

Thursday, 30 January 2025

Chair of the Reliability Panel

Level 15
60 Castlereagh Street
Sydney NSW 2000

Review of the System Restart Standard – Consultation on Issues Paper

Dear Mr Jordan,

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia, representing nearly 1,000 of the leading businesses operating in renewable energy, energy storage, and renewable hydrogen. The CEC is committed to accelerating the decarbonisation of Australia's energy system as rapidly as possible while maintaining a secure and reliable supply of electricity for customers.

The CEC welcomes the opportunity to provide a submission to the Reliability Panel on its periodic review of the System Restart Standard. The following provides responses to the questions raised in the Issues Paper on the Review of the System Restart Standard and is informed by feedback from CEC members.

Should the Reliability Panel require any further information or context, please feel free to contact the CEC.

Restart preparedness

Roles and responsibilities for system restart under the National Electricity Rules

Question 1: Appropriateness of the current roles and responsibilities for system restart

- Are stakeholders aware of any issues related to the roles and responsibilities within the current system restart regulatory framework that may impact system restart outcomes over the short to long term? If so, please elaborate.
- What if any, are the potential changes to the current restart frameworks that could improve restart preparedness?
- What if any, are issues or shortcomings of the current restart governance arrangements?
- How might SRAS governance arrangements evolve to address risks over the medium and long term?

The CEC considers the current roles and responsibilities remain appropriate; however, think there could be a greater role for transmission and distribution network service providers in the medium

to longer term to address changes in the power system with respect to renewable energy zones and distributed CER integration. These two areas are further elaborated in response to questions in the Issues Paper in the sections below.

More broadly, the CEC is of the opinion that AEMO should take a greater role in outlining the system restart requirements for the future power system, particularly against the backdrop of continued retirement of large-scale synchronous generators connected to the power system. As the power system operator, AEMO is best placed to understand the types of system restart resources required and the location of these resources within the network to facilitate the restart.

Changes in the transmission system on the requirements for system restart

Question 2: System restart capability from renewable energy zones

Are there opportunities for the design and development of REZs to support future restart preparedness?

- What opportunities are there for the design and specification of generation and network infrastructure in each REZ help to support future system restart?
- How might the projected REZ developments impact future system restart pathways?
- Do the projected and committed REZ development require the consideration of any changes or amendments to the system restart frameworks or the system restart standard? If so, please describe any such potential changes.
- How should this information be communicated to the market and/or system planners, and how far in advance would this information be required to be actionable?

There is merit in the consideration of incorporating system restart facilities and/or capability within the development of REZ projects. As traditional generation units are closed and new forms of black start capability are required, consideration should be given to whether this could be procured from within REZ areas adjacent to transmission corridors. Consideration should also be given to how VRE generation resources and energy storage assets within REZ and adjacent to a REZ might be coordinated or provided in blocks to better facilitate the reconnection of load blocks in an efficient manner.

Question 3: Transmission network changes and system restart

- Given current projected network changes set out in AEMO's ISP planning scenarios, what considerations would need to be given to maintain and strengthen restart capability in the future power system?
- Are the current electricity sub-network boundaries appropriate for the future power system with respect to REZ's and new interconnections? If not, how might they change?
- In the context of the projected changes in the electricity system over the coming decade, are the guidelines in the standard for electrical sub-network boundaries fit for purpose? If not, what adjustment or additions could be made to future proof them?
- What are stakeholders' views on the current process for defining electrical sub-networks and the associated restoration requirements? Do stakeholders consider that any changes could be made to the current frameworks and/or the standard to enable the process of changing

electrical sub-network boundaries to be more flexible? If so, please describe these.

As noted above, the CEC considers AEMO as market operator is best placed to understand and respond to changes in transmission pathways on the need for SRAS resources in different locations within the network. As the network topology of the system changes over time, AEMO should consider the strategic locations of SRAS resources either within or outside electricity sub-network boundaries for which the service is procured as part of its overall planning of the future state of the power system. AEMO is best placed to understand the locational value of SRAS as it relates to its ability to energise the transmission network and/or sustain stable restoration of the power system, including assisting other generating units to restart.

Changes in the distribution network on the requirements for system restart

Question 4: Managing risks to system restart from changes occurring at the distribution level of the power system

- Do stakeholders consider there likely to be any required changes to the system restart frameworks, including the Standard, because of changing operational patterns, driven by CER such as rooftop PV and batteries? If so, please describe.

The proliferation of CER resources in the distribution network will require a greater understanding of the underlying demand on each distribution feeder to enable restoration of the power system. This could potentially be achieved through greater visibility of the distribution network from the information provided by type 4 metering installations or overlaying each distribution feeder with available information from AEMO's DER register.

The CEC is unclear about the degree of visibility that distribution network service providers have about the approximate amount of load on each distribution feeder, and how this varies across the day because of CER resources connected to the network. Greater visibility of load blocks would assist in the restoration process and reduce instability in the restoration process where load blocks are significantly higher or lower than expected.

However, the CEC notes that the changing operational patterns at the distribution voltage level because of greater deployment of rooftop PV and batteries is likely to put an increased focus on safety considerations around anti-islanding protection requirements. That is, an increased need to consider safety in any required changes to the system restart frameworks for system restoration from within the distribution network. AEMO should work closely with DNSPs to understand and resolve these issues, to ensure the capabilities of CER and embedded generation and storage can be fully leveraged.

Question 5: Opportunities for improved restart preparedness from changes in the distribution system

- Do changes in the distribution level of the power system present any opportunities for improved system restart preparedness over the short, medium and long term?
- Is it conceivable that distribution system power islands could play a role in future power system restoration following major supply disruptions? What are the technical challenges that would need to be overcome to realise such a potential?
- Are stakeholders aware of any impediments to unlocking the benefits of improved resilience in relation to how distribution systems respond to major supply disruptions and contribute to system restoration?

- Do stakeholders consider that the current restart frameworks and standards are helpful, neutral or detrimental to realising the potential of distribution systems for improved system restart outcomes?

With the advent of local area networks and microgrids within the distribution network that seek to use locally produced electricity in conjunction with battery systems to power the system, there is a potential opportunity over the medium to longer term to incorporate this capacity into local black system procedures.

The CEC notes several international studies have investigated the technical challenges of system restart through the distribution network via the utilisation of distributed energy resources and grid-forming inverter-based resources. The main technical challenges relate to the restart resources being able to connect and operate at low fault levels, low system inertia, and high demand and supply variability to enable smaller islands to be slowly linked together to enable system restoration. To enable the system to operate under these technical conditions, sophisticated algorithms are required to manage the system, which could be investigated by distribution network operators as part of their consideration of DER orchestration into the future.

With respect to the current restart frameworks and standards, the CEC understands that distribution networks are required to develop local black start procedures (LBSP) under NER clause 4.8.12(d) in accordance with guidelines published by AEMO. The collective LBSP of all generators and network service providers are then used by AEMO to develop the system restart plan. While the restart plan does not preclude AEMO considering reenergisation at the distribution level as a separate component of the system restart plan (NER clause 4.8.12(a1)), to better enable this functionality, the CEC suggests the Reliability Panel consider the possible challenges and opportunities in any potential changes to the regulatory framework that may be needed to AEMO's guidelines for preparing local black system procedures made under NER clause 4.8.12(e).

Restart capability

Impact of changing generation fleet on restart capability

Question 6: Commercial arrangements to provide signals and incentives for investment in SRAS

- What information would providers seek when deciding to invest and maintain SRAS capability under the current arrangements? How might this change as the system transitions?
- What commercial arrangements would provide incentives to invest in SRAS capability?
- What is the lead time for investment in SRAS capability if a locational gap was identified?
- Are further commercial incentives needed for plant maintenance and uplift? If any, please elaborate.
- What is the experience of potential providers of new technology-based SRAS, including BESS and grid forming inverters?

The CEC remains of the view that as part of its power system planning and reporting that AEMO needs to provide clear investment signals for market participants on any SRAS requirements. That is, information on where within each sub-network, how much and when any restart services are required and with sufficient lead-time for market participants to respond to these signals.

As a result of changes to the NER as part of the *National Electricity Amendment (System Restart Ancillary Services) Rule 2015*, AEMO can innovate in the procurement of restart services by

allowing it to select from a larger number of services with different levels of reliability to meet an aggregate reliability requirement.¹ Specifically, previous limitations on procurement methods and contract tenors were removed from the NER, to ensure AEMO could enter into the most effective arrangements. To date, the CEC is unaware of AEMO utilising this purposeful flexibility under the NER, such as by entering into long term contracts, or engaging with developers at project construction, to deliver new SRAS capabilities. The Reliability Panel should encourage AEMO to make use of this flexibility to explore and develop new SRAS solutions.

The AEMC made additional changes to the regulatory framework for the procurement, testing and deployment of system restart ancillary services as part of *National Electricity Amendment (System restart services, standards and testing) Rule 2020*.² The intent of this change to the NER was to enhance the ability of AEMO, transmission network businesses and other parties in the restoration of the power system to effectively prepare for, and respond to, a major power disruption.

The changes to the regulatory framework were considered 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 NEM, that can create challenges relating to the availability and dependability of the services required to restore supply during a system restoration.

Another intent of these changes was to drive more efficient outcomes in SRAS markets, by enabling AEMO to define and procure a wider range of services to assist in a restart process. This could be in the form of direct restart services from diesel / gas generators or BESS, or in the form of 'system restoration support services', which are more passive services, such as PV inverters acting as a dynamic reactive power compensator to stabilise voltages along the restoration pathway.

The CEC is not aware of AEMO having yet procured any of these newer services. The Reliability Panel should encourage AEMO to make better use of the leeway it is provided under the NER, to define and procure these kinds of services.

The CEC also notes AEMO published a white paper on the *Application of advanced grid-scale inverters in the NEM* in August 2021 with a view to providing recommendations toward enabling the application of grid-forming inverters to support the NEM as the amount of inverter-based resources (IBR) increases and synchronous generation online reduces.³ The CEC would like to see AEMO expedite its work on the consideration of grid-forming inverter capability in conjunction with the other recommended areas for action identified in this report.

For example, when using a battery energy storage system (BESS) or pumped hydro to provide SRAS, the system restart service needs to account for the opportunity cost of holding adequate headroom within the storage system to allow provision of the service.

Could revision of the Standard provide new restart capability

Question 7: Understanding how the Standard could evolve to support a transitioning system

¹ AEMC 2015 | System restart ancillary services - Final determination

² AEMC 2020 | System Restart Services, Standards and Testing - Final Determination

³ AEMO 2021 | Application of Advanced Grid-scale Inverters in the NEM

- Do the current requirements set out in the NER for setting the Standard remain appropriate when considering the issues for system restart? If not, please elaborate. Note the current NER requirements for setting the Standard are outlined in section 3.2 of the Issues paper.
- How does the Standard inhibit the ability to secure sufficient SRAS capability in the future as the NEM continues to transition?
- What are some of the considerations for providing SRAS across interconnectors?
- What would be the elements for a Standard that is appropriate for an inverter-based resources dominated power system?

The CEC considers the primary focus of the restart standard should remain the independent restoration of each subnetwork, with SRAS procured accordingly in each region. While interconnectors can and should be used as appropriate in any system restoration, it is important to remember that a major supply disruption or black system event may in fact be caused by physical loss of an interconnector. Domestic sources of SRAS should always therefore be available in a subnetwork region.

The CEC reiterates its previous comments that AEMO seek to accelerate its investigation and analysis of inverter-based technology trials in their ability to support the operation of the NEM and their potential use as restart services. This will help to reduce the cost pressures potentially created by a requirement for domestic procurement of SRAS in each subnetwork.

Transparency and reporting

Given the challenges identified by AEMO in relation to the provision of SRAS in the future system, The Reliability Panel proposes to investigate the potential benefit of revised or additional reporting arrangements to provide sufficient transparency to support investment in new SRAS capability. Transparency and reporting of SRAS market arrangements enable:

- market participants to be aware of current gaps in the market for the provision of SRAS services; and
- provision of signals for new investment to address gaps in the future.

The Issues paper included the following question in relation to enhancing the future requirements for transparency and reporting by AEMO.

Question 8: Evolving the arrangements for transparency and reporting

- How can existing reporting arrangements be improved for market participants and stakeholders to understand the gaps in restart planning and opportunities for investment in SRAs provision? What additional information would stakeholders find useful to inform decisions on whether to invest in new SRAS capability?
- How should system restart related information be made available to stakeholders?
- Would there be benefits in AEMO identifying potential system restart challenges and opportunities through the Transition Plan for System Security?

As the market body responsible for understanding all relevant aspects of the system restart plan and to effectively co-ordinate the safe implementation of the plan, AEMO is best placed to understand any gaps and opportunities for investment in SRAS provision.

The CEC considers AEMO should provide additional information – both in terms of detailed description of system need and the timeframes when those needs will arise. Importantly, those timeframes should be at least 10 years in advance, to send clear investment signals for provision of new services. Detailed system needs should also set out specifically where in the system the service is required and what form that service should take.

There are several planning documents where the provision of this information would be appropriate. In addition to the Transition Plan for System Security, the Electricity Statement of Opportunities (ESOO) would also seem to be a logical place to disseminate this information given the function of the ESOO is to provide investment signals to the market.

In any event, the CEC considers that this requirement should be enshrined in a regulatory obligation on AEMO.

The CEC welcomes further engagement with the Reliability Panel as any changes to the system restart standard and/or system restart ancillary services framework is further developed. Further queries can be directed to jeastcott@cleanenergycouncil.org.au.

Kind regards

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