INFORMATION

RELIABILITY PANEL REVIEW OF THE POWER SYSTEM RESTART STANDARD

Final Determination released 15 December 2016

The Reliability Panel has determined a new system restart standard. The new standard has been tightened and provides a more stringent target for the procurement of system restart ancillary services (SRAS) by the Australian Energy Market Operator (AEMO). It will apply from July 2018 when the current SRAS contracts end.

What is the power system restart standard

The system restart standard specifies the parameters for restoring generation and transmission system operations after a major supply disruption including a black system event (black out). This generation capability can then be used to restart other generators and these can subsequently restore supply to consumer load. AEMO meets the standard by purchasing sufficient restart services - known as System Restart Ancillary Services (SRAS)- from generators across the market.

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, that is, the overall reliability of the SRAS procured for the sub-network rather than just for any individual source of SRAS.

The standard is not an operational standard – it is a procurement standard under which AEMO is required to contract restart services from generators. It does not set out the process of returning supply to consumers directly following blackouts. While the Standard and SRAS contribute to overall restoration of supply to consumers, they are critical to the first of three stages in the system restoration process, as is illustrated in the attached diagram which also sets out the roles and responsibilities of market institutions and market participants in the restoration process generally.

Why is there a need for the Standard

Most generators need to get energy from the grid to start generating electricity again after a major supply disruption. If supply from the system is lost most generators are not capable of independently restarting in the event of tripping off. Some generators use specialised equipment to restart without external supply. They are available to restart other generators, and able to begin restoring the system. AEMO purchases the on-going availability of such generators as SRAS.

The new system restart standard

The new Standard has been tightened and this has been done in a number of ways:

- the level and time components are now tailored for each electrical sub-network to reflect the speed at which the generation can be restored, the characteristics of the transmission network and the economic circumstances that apply to the sub-network;
- it minimises the costs of the SRAS that will need to bought by specifying the minimum level of generation and transmission capacity to be restored by SRAS in each sub-network in accordance detailed economic assessment of procuring different levels SRAS; and

Black system events can have significant economic and social impacts, so it is important there are enough restart services available to quickly restore power supply.

The new system restart standard will commence in July 2018 when the current contracts for restart services end.

- it includes aggregate reliability of the SRAS procured for each of the electrical sub-networks. This requirement of the Standard better specifies the performance of the procured SRAS, and includes a requirement for AEMO to consider the reliability and damage to the transmission network, following a major supply disruption, when it calculates aggregate reliability.

The new Standard includes within it revised guidelines for the determination of sub-networks boundaries by AEMO. They make it easier for AEMO to exercise its discretion on setting sub-network boundaries to maximise the efficiency of SRAS procurement.

The Panel has also revised guidelines within the Standard relating to the diversity and strategic location of SRAS, which reinforce the importance of including a range of different services in order to support the reliability of the restoration process for each sub-network. The new guidelines require AEMO to specifically consider the diversity criteria (relating to electrical, technological and energy source diversity), and when it assesses the aggregate reliability of each sub-network.

Recommendations for changes in the restoration process more generally

During public consultation on this review the Reliability Panel became aware of stakeholder concerns in relation to the power system restoration process that were outside the scope of the Standard.

In response, the Reliability Panel has made a number of recommendations in addition to determining the new Standard, including that:

- AEMO explore avenues for increased engagement with network businesses in relation to restoration processes to fully understand the performance of the network when assessing the procurement of SRAS;
- AEMO and network businesses develop plans for the restoration of load following a black system event, and communicate these plans to jurisdictional governments so they can be factored into respective state emergency plans; and
- AEMO, generators and network businesses should investigate ways to undertake full testing of procured SRAS, particularly when transmission lines or generators are being returned to service following maintenance.

Relationship with the black system event in South Australia

In reviewing the standard, the Panel considered the first two most recent reports prepared by AEMO on its investigation into the South Australian black system event. While the Panel will continue to consider the implications of any further findings, the Panel's view is that the standard is set at an appropriate level. The Panel notes that AEMO published a third report on the investigation of the South Australian black system event on Monday 12 December 2016. The Panel did not consider this report.

Background

The Panel received Terms of Reference from the AEMC on 30 June 2015 to undertake this review. These Terms of Reference followed the Commission's final rule determination in 2015 regarding the governance frameworks under the National Electricity Rules for SRAS.

Major supply disruptions, particularly black system events, can have significant economic and social impacts, so it is important there are enough restart services available to quickly restore power supply. In determining the new Standard, the Panel examined the trade-off between the on-going cost of the provision of SRAS and the potential cost of an extended outage, in accordance with the revised governance frameworks. In addition, the Panel considered the physical underpinnings of the power system and the international context for restoration after major supply disruptions, including black outs

Who is the Reliability Panel

The AEMC's Reliability Panel defines the power system security and reliability standards necessary to provide a reliable and secure electricity market - against which the NEM's performance is measured and reported.

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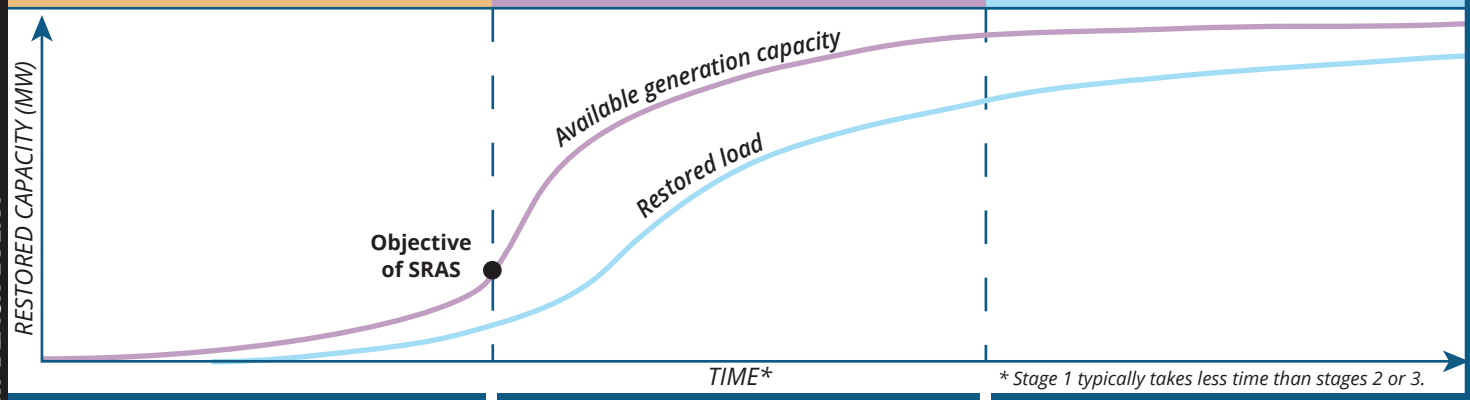
BLACK SYSTEM RESTORATION

	STAGE 0: PREPARE FOR THE POSSIBILITY	STAGE 1: RESTART THE SYSTEM	STAGE 2: RESTORE GENERATION	STAGE 3: RESTORE LOAD
		 * Stage 1 typically takes less time than stages 2 or 3.		
OUTCOME	Procure sufficient System Restart Ancillary Services (SRAS) capability (to the System Restart Standard). A clear, well-understood *System Restart Plan* and *local black system procedures* are in place	Restart the affected power system(using SRAS if needed) and restore network and supply to the major generators	Restart all the major power stations required to meet consumer demand including restoration of most of the high voltage transmission network	Restore supply to meet the remainder of consumer demand including completing the restoration of the transmission and distribution network
ROLES AND RESPONSIBILITIES		STAGE 1	STAGE 2	STAGE 3
AUSTRALIAN ENERGY MARKET COMMISSION (AEMC)	Sets the rules that govern the planning and preparation to be undertaken, as well as roles and responsibilities			
AUSTRALIAN ENERGY MARKET OPERATOR (AEMO)	Procures SRAS from generators to meet the System Restart Standard at lowest cost and ensures SRAS capability is maintained Issues *SRAS Guidelines* establishing the process AEMO uses to procure SRAS Plans how the system will be restored (confidential *System Restart Plan*) Recovers SRAS costs from Market Customers and generators Guides and approves generators and network service providers' *local black system procedures* Reports annually on the SRAS process, compliance with the System Restart Standard and costs	Coordinates system restart Assesses extent of disruption and damage Determines process to initiate supply of SRAS and implement *System Restart Plan* (amended as required) Communicates with market participants Initiates operation of SRAS if required Issues directions and instructions to return the power system to a secure operating state	Coordinates system restoration Directs SRAS to be turned off if no longer required	Coordinates system restoration
AUSTRALIAN ENERGY REGULATOR (AER)	Assesses whether AEMO and market participants have met their obligations under the Rules as part of the AER's broader compliance role			
RELIABILITY PANEL	Reviews and determines the System Restart Standard			
GENERATORS (INCLUDING WITH SRAS CAPABILITY)	Develops *local black system procedures* for responding to system black events May offer SRAS (including provision of all data, models and parameters that allows AEMO to effectively evaluate SRAS sources) Also, if contracted to AEMO to provide SRAS: Monitors and maintains restart capacity as per *SRAS guidelines* Undertakes annual testing in accordance with *SRAS Guidelines*	Assesses status of generating units Stabilises operation of generating units, where possible Notifies AEMO of status Prepares facility for restart Responds to AEMO directions Also, if contracted to AEMO to provide SRAS: Notifies AEMO of operational status Prepares facility for restart Responds to AEMO instructions	Restarts all required generating units Reconnects generating units under the direction of AEMO	
TRANSMISSION NETWORK SERVICE PROVIDERS	Provides information to AEMO to facilitate SRAS procurement Develops *local black system procedures* for responding to black system events Supports testing of SRAS sources	Assesses network status Prepares to re-energise its network including disconnecting and isolating all network elements Prepares for blocks of load to be reconnected Obtains AEMO approval before connecting load Liaises with DNSPs	Energises most or all of the undamaged transmission network	All undamaged transmission network is energised Repairs damage
DISTRIBUTION NETWORK SERVICE PROVIDERS		Assesses network status Prepares to re-energise its network including disconnecting and isolating all network elements, in liaison with TNSPs Acts on advice of TNSPs to reconnect load	Energises more distribution networks as further load is restored	Progressively energises all distribution network Repairs damage
JURISDICTIONAL SYSTEM SECURITY COORDINATOR	Notifies AEMO of existence of sensitive loads and priorities for load shedding in their jurisdiction	Advises, oversees and coordinates with other parties	Advises, oversees and coordinates with other parties	Advises, oversees and coordinates with other parties

SYSTEM BLACK EVENT