-step with other test notice periods. AEMO proposed an alternative approach where the proposed test date would be notified to participants at the time the test program is finalised and the minimum period before the test could be undertaken would be six weeks, rather than six months (unless AEMO and all impacted participants agree to a shorter period). This proposal is discussed further in appendix d.6.1.
- Removing the requirement that AEMO undertake a restart path test at least once every three years in each electrical sub-network. AEMO suggested that it may not be practical, necessary or cost-efficient to undertake tests this frequently.[240]
- Removing the requirement that the SRAS Guideline include guidance on the frequency of system restart path testing.[241] AEMO suggested that it would be impossible to provide meaningful guidance on this because the need for testing will typically be driven by changes to the conditions in relevant parts of a particular sub-network and will also be restricted by practical considerations, which are hugely varied between sub-networks.
- Modifying elements of the testing framework to clarify the obligations of the parties involved, particularly in relation to information provision and the development of the test program.[242]
- The establishment of a standalone compensation framework for participants to recover direct costs incurred as a result of participating in a restart path test.[243] AEMO disagreed with the approach proposed under the draft rule, which would have deemed an instruction by an NSP or AEMO relating to participation in a test to be a direction for the purposes of the existing directions compensation framework under the NER. AEMO noted that this approach would require activation of the interwoven set of clauses that provide

238 Ibid.
239 Ibid, p. 11.
240 Ibid, p. 9.
241 Ibid.
242 Ibid, p. 10.
243 Ibid, p. 12.

for recovery of the cost of directions in the settlement process, which would introduce additional complexity into the rules in relation to this framework and potentially result in unintended outcomes. The alternative compensation framework proposed by AEMO is discussed in appendix d.6.1.

- Changes to AEMO's reporting obligations with respect to restart path testing,[244] including:
  - providing for AEMO to report to test participants on the performance of their plant and any unknown or unexpected test results
  - incorporating a requirement to report on the high-level outcomes of a restart path testing into AEMO's existing reporting obligations with respect to SRAS
  - removing the requirement for AEMO to publicly report on how AEMO consulted with test participants and sought to minimise the costs and operational impacts of a test.
- Inclusion of a transitional provision to address restart path testing already planned prior to the final rule being made.[245]

D.4 Stakeholder comments

D.4.1 Consultation paper

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:[246]

- 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.

244 Ibid, p. 13.
245 Ibid, p. 14.
246 Submissions to consultation paper: AGL Energy, p. 3; AEC, p. 2; Delta Electricity, p. 5; Hydro Tasmania, p. 2.

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.[247]

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.[248]

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.[249] 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.[250]

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.[251]

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.[252]

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[253]
- the rules should address the frequency with which AEMO can direct that such tests be undertaken[254]
- outages for testing purposes should be excluded from Service Target Performance Incentive Scheme (STPIS) calculations.[255]

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.[256]

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247 Submissions to consultation paper: AGL Energy, p. 3; ERM Power, p. 3.

248 Submissions to consultation paper: EnergyAustralia, p. 3; AEC, p. 2; Delta Electricity, p. 5; ERM Power, p. 3; Mondo Energy, p. 3.

249 Delta Electricity, submission to consultation paper, p. 1.

250 Ibid.

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

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

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

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

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

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

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.[257]

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.[258]

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.[259]

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).[260]

D.4.2 Draft determination

Most stakeholders that made submissions to the draft determination commented on the proposed restart path testing framework under the draft rule. Stakeholders were generally supportive of the majority of the testing framework set out in the draft rule, particularly the ability for test participants to recover direct costs incurred as a result of participation in a test. Some stakeholders identified specific issues or concerns regarding the proposed framework, including:

- **AGL** submitted that:[261]
  - AEMO should be expressly required to provide a "draft" test program to test participants and those participants should have the opportunity to comment on the draft program
  - test participants should have the ability to approve or challenge a test program, particularly in relation to the timing of a test.
- The **Australian Energy Council** requested that "incremental manning costs" be expressly included in the direct costs test participants are entitled to recover through the compensation framework.[262]
- **Energy Networks Australia**, **TasNetworks** and **AGL** questioned the practicality and cost implications of the requirement that AEMO undertake a test at least once every three years in each electrical sub-network.[263]

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

258 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.

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

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

261 AGL, submission to draft determination, pp. 4.

262 AEC, submission to draft determination, p. 1.

263 Submissions to draft determination: ENA, p. 1; TasNetworks, p. 2; AGL, p. 4.

- **TasNetworks** suggested there should be specific arrangements in the final rule for NSPs to recover the costs of testing.[264]

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 of 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 frameworks which would apply.

D.6 Commission's analysis and conclusions

264 TasNetworks, submission to draft determination, p. 2.

BOX 9: FINAL RULE

The final 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 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 weeks between the test program being finalised and the test being undertaken (subject to circumstances which necessitate a change to the timing of the test, or an earlier date agreed to by all test participants)
- establishes a framework for participants to claim compensation for any direct costs incurred as a result of participation in a test, with the costs of such compensation to be recovered in the same way as other SRAS costs. This compensation framework is to be available to test participants from the commencement of the transitional provisions.
- requires AEMO to report on the outcomes of a test, including how AEMO consulted with test participants and sought to minimise the costs and operational impacts and whether the test indicated that the system restart plan is consistent with achieving the system restart standard
- 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 final rule:

The final rule will 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
- increasing transparency of the outcomes of restart path testing by requiring this information to reported 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 under the final 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 final 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 final rule to provide any information reasonably requested by AEMO to inform the design of the test program within specified timeframes.[265] 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.[266]

The final 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.[267] 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, but are

265 Clause 4.3.6(e) of the final rule.
266 Clause 4.3.6(k)(1) of the final rule.
267 Clause 4.3.6(b) of the final rule.

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 final 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 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.

Noting the difficulty in predicting with certainty when a test may be required in a particular sub-network, the final rule requires AEMO to amend the SRAS Guideline to include guidance as to the types of considerations or changes in power system conditions which may trigger the need to undertake such a test.[268]

The Commission considers that this approach would provide transparency to participants about when such tests may be required, while providing AEMO with the flexibility to undertake such tests 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.

The draft rule included a requirement that AEMO undertake a restart path test in each electrical sub-network at least once every three years. As discussed in appendix d.3.3 and appendix d.4.2, a number of stakeholders (including AEMO) considered that this requirement may be impractical and inefficient, and that AEMO should not be mandated to undertake a test if there has not been a material change in conditions in a particular sub-network during this period which necessitates a test occurring.

The Commission also notes that AEMO has a clear set of existing obligations to actively analyse, validate and report on the ability of the system restart plan to achieve the system restart standard as the power system evolves. This is included as part of AEMO's annual reporting obligations in relation to SRAS under the NER.[269]

Accordingly, the Commission agrees that it would not be efficient or necessary to mandate a minimum testing frequency in the rules. In practice, these tests will be undertaken as the need arises, which may be more or less frequently than once every three years. On that basis, the final rule does not prescribe a minimum frequency with which AEMO must undertake restart path tests in each sub-network.

Timing and design of restart path tests

The requirements set out in the final rule in relation to the timing and frequency of restart path testing will provide sufficient notice to participants to allow them to prepare for a test, while also making sure that AEMO has the flexibility to undertake the types of testing require

268 Clause 3.11.7(d)(3A) of the final rule.

269 Clause 3.11.10(b) of the NER requires AEMO to report annually on whether sufficient SRAS were procured to meet the system restart standard in each electrical sub-network.

and adjust the timing of tests where necessary. The key changes in the final rule from the framework proposed in the draft rule are that:

- the minimum period between the finalisation of the test program and the test being undertaken has been reduced from six months to six weeks[270]
- AEMO will be required to specify multiple windows (of not more than four weeks) within which a test may be undertaken.[271]

These changes are discussed in more detail below.

The draft rule provided 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 intent of the draft rule was to provide affected participants with a significant amount of notice prior to a test being undertaken to ensure that they could adjust their operations as required to accommodate the test.

However, further discussions with AEMO regarding the nature and complexity of different variations of restart path tests have made it clear that a minimum six-month notice period would not provide the practicality and flexibility needed to facilitate the types of testing required. Furthermore, the Commission understands that the parties most likely to be affected by a restart path test will have sufficient time given the prior notice received by way of AEMO's consultation process to prepare for the test itself.

In particular, the Commission notes that:

- Participants involved in a restart path test will be consulted by AEMO on the timing of a test as part of the development of the test program. These participants should therefore have an understanding well before the test program is finalised of when the test is likely to occur, and can begin the process of preparing well before the formal notification period.
- The development of a test program could take several months, depending on the complexity of the test. Mandating a six-month notice period in addition to the time required to develop the test program increases the likelihood of a material change in

270 Clause 4.3.6(h)(2) of the final rule.
271 Clause 4.3.6(h)(1) of the final rule.

conditions in the power system occurring between AEMO identifying that a test is required and actually being able to undertake the test, which could potentially prevent the test from occurring.

- Some tests may be relatively simple (e.g. energising a transmission line and/or transformer in a part of the network which would not impact on interconnector flows or non-SRAS generators) and be unlikely to impact on many participants, or have a material market impact. Such a test would not warrant an extended notice period.

Given that a six-month notice period could significantly restrict the utility and practicality of restart path tests, the Commission considers that a shorter notice period is necessary and appropriate. In its submission to the draft determination, AEMO proposed that the notice requirements under the final rule be amended to prescribe a minimum period of six weeks (rather than six months) between the finalisation of the test program and the test being undertaken. This proposal was based on the current practice applying to planned network outages, which is for NSPs to give AEMO six weeks' notice of such outages. AEMO then publishes notice of such outages on its network outage scheduler, which is accessible on its website, as well as through the market management system (MMS) data interchange.

The Commission acknowledges that the nature and impact of restart path testing will not be identical to that of planned network outages. However, based on further discussions with stakeholders about views raised in submissions to the draft determination the Commission considers that a minimum six-week notice period between the finalisation of the test program and the beginning of the first test period should still provide test participants with sufficient opportunity to prepare for a test and adjust their operations as required to minimise the impacts of such testing. The Commission notes that some stakeholders expressed concern about the potential risks associated with shortening the minimum notice periods for restart path tests However, the obligations on AEMO under the final rule in relation to the design of such tests appropriately balance the need for a flexible and practical testing framework with the need to provide adequate notice and transparency to participants.

If a particular test involves a high degree of complexity and engagement with a larger number of participants, it may be appropriate for AEMO to provide a longer notice period to participants to account for this additional complexity. This sentiment has been reflected by stakeholders in discussions with the AEMC. However, the Commission does not consider that the rules should impose a blanket restriction on AEMO's ability to efficiently undertake relatively straightforward tests by imposing unnecessarily long minimum notice timeframes for all tests.

In addition, as discussed above, the notice period for test participants would effectively be materially longer than six weeks, as test participants would be notified early in the development of the test program of the likely timing of the test, which would be refined following consultation with those participants. In practice, this means that the parties most likely to be affected by a test will have longer than six weeks to prepare and look to minimise the impact of the upcoming test.

The final rule also requires AEMO to nominate in the test program multiple test periods, within which the test may be undertaken. Each of these test periods must not be longer than

four weeks. A test would be required to be held in the first test period specified, unless AEMO considers it is necessary to reschedule the test (for example due to forecast extreme weather conditions), in which case AEMO would need to reschedule the test to occur as soon as reasonably practicable, having regard to the principles applying to the development of the test program (including to minimise cost and operational impacts on participants). This could include rescheduling the test to occur on a date within the current test period, or in the next test period specified in the test program. The intention of this change is to provide greater certainty to both AEMO and test participants about the potential dates to which a test may be rescheduled if this turns out to be necessary, which would have been less transparent under the draft rule.

Some stakeholders have expressed the need to make sure that AEMO takes reasonable measures to coordinate restart path testing with TNSP planned outages where possible and consider the cost impacts of testing on TNSPs. The Commission considers that these considerations are adequately addressed in the final rule by the principles AEMO is required to adhere to when designing the test program.[272] In addition, AEMO noted in its submission to the draft determination that it will be important to identify opportunities to take advantage of planned outages and take into account asset maintenance activities when determining the test date.[273]

The Commission considers that the timing and notice requirements for testing under the final rule 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
- reduce the risk of a material change in circumstances between the finalisation of the test program and the testing period which may prevent the test from occurring.

Stakeholders have emphasised in submissions to the consultation paper and draft determination, that having the opportunity to provide input on the technical specifications applying a restart path test will 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 final 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.[274] The Commission expects that this will involve detailed consultation by

272 Clause 4.3.6(g) of the final rule.
273 AEMO, submission to draft determination, p. 10.
274 Clauses 4.3.6(d) and 4.3.6(g) of the final rule.

AEMO with affected participants, with the information provided by test participants forming an important input into the way a test is designed and carried out.

AEMO's rule change proposal also included 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 final rule.[275] The final rule also imposes an obligation on AEMO to minimise risks to power system security when designing the test program.[276]

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. However, the final 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

The final rule introduces a standalone framework to facilitate the recovery of direct costs incurred by test participants as a result of participation in a restart path test.[277] The cost recovery framework under the final rule differs from that proposed in the draft rule in that:

- the final rule establishes a separate compensation framework specifically for the purpose of restart path testing, rather than utilising the existing directions compensation framework
- the costs of such compensation will be recovered in the same way as other SRAS costs
- the compensation framework is to be available for those test participants affected by restart path testing undertaken after the transitional date but prior to the commencement of the final rule.

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.[278] 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.[279]

275 Clause 4.3.6(g) of the final rule.
276 Ibid.
277 Clauses 4.3.6(m)-(p) of the final rule.
278 AEMO, rule change request, p. 25.
279 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.

Under the draft rule, participants would have been able to recover their direct costs under the existing framework in the NER which allows participants to claim compensation for costs incurred as a result of a direction issued by AEMO 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.[280]

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.[281] The Commission considers that the potential for this type of testing nevertheless gives rise to a risk that specific generation types may be disproportionately

280 NER, clause 3.15.7A.

281 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.

affected by being required to participate in a test, in terms of the direct costs they incur as a result of their involvement. For example, this could add investment risk to those particular types of flexible, dispatchable peaking generation identified here.

The draft rule addressed this risk by establishing a limited entitlement to compensation for the direct costs incurred by generators participating in a restart path test. The entitlement for participants to recover direct costs has been maintained in the final rule. However, the final rule establishes a separate, standalone process through which this would occur. The Commission understands that seeking to utilise the existing directions compensation framework in the NER would be unnecessarily administratively burdensome for both AEMO and market participants and would introduce additional complexity into this existing framework.

The Commission therefore considers it appropriate to establish a compensation framework specifically for the purposes of compensation claims relating to participation in restart path tests. Importantly, the compensation framework under the final rule would have the same outcomes as that proposed in the draft determination, but would utilise a more efficient process to achieve those outcomes.

Specifically, the final rule provides that:

- participants would need to submit a written claim to AEMO within 10 business days of a test providing evidence of the direct costs they incurred (participants are permitted to submit only one written claim per test)[282]
- if the claim is for less than $100,000 and AEMO determines it is reasonable, AEMO would pay the participant the amount claimed. The Commission considers that this threshold is appropriate as it will allow smaller claims to be dealt with more efficiently, which is in the interest of AEMO and the relevant participants[283]
- if the claim is for more than $100,000 (or AEMO does not consider it is reasonable), AEMO would refer the claim to an independent expert for assessment[284]
- the costs of compensation payments would be recovered in the same way as other SRAS costs[285] - the rules require AEMO to recover half the costs of SRAS from market customers and the other half from market generators and market small generation aggregators on a regional basis, based on the energy generation and consumption of each in that region.

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

282 Clause 4.3.6(m) of the final rule.
283 Clause 4.3.6(o) of the final rule.
284 Ibid.
285 Clause 4.3.6(q) of the final rule.

- 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 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.

The Commission also considers that the reference in the final to "incremental operation and maintenance costs" would capture "incremental manning costs". As such, the Commission does not consider the change to the rule drafting proposed by the Australian Energy Council in this regard to be necessary.[286]

The final rule also clarifies that test participants may only make a single claim for compensation in relation to a particular restart path test.[287] This will prevent the scenario where a participant may make multiple claims just below the $100,000 threshold in order to effectively claim more than the threshold without the claims being referred for assessment by an independent expert.

Cost recovery for NSPs

Given that restart path testing would be required by AEMO, the efficient costs NSPs incur in association with this testing are expected to be recovered through charges for prescribed transmission services. However, 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 NSP'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

286 See Australian Energy Council, submission to draft determination, p. 1.

287 Clause 4.3.6(n) of the final rule.

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.

Some stakeholders submitted that the final rule should establish separate arrangements for TNSPs to recover the costs associated with restart path testing, similar to the framework which has been established for generators. The final rule does not introduce separate cost recovery arrangements for NSPs. The Commission does not consider it necessary or appropriate to do so, given that there is already a framework under the NER for TNSPs to recover costs of this nature (i.e. the cost pass through provisions discussed above). While the costs incurred by NSPs in relation to restart path testing may be unlikely to meet the materiality thresholds under this framework, the Commission does not consider that this warrants establishing a separate cost recovery framework for NSPs. The cost pass through framework has been designed to provide flexibility for changing circumstances while also maintaining incentives on NSPs to manage risk.[288] The fact that a particular pass through event does not meet the existing materiality thresholds does not suggest that the cost pass through framework is not fit-for-purpose or should be supplemented with other arrangements for specific regulatory change events.

Reporting obligations

As discussed above, the final 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 final 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 final rule includes a requirement on AEMO to report on the outcomes of restart path tests as part of its existing annual reporting obligations in relation to SRAS. The information AEMO must report on includes:

- whether the system restart plan being tested is likely to be consistent with the achievement of the SRS and AEMO's power system security responsibilities[289]
- how AEMO consulted with test participants in relation to the scope and timing of a restart path test[290]

288 AEMC, Cost pass through arrangements for Network Service Providers - final determination, August 2012. Available at: https://www.aemc.gov.au/sites/default/files/content/c778701e-eb31-42c8-81be-b985bdc4388a/Final-rule-determination.pdf.

289 Clause 3.11.10(b)(4) of the final rule.

290 Clause 3.11.10(b)(5) of the final rule.

- how AEMO sought to minimise the costs of a test and the operational impacts on affected participants[291]

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.

The final rule also provides that, within three months of completion of a test, AEMO will provide a report:

- to the TNSP on the results of the test[292]
- to each non-NSP test participant on the performance of its plant in the test.[293]

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.[294]

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 final rule[295] will:

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

291 Clause 3.11.10(b)(6) of the final rule.
292 Clause 4.3.6(t)(1) of the final rule.
293 Clause 4.3.6(t)(2) of the final rule.
294 AER, rule change request, p. 8.
295 Clause 4.8.12(j) of the final rule.

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. The final rule also makes some minor administrative changes to the SRAS communication protocol provisions proposed in the draft rule.

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.[296]

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 final rule clarifies that NSPs must:[297]

- 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.[298] AEMO has an obligation under the rules to use reasonable endeavours to achieve its power system security responsibilities.[299]

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296 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.

297 Clause 4.3.4(a1) of the final rule.

298 Clause 4.3.1 of the NER.

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

The AER's rule change proposal included 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.[300]

Given that AEMO would have a direct role in the preparation of the test program for a system restart path test, the Commission agrees that it is appropriate for AEMO's power system security responsibilities to expressly refer to AEMO's role in SRAS testing.

Accordingly, the final 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,[301]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 will also complement the existing obligation on NSPs to use reasonable endeavours to assist AEMO in discharging its power system security obligations.[302]

AEMO suggested in its submission to the draft determination that any additions to AEMO's power system security responsibilities should avoid any potential conflict with, or duplication of, AEMO's existing responsibilities in clause 4.3.1 of the NER with respect to SRAS.[303] The final rule incorporates some minor structural changes to the drafting proposed in the draft rule to achieve this objective.

299 Clause 4.3.2(a) of the NER.
300 AER, rule change request, p. 10.
301 Clause 4.3.1(p) of the final rule.
302 AER, rule change request, p. 7.
303 AEMO, submission to draft determination, p. 6.

E LOCAL BLACK SYSTEM PROCEDURES

E.1 Overview

This appendix addresses the role and function of local black system procedures (LBSPs) 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 prior to energisation or synchronisation, to maintain the integrity of the system restart process.

BOX 10: SUMMARY OF FINAL RULE

The final 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 NSP must take following any major supply disruption prior to energisation or synchronisation.

The final rule incorporates a minor change from the draft rule to make sure it accurately reflects the circumstances in which such action would be required to be taken by a generator or NSP.

The remainder of this appendix outlines:

- the 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 LBSPs.[304] LBSPs are an important set of documents used by AEMO to develop its regional restoration options. The rules require LBSPs to:[305]

- 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

304 NER, clause 4.8.12(d).
305 NER, clause 4.8.12(f).

- appropriately incorporate any energy support arrangements to which a generator or NSP may be a party.[306]

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.[307] 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.[308]

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.[309]

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.[310] 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.[312]

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.[313]

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, the Commission decided to progress this issue as part of the assessment of these rule change requests.

E.3 Proponents' views

E.3.1 Consultation paper

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

306 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.

307 NER, clause 4.8.12(g).

308 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.

309 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.

310 NER, clauses and 4.8.14(b).

312 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.

313 Ibid.

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.[314]

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 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.[315]

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

E.3.2 Draft determination

The draft rule sought to address the issues discussed above by providing that LBSPs must include any actions that a generator or NSP must take following a major supply disruption to assist the safe implementation of the system restart plan.

In its submission to the draft determination, AEMO noted that while the primary intent of this amendment is to cover generator-specific switching procedures, it is deliberately not limited to those things.[316] AEMO also noted that the draft provision as worded was probably not appropriate for LBSPs, because the things that a participant must do are likely to change depending on the circumstances, and it will be AEMO or the NSP's role to instruct the participant to do whatever is necessary following a major supply disruption.[317]

AEMO highlighted that the recently amended LBSP Guidelines do explicitly require the provision of 'proposed switching procedures', noting that things may change on the day. AEMO stated that with the exception of processes pre-defined in SRAS contracts and (potentially) energy support arrangements, there are many variables that need to be accommodated in a system restoration scenario. As such, AEMO noted there will rarely be specific step by step procedures that must occur following any major supply disruption.[318] Further, AEMO stated that the wording of the draft rule implied that a generator or NSP would have knowledge of the system restart plan, as it referred to taking action to assist in the safe implementation of the plan. AEMO noted that this will not necessarily be the case.

Given the concerns noted above, AEMO suggested the proposed clause 4.8.12(f)(1A) either be removed, or be reworded to require LBSPs to "include actions the Generator or Network Service Provider may need to undertake following any major supply disruption prior to energisation or synchronisation".[319]

314 AEMO, submission to consultation paper, p. 8.
315 Ibid
316 AEMO, submission to draft determination, p. 7.
317 Ibid.
318 Ibid.
319 Ibid.

E.4 Stakeholder comments

Relevant stakeholder comments on the role and function of LBSP's in submissions to the consultation paper 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.[320]

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 encouraged the AEMC's consideration of incorporating an operational procedure for generators into the LBSP.[321]

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.[322]

No stakeholders (other than AEMO) commented on the proposed changes relating to LBSPs in submissions to the draft determination.

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 Commission's analysis and conclusions

320 EnergyAustralia, submission to consultation paper, p. 4
321 Hydro Tasmania, submission to consultation paper, p. 4.
322 Delta Electricity, submission to consultation paper, p. 7

BOX 11: FINAL RULE

The final rule amends the requirements set out in the NER regarding the information LBSPs must contain. Specifically, the final rule clarifies that LBSPs must include any actions the generator or NSP must take following any major supply disruption prior to energisation or synchronisation.

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)(1) in the final rule, which requires LBSPs to include information regarding any actions that a generator or NSP must take in the event of a black system event prior to energisation or synchronisation. The Commission considers that this will provide a clearer link between the content of LBSPs and parties compliance obligations under the rules with respect to LBSPs.

The final rule differs from the draft rule insofar as it refers to actions taken by a generator or NSP prior to energisation or synchronisation, rather than actions taken to assist the safe implementation of the system restart plan. This change addresses the issue identified by AEMO that not all generators or NSPs will have knowledge of the system restart plan and it is not therefore appropriate to refer to the system restart plan in this context. This change also

alleviates the concerns expressed by AEMO regarding the use of the terminology "actions a generator or NSP *must* take". As such, this wording has been maintained in the final rule.

The Commission does not envision that all LBSPs would be required to specify actions generators or NSPs must take in these circumstances. Specific information included in a particular LBSP is dependent on the circumstances of the relevant participant and would not limit AEMO's ability to require that participant to take certain actions should a major supply disruption occur. However, the Commission considers 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 and practical.

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 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 final rule determination.

F.1 Final rule determination

In accordance with s. 102 and 103 of the NEL the Commission has made this final rule determination in relation to the rules proposed by AEMO and the AER.

The Commission's final determination is to make a more preferable rule under the NEL, substantially in the form as suggested by AEMO during the rule change process.

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

A copy of the more preferable final 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 rule falls within the subject matter about which the Commission may make rules. The more preferable 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[323]
- the activities of persons involved in the operation of the national electricity system[324].

Further, the more preferable 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.[325]

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.

323 s. 34(1)(a)(ii) of the NEL
324 s. 34(1)(a)(iii) of the NEL
325 Clause 11 of Schedule 1 to the NEL

There is no relevant Ministerial Council on Energy (MCE) statement of policy principles for this rule change request.[326]

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.[327] The more preferable 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 final 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 final 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 final 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 final rule be classified as conduct provisions.

326 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.

327 Section 91(8) of the NEL.

G SUMMARY OF OTHER ISSUES RAISED IN SUBMISSIONS

This appendix sets out other issues raised in submissions to the consultation paper and draft determination which have not already been addressed in the final determination and the AEMC's response to each issue.

Table G.1: Summary of other issues raised in submissions to the consultation paper

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 final rule clarifies that in meeting this objective, AEMO may take the long-term 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 in the revised Guideline. This can be made clear in the NER drafting.	The final rule does not propose any changes to the generator technical performance standards.

STAKEHOLDER	ISSUE	AEMC RESPONSE
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 final 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 final 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 final 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 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	The Commission notes this comment. AEMO has noted in its submission to the consultation paper that testing would not involve the involuntary disconnection of customer loads.

STAKEHOLDER	ISSUE	AEMC RESPONSE
	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.	
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 in the final 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. The Commission has therefore 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 final rule makes changes to AEMO's proposed testing framework where necessary to ensure that risks and 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	The final rule does not propose changes to the existing framework governing the testing of individual SRAS

STAKEHOLDER	ISSUE	AEMC RESPONSE
	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.	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, • system strength services, • small and large signal stability requirements within the range of operations required under the black system	The Commission notes this comment. The final rule provides for the new system restoration support services to be defined by AEMO in the SRAS Guideline.

STAKEHOLDER	ISSUE	AEMC RESPONSE
	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 final 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.

Table G.2: **Summary of other issues raised in submissions to the draft determination**

STAKEHOLDER	ISSUE	AEMC RESPONSE
AGL, p. 2.	Providers of system restart support services will need to meet the annual SRAS testing and availability requirements along with being better incorporated into the proposed system path tests. The AEMC should clarify if this is the	Given that system restart support services will now fall within the definition of SRAS, providers of these services will be subject to the requirements applying to existing SRAS providers. The Commission understands that AEMO

STAKEHOLDER	ISSUE	AEMC RESPONSE
	case.	will also incorporate the provision of these services into the development of the system restart plan, including when determining viable system restart paths.
AGL, p. 4.	The draft rule should be amended to limit when a component of the restart path should be tested, rather than the generic term of the 'restart path'. The 'component of the restart path' may include either a part of the transmission network or a market participant's contribution to meeting the system restart path plan. The rule should state that that once a component of the restart path is tested, this component should only be tested again when there has been a material change in this component and AEMO considers it necessary.	The final rule provides for testing to occur where required to verify whether the system restart plan is likely to be capable of achieving the system restart standard or the AEMO power system security responsibilities. The Commission does not consider it necessary to limit testing to the validation of a particular component of the system restart plan. It is not clear what would constitute a "component" of the system restart plan in this context. In addition, the Commission understands that AEMO will only test particular elements of a restart path where this is necessary due to a material change in circumstances or power system conditions, which will be reflected in the guidance provided by AEMO on this issue in the SRAS Guideline.
AGL, p. 5.	Whilst we appreciate the AEMC does not envision high risk testing, this should be reflected in the rules. The rules should therefore expressly exclude AEMO from implementing tests that will expose a market participant to risks to their facility that are materially greater than the normal operation of their facility... Should high risk testing be considered valuable and necessary, then the AEMC may facilitate these types of tests in the rules through formal contractual agreements between AEMO and the test	The nature and complexity of the restart path testing required will be variable based on a number of factors and the Commission does not consider that it would be practical to expressly prevent AEMO from conducting tests which may be considered "high risk". The risks to a facility which are "materially greater" than those faced during normal operation are highly subjective. The Commission considers that the approach suggested would create ambiguity which could frustrate potentially critical testing

STAKEHOLDER	ISSUE	AEMC RESPONSE
	participant. Just as AEMO assesses the suitability of potential SRAS providers to meet the restart standard, this may be particularly useful if AEMO considers a market participant's location and/or type of facility mean they could play a more central role in testing components of the restart path.	from being undertaken and thereby undermine the restart path testing framework.
TasNetworks, p. 2.	TasNetworks notes that AEMO may change the test date at any time if considered reasonably necessary. Although supporting AEMO discretion within the testing framework, TasNetworks considers this should be accompanied by an obligation to consult with affected participants before a test date is changed.	The final rule provides that where AEMO reschedules a test, they must follow the principles applying to the design of the test program, which includes minimising the cost and operational impacts on test participants.