

16 October 2025

Rainer Korte
Chair of the Reliability Panel
Australian Energy Market Commission (AEMC)

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Via electronic lodgement

Dear Mr Korte,

Response to Review of the System Restart Standard Draft Determination

AusNet welcomes the opportunity to make this submission in response to the Reliability Panel's Draft Determination on the Review of the System Restart Standard (the **Draft Determination**).

AusNet is the largest diversified energy network business in Victoria with over \$13 billion of regulated and contracted assets. It owns and operates three core regulated networks: electricity distribution, gas distribution and the state-wide electricity transmission network, as well as a significant portfolio of contracted energy infrastructure. It also owns and operates energy and technical services businesses (which trade under the name "Mondo").

This submission reflects our perspective as the primary system operator of Victoria's declared transmission system.¹ During real-time incidents, AusNet's Transmission Operations Centre (**TOC**) coordinates with the Australian Energy Market Operator's (**AEMO's**) National Operations team on Victorian emergency management, load shedding and system restart related matters. Importantly, AEMO has officially delegated system restart functions to AusNet in Victoria. This includes responsibility to (1) restore and maintain power system security following a major supply disruption (2) act as the single point of contact for AEMO rather than introducing additional interfaces with distribution system operators (**DSOs**) in an emergency.²

Our views are as follows:

- **We support the Panel's recommendation to incorporate future-focused restoration modelling into system restart planning across three planning horizons (Recommendation 2.1)**

Future-focused restoration modelling is critical to ensuring that system restart capability remains robust and fit for purpose as the power system transitions. In our previous submission to the Review of System Restart Standard Issues Paper, we highlighted several near-term risks that underscore the need for forward-looking modelling. These include the retirement of existing System Restart Ancillary Services (**SRAS**) providers, increasing penetration of rooftop solar PV, and the evolving operational characteristics of inverter-based resources (**IBR**). These changes challenge traditional assumptions about feasibility of restart pathways and increase the risk of restoration failure if not proactively addressed.

We also strongly support any recommendations that shift SRAS from being treated solely as a market function to one that is also recognised as a critical planning function. System restart is a foundational capability for power system resilience, and its delivery must be underpinned by coordinated planning, technical validation, and strategic investment, not just market procurement.

For these reasons, AusNet supports the proposal to undertake restoration modelling across three planning horizons outlined in the Transition Plan for System Security (**TPSS**). This modelling should be used to identify emerging risks and inform timely investment in SRAS capability, including new technologies and restoration support services. We consider the planning horizons of zero to two years, two to five years, and five years and beyond to be appropriate and well-aligned with the evolving needs of the power system.

¹ Under Victoria's declared shared network arrangements, AEMO's National Operations team (on behalf of AEMO Victorian Planning) and AusNet deliver different parts of the Victorian operations function. AusNet is responsible for outage and access management, incident response, network operation and control and the provision of network and asset information. AEMO's National Operations team is responsible for Victorian network limits management and contingency management in addition to its regular national functions.

² AEMO, Instrument of Delegation, August 2013

- **We recommend that AEMO be required to consult directly with Transmission Network Service Providers (TNSPs) when planning for SRAS**

The Panel's Draft Recommendation 2 only requires AEMO to engage with the Panel on future system restart needs and associated restoration modelling. As currently drafted, there is no formal requirement for TNSP involvement in planning for SRAS.

We would encourage the Panel to reconsider this position. TNSPs bring critical insights from their deep network knowledge and operational experience. Early and formal involvement would support more efficient planning and ensure SRAS strategies reflect the practical realities of the transmission network and its constraints.

In Victoria, AusNet holds delegated system restart responsibilities and operates approximately 99% of the transmission network. Our operational expertise enables us to provide detailed information on asset capabilities - including specifications, switching limitations, interlock locations, and field resource availability all essential inputs to SRAS planning. We also can provide technical advice on capacitor banks, static VAR compensators (**SVCs**), station service arrangements, and restoration procedures.

In some cases, there are restart pathways that rely on assets operated by another TNSP. This underscores the need for coordinated planning across jurisdictions and reinforces the importance of direct engagement with TNSPs.

To ensure adequate involvement, we recommend establishing a formal consultation process with TNSPs. Specifically, we propose that Draft Recommendation 2.1 be amended as per below.

Recommendation 2

- (1) From 2026, AEMO sets out in the annual Transition Plan for System Security (**TPSS**) how it plans to deliver system restart capability through the transition to a low- or zero-emissions power system, including:
 - (a) setting out the future system restart needs for the NEM based on future focused restoration modelling that accounts for the contribution of IBR and the expected closure of coal-fired generation over the three planning horizons set out in the TPSS.
 - (b) engagement with the Panel on the future system restart needs and associated restoration modelling.
 - (c) **establishing formal arrangements to consult with and take into account the views of relevant TNSPs when planning for SRAS.**

We suggest consultation with TNSPs includes, but not be limited to, technical advice on asset capabilities, restoration procedures, and interjurisdictional dependencies. The consultation process should be structured and regular, similar to the engagement requirements put in place for the General Power System Risk Review process as per clause 5.20A.2 of the National Electricity Rules (**NER**).

Direct engagement with TNSPs will complement existing joint planning mechanisms such as the Operational Transition Program Working Group (**OTPWG**). While these forums provide useful coordination opportunities for developing the TPSS, they are not designed for the level of detailed input required for SRAS planning, which often requires project specific discussions on complex technical and operational considerations. Establishing a structured and direct consultation process with TNSPs will enhance the robustness and practicality of SRAS planning.

- **We recommend that AEMO review, consult and update current protocols and guidelines to specifically acknowledge deep network testing, mandate it in specific scenarios, and ensure real-time visible high-speed monitoring during such tests**

The Panel's draft determination has not proposed amendments to the current Rules framework (or made a recommendation) that encourages deeper restoration testing. However, we understand the Panel is interested in potential changes to the framework that could better support more extensive SRAS testing in line with AEMO's advice and recommendation 3.2.7 from the 2025 International System Restoration Review.

AusNet has identified three changes that we consider represent reasonable reforms to support more extensive SRAS testing:

- (1) A clearer definition of deep network testing.
- (2) A series of agreed defined scenarios where deep network testing is required.
- (3) Mandatory requirement that real-time visible high-speed monitoring capability is in place for all relevant equipment within the restart pathway prior to conducting deep network testing.

Further detail outlining these changes and their benefits is provided below.

Defining deep network testing and its value

While shallow testing and simulation play an important role in planning and provide a high level of confidence in expected system behaviour, they cannot fully replicate the complexities of real-world conditions. Deep network testing enables validation of modelling assumptions, identification of unforeseen issues, and refinement of operational procedures. It also provides critical insights into how systems and assets interact in practice, which interfaces require adjustment, and which procedures or roles are pivotal to successful execution.

We understand that network testing can mean different things to different parties, and that shallow and deep network testing are not yet formally defined in the current Rules framework. We proposed the definitions outlined below are given further consideration by AEMO and industry, and final version adopted through an appropriate vehicle (e.g. guideline amendments).

These definitions clarify the scope of testing expected to be conducted. AusNet has drawn on its own experience conducting these tests and international best practice in proposing these definitions. The definitions are designed to (1) appropriately test restart pathways to demonstrate power system resilience (2) minimise disruption to commercial and residential customers and (3) align with the Electric Reliability Council of Texas (**ERCOT**) framework.³

Shallow network testing definition

A basic startup test where SRAS units must be capable of operating in a stable manner supplying their own auxiliaries or running at zero export load for 30 minutes.

Deep network testing definition

A comprehensive test that involves at least one of the below tests as agreed between AEMO and the relevant TNSP(s):

- Line energising test:
 - A test to verify the SRAS unit's ability to energise lines along the cranking path.
 - The SRAS unit must demonstrate the ability to energise enough transmission to deliver its output to required loads as specified in the System Restart Plan.
- Load¹ carrying test:
 - A test to verify the SRAS unit's ability to supply a pre-arranged load.
 - The SRAS unit must demonstrate the ability to supply the required load while maintaining voltage and frequency for at least 30 minutes.
- Next-start resource test:
 - A test to verify the SRAS unit's ability to start the next unit in the restoration sequence.
 - The SRAS unit must demonstrate the ability to start the next SRAS unit's largest required motor while maintaining voltage and frequency stability for at least 30 minutes.

¹ Load testing is expected to be conducted using batteries or industrial loads such as pumps. Testing using these loads provides both the TNSP and AEMO confidence in the System Restart Plan, without de-energising commercial or residential customers. Where industrial customers are involved, participation should be agreed in advance.

³ Deep network testing is also conducted in other international jurisdictions, including Denmark, where Energinet serves as the transmission system operator.

Importantly, deep network testing should be sufficiently substantive to enable a genuine understanding of the impacts on the network which includes the 'unknown unknowns.' While not intended to be a rigid or prescriptive exercise, it should go beyond minimum compliance to ensure the insights gained are operationally valuable and technically robust.

Deep network testing also plays a vital role in building operational understanding and strengthening relationships across organisations. It reveals how people, systems, and processes work together under stress, and often uncovers coordination or interface issues that are not visible in models. Each test contributes to a shared body of experience and often leads to targeted modifications that enhance system resilience and improve restart readiness from both a practical and operational perspective.

Without testing under realistic conditions, there remains a degree of uncertainty around how assets and systems will perform when called upon to restore the network. This uncertainty could be the difference between a restart pathway succeeding or failing.

International experience reinforces the value of deep testing. For example, ERCOT conducts deep network testing every four years. Despite their rigorous testing regime, defects are frequently identified, and tests often require multiple attempts to succeed, even in pathways that had previously passed.⁴ This highlights that deep testing is not a one-off validation exercise, but an ongoing process of learning and refinement.

Deep network testing should be mandated in specific defined scenarios

We acknowledge that there are legitimate risks associated with performing deep network testing, in addition to the risks associated with foregoing deep network testing as outlined in the table below.

Risks of undertaking deep network testing	Risks of not undertaking deep network testing
- Potential damage to transmission assets (e.g. transformers without adequate over-voltage protection). - Operational complexity and coordination challenges. - Cost implications for generators (e.g. units offline for extended periods).	- Increased risk of restart failure due to unvalidated pathways. - Reduced confidence in restoration modelling and system readiness. - Limited ability to identify and resolve latent issues in restart pathways.

These trade-offs require all parties to accept the risks and commit to the planning and effort required to conduct meaningful deep network tests. The result is a system where deep testing is technically possible but rarely pursued, despite its benefits over shallow testing.

Further, while we agree with the Panel that the NER currently provide sufficient flexibility for deep network testing to occur in the NEM, this flexibility has not translated into consistent practice. We acknowledge that a deep network test is currently being planned in Victoria, which is a positive development. However, coordination challenges such as aligning parties, ensuring readiness and selecting the lowest-impacting timing have contributed to delays, underscoring the delicate trade-offs that must be managed. This experience reinforces the point that flexibility alone is not enough to ensure deep network testing occurs when it is needed.

To ensure the risks and benefits of deep network testing are appropriately balanced, we propose that the current protocols and guidelines be amended to mandate deep network testing in specific scenarios, as outlined below.

These scenarios are aligned with clause 4.5.1 of the 2021 SRAS Guidelines but are less onerous due to the additional risks and planning required for deep network testing.

- 1) A new restart pathway is established or proposed
- 2) A material change occurs to a SRAS unit

It is important to verify that the restart capability of a SRAS unit remains following any material change. A material change may include a rotor rewind or modifications to the generator governor. We have

⁴ ISON (2025). International System Restoration Review. Accessed [here](#).

proposed this scenario based on our belief that this definition supports keeping customers online. However, we have yet to test this externally with other interested stakeholders but would encourage AEMO to undertake a wider discussion.

3) More than 10 years have elapsed since the last deep network test in the region

While market operators such as ERCOT conduct deep network testing on a four-year cycle, this frequency is only feasible due to the presence of parallel redundancy in its network. In ERCOT's case, testing can be undertaken without interrupting customer load, as alternative pathways are available to maintain supply during the test. This significantly reduces the operational risk and complexity associated with testing.

In contrast, the NEM lacks this level of redundancy, making deep testing more costly and operationally complex. It requires coordinated outages, access to suitable load (such as pumped hydro or power plant auxiliaries), and meticulous planning to avoid asset damage and ensure system safety.

We consider a 10-year cycle offers a practical starting point, balancing system assurance with the financial and logistical realities of conducting full-path validation under realistic conditions. We recommend that the Reliability Panel periodically review this timeframe to determine whether a shorter testing interval may become necessary, recognising that system dynamics will continue to evolve.

Mandatory requirement for real-time visible high-speed monitoring capability

Installation of real-time visible high-speed monitoring capability prior to a deep network test is essential to ensure that testing yields meaningful insights and enables accurate validation of system behaviour against models.

Real-time monitoring equipment is relatively low-cost and portable, allowing for flexible deployment across the transmission network. While Supervisory Control and Data Acquisition (**SCADA**) systems typically provide data at four-second intervals, this resolution is insufficient to detect fast-acting phenomena such as resonance oscillations or transient instability, which may occur over much shorter timeframes. Real-time visible high-speed monitoring is therefore necessary to capture the full range of system behaviours during testing.

Although clause 4.3.3(d) of the 2021 SRAS Guidelines requires NSPs to use reasonable endeavours to ensure that real-time visible high-speed measurement devices are installed and operational at the time of SRAS testing, this has not consistently occurred in practice. AusNet has experienced instances where we were requested to conduct testing without real-time visible high-speed monitoring equipment in place. The absence of adequate monitoring during these tests has constrained our ability to compare actual system behaviour with modelling performed.

Accordingly, we recommend that the Reliability Panel establish real-time visible high-speed monitoring capability as a mandatory prerequisite for any deep network test, to enable robust validation of system modelling.

Mandating these changes to the testing framework would provide greater confidence in the system's ability to recover from major disruptions.

If you have any questions regarding this submission, please contact Jason Jina, Policy and Reform Manager by email at jason.jina@ausnetservices.com.au.

Sincerely,



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AusNet