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7 August 2025

Ms Dora Guzeleva
Director Wholesale Markets
Energy Policy WA
energymarkets@demirs.wa.gov.au

Dear Ms Guzeleva,

Consultation Paper – Power System Security and Reliability Standards Framework Review

The Australian Energy Market Operator (AEMO) welcomes the opportunity to provide a submission on the Power System Security and Reliability (PSSR) Standards Review (the Review) Consultation Paper. AEMO has collaborated extensively with Energy Policy WA, Western Power and other stakeholders as part of the PSSR Standards Working Group and looks forward to supporting the detailed design for these critical frameworks.

Enabling the energy transition in Western Australia requires strategic planning for PSSR and the Coordinator of Energy's Review is a critical effort to ensure that PSSR is maintained as part of the State Electricity Objective (SEO).

There is a heightened focus on security globally as a result of recent events impacting the Iberian Peninsula and as operators increasingly coordinate high renewables power systems alongside energy storage technologies. AEMO therefore welcomes the outcomes of this review, which addresses many of the gaps in the current arrangements to support the delivery of a single, consistent standard for PSSR under the Electricity Market and System (ESM) Rules. Specifically, AEMO supports the proposals for:

- coordinating assumptions and inputs into the key planning processes, where appropriate;
- centralised investment and planning to ensure sufficient fault levels are maintained for network operations;
- maintaining a stable voltage waveform and ensuring sufficient fault level for network operations (collectively referred to as 'system strength'); and
- reducing barriers to the integration of new technologies such as Grid Forming (GFM) inverters, providing a pathway to substituting synchronous capabilities as the system transitions to higher levels of inverter-based renewables.

AEMO would welcome further consideration around the role of the Whole of System Plan (WOSP) in supporting the proposed coordinated planning. It could provide the opportunity to strategically plan the transition – via an optimal development path against which the transition may be tracked, and transition points systematically planned.

Transition planning for system security

The Review proposals will provide the base framework for coordinated forecasting and planning. The detailed design of the frameworks should support systematic, structured planning for critical milestones in the transition (transition points), which must be underpinned by a detailed understanding of the associated PSSR impacts. This is necessary to inform timely investment decisions and operational readiness such that increasing levels of renewable generation can operate in the WEM when ready to do so, without inefficient barriers driven by engineering requirements.

Transition planning is a key focus for AEMO, enabled on the East Coast through new obligations under the National Electricity Rules which include the delivery of a Transition Plan for System Security[1]. The framework highlights the importance of planning, a new approach to investments in services and the trialling of new technologies to support system security. AEMO WA continues to leverage this work in close collaboration as part of delivering the SWIS Engineering Roadmap. AEMO would welcome the opportunity to work with Energy Policy WA and Western Power to consolidate and formalise security reporting in the SWIS.

Response to Consultation Paper Proposals

AEMO has provided a response to each of the proposals outlined in the Consultation Paper in Attachment 1. Some key points for Energy Policy WA to consider include:

- AEMO notes there are inherent challenges associated with the proposal to treat hybrid facilities as a Load if they do not have a PSSR impact (Proposal 4). Establishing the PSSR impact of such a facility would require equivalent assessments undertaken as part of the registration of a Generator Performance Standard (GPS).
- AEMO supports the proposal for a future fleet outlook for use in fault level assessments and assessing stable voltage waveform (Proposal 13); however, it may be prudent to separate the entity responsible for setting generation assumptions for the determination of system strength requirements from the entity responsible for providing the service (Proposal 15).
- AEMO recommends enabling provision of power system models from existing generators connected to areas experiencing system strength degradation (Proposal 15). This will be essential to accurately determine current and future system strength requirements.
- AEMO acknowledges the need for greater collaboration with WA stakeholders for an enhanced process in coordinating the assumptions and inputs for forecasting (Proposal 16) and supports the option of leveraging the existing Multi-Sector Modelling (MSM) process and the Inputs, Assumptions and Scenarios (IAS) process. While MSM and IAS inputs are already utilised for AEMO's WEM Electricity Statement of Opportunities (ESOO) and could potentially inform the WOSP or to a public data set, as well as Western Power's Transmission System Plan, the final design must be fit-for-purpose for the WEM/SWIS and ideally retain national consistency.
- The significant pace of the energy transition and the need to accommodate rapidly developing new technologies recommends consideration of flexibility under the rules, particularly in relation to GPS requirements. The detailed design of these frameworks should consider, where appropriate, the delegation of specific requirements to WEM Procedures and Guidelines. AEMO will provide more detailed feedback

[1] https://aemo.com.au/newsroom/news-updates/aemo-publishes-inaugural-transition-plan-for-system-security-report

and highlight any relevant considerations for implementation during the detailed design and drafting of the Amending ESM Rules. AEMO also notes there are likely to be a significant number of WEM Procedures impacted by this review, and requests sufficient time to identify and assess resourcing implications.

AEMO looks forward to continuing to work with Energy Policy WA and the PSSR Working Group in the finalising the detailed design and Amending ESM Rules.

If you would like to discuss any of the matters raised in this submission, please contact Ben Davis, Manager WA Regulatory Affairs at [redacted]

Yours sincerely,

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Nicola Falcon

Interim Executive General Manager WA

Attachments: Attachment 1 – AEMO response to the Consultation Paper Proposals

Attachment 1 – AEMO response to the Consultation Paper Proposals

Proposals	AEMO comments
Section 3.1 – Network planning standards for PSSR	
Proposal 1 The planning standard for Western Power as the Network Operator to include both customer outcome standards and deterministic standards such that: • **The customer** outcome standards be implemented as obligatory standards in the ESM Rules, with effective incentive mechanisms determined as part of the access arrangement process, and the deterministic standards be included to provide guidance to the network design process. • The customer outcome standards to be set on a locational basis. • Specific measures for customer outcome standards will be consulted on a later date. • The customer outcome standards will be reviewed by government on a regular basis (3-5 yearly).	• AEMO supports the intent of this proposal, provided the detailed design results in a framework that is operable and that the expense of any potential governance framework is considered. • AEMO also recommends that there is some form of oversight built into the framework, even if this is just a minimum requirement of transparency placed on the Network Operator (e.g. a public record of the reasons for decisions).
Section 3.2 – The User Facility Standards Framework	
Proposal 2 – User categorisation framework A revised facility categorisation framework will be implemented in the ESM Rules, comprising of: • Large User Technical Standards: (Energy Producing Systems (incl. Electric Storage Resources (ESR)) >10MVA, Synchronous Condensers); • Medium User Technical Standards (Energy Producing Systems (incl. ESR) ≤10MVA);	• AEMO supports the intent of this proposal and the revised categorisation framework, provided it is also supported by Rule Participants. • AEMO notes that the Consultation Paper is generally silent on how aggregations of Distributed Energy Resources (DER) or Virtual Power Plants might fit into a User Facility Standards Framework. As these areas are not contemplated by this review, there should be consideration of the requisite coordinated assumptions for DER through the appropriate workstreams.

Loads (other than stand-alone ESR); and • Small User Technical Standards (equipment connected to the low voltage network).	• AEMO supports the statement that consideration will need to be given in the future to the application of standards to inverter-based loads and loads which may present a PSSR risk as a consequence of their withdrawal characteristics. This will become more relevant as larger numbers of inverter-based loads continue to enter, and have broader implications for the system. Consideration should be given to the Australian Energy Market Commission Access Standards Stage 2 review[2], which includes reforms to treatment of inverter-based loads.
Proposal 3 – Application of standards to each category of users • The Ideal Generator Performance Standard will be renamed the "Automatic User Performance Standard". • The Common Requirements for all users will be based on the section 3.2 of the 2023 proposed Technical Rules. • The following user facility standards will apply to each category of user: – Large user Facility standards – Medium User Facility Standards – Loads – Small User Facility Standards	• AEMO generally supports the intent of this proposal, including the renaming of the standard to the Automatic User Performance Standard, and conferring obligations based on the size of risk, rather than using the existing definition of System Size. • AEMO supports the principle of balancing the management of PSSR risks with not imposing onerous technical requirements on proponents. This will be critical for ensuring that standards are applied in a way that focus on efficiency and that rules do not create unnecessary costs or other barriers to market participation.
Proposal 4 – Point of compliance with user facility standards and hybrid facilities • The Network Operator will be required to document in a WEM Procedure, in accordance with principles set out in the ESM Rules, the circumstances in which compliance at a point other than the Connection Point will be required. Compliance will only	• AEMO supports the increased transparency and the requirement on the Network Operator to document in a WEM Procedure the circumstances in which GPS compliance at an alternative point might be required. • AEMO agrees that in most cases compliance should be assessed at either the Connection Point or an alternative point, unless this is specifically provided for under the ESM Rules (e.g. A.12.2).

[2] See: https://www.aemc.gov.au/rule-changes/improving-nem-access-standards-package-2

be permitted to be assessed at either the Connection point(s) or the alternative point(s) for facility i.e. not at both. • Hybrid facilities that have the control and protection systems in place at all times to ensure their operation will not have a PSSR impact on the rest of the system will be treated as loads under the new User Facility Standards categorisation framework.	• AEMO remains concerned that, without applying the equivalent assessments as would occur as part of a GPS, it will not be possible to identify where hybrid facilities with energy producing systems larger than 10 MVA have sufficient control and protection systems in place to not present a risk to PSSR. As more utility-scale Inverter Based Resources (IBR) are connected to the system, it will become more important for appropriate performance to be assessed. Treating certain Hybrid Facilities (which may include large-scale batteries) as a Load, may have the unintended consequence of reducing AEMO's ability to manage PSSR over time, as they will not be subject to the information requirements under a GPS.
Proposal 5 – Governance of the user facility standards framework The existing governance framework will remain primarily the same, some modifications will be made to: • ensure guidance on which facilities ≤10MVA are captured by the Large User Technical Standards framework; • ensure AEMO is consulted on the Performance Standards for such facilities in the way it is currently consulted under Chapter 3A of the ESM Rules for Transmission Connected Generating Systems; • require AEMO to engage directly with proponents to resolve issues if the Network Operator agrees to a negotiated position but AEMO does not and the Network Operator requests that AEMO do so; and • expand the number of facilities who are required to have a monitoring plan registered with AEMO to include facilities that: – are not currently captured by the ESM Rules GPS framework; and	• AEMO generally supports the proposal to retain the existing governance framework for user facility standards for Facilities currently subject to the GPS framework. As part of finalising modifications for the updated governance arrangements, consideration should be given to clarifying AEMO's role, specifically in respect of negotiated standards. This includes providing for AEMO to charge proponents directly for AEMO's costs incurred as part of making assessment for a negotiated standard. • AEMO is generally supportive of increased transparency, but as noted in the consultation paper, AEMO sees several risks associated with publishing the negotiated standards for future connections. • AEMO suggests the following matters will need to be considered when seeking to balance risks against any benefits associated with publishing negotiated standards: – Negotiated standards are bespoke and heavily dependent on the location of the network and parameters of the specific Facility. Publishing these standards could lead to the unintended consequence of creating false expectations for new Facilities seeking to achieve the same or a similar outcome as part of their bespoke connection. This would lead to wasted resources and potentially protracted timeframes for new connections, if the same standard is ultimately considered unsuitable. – There is a limit to how much value additional transparency would provide. The framework already provides transparency and visibility around the types of

<table>
<tr><td>– will be captured by the Large User Technical Standards under the revised framework.

For future connections, where connection standards are negotiated between participants and the Network Operator, these negotiated standards will be made public.</td><td>standards that can be negotiated. For example, the GPS sections of the ESM Rules outline the factors AEMO and Western Power should consider when assessing a negotiated standard.

– This proposal is different from the process for publishing exemptions that exists under the Technical Rules. In most cases only the type of exemption is published, the details of the alternate performance level that had been agreed with the Participant is not generally published.

• As noted in the Consultation Paper, AEMO does not support the aspect of the proposal which requires AEMO to engage directly with the proponent where it disagrees with a negotiated standard, but the Network Operator does not.

– The rules currently set out the process for GPS engagement, which includes a lead role for the Network Operator in the assessing and approving negotiated GPS, on the advice of AEMO (where applicable). It has been AEMO's experience, to date, that early and joint 3-way engagement as partners in the connection process is the best way to avoid disagreement in first instance and resolve issues collaboratively when needed. While AEMO notes it has not encountered any cases where such a disagreement has occurred that has not been able to be resolved by early and joint engagement, there should continue to be flexibility for AEMO liaise directly with proponents, if and where appropriate.</td></tr>
<tr><td colspan="2">Section 3.3 – Suitability of Technical Requirements (connection standards) for new technologies</td></tr>
<tr><td>Proposal 6 – Withstand Short Circuit Ratio (SCR)</td><td rowspan="5">• AEMO welcomes initiatives that are focused on removing inefficient barriers to market entry by recognising the differential capabilities of new technologies (Proposals 6 through 11).

• While AEMO is actively progressing analysis to support the role of advanced inverter capabilities, and generally supports the intent of the six proposals, some additional technical validation is required to build engineering confidence in the capabilities of new technologies as a replacement for synchronous generation as part of the energy transition. AEMO considers that Rule Participants and Original Equipment</td></tr>
<tr><td>Proposal 7 – Voltage phase angle jump</td></tr>
<tr><td>Proposal 8 – Active and reactive current response during and after contingencies</td></tr>
<tr><td>Proposal 9 – Disturbance ride through for multiple disturbances</td></tr>
<tr><td>Proposal 10 – Damping of power system oscillations</td></tr>
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Proposal 11 – Partial load rejection	Manufacturers are also well placed to provide relevant feedback on this matter. This includes comments on the suitability of the proposed Withstand Short Circuit Ratio standards presented in the Consultation Paper. • AEMO notes that incentives or obligations for connection of GFM inverters is not contemplated in the review., AEMO expects appropriate incentives and obligations will be developed as part of development of the system strength framework and as an outcome of other reviews such as the Essential System Services Review. • AEMO will provide additional feedback if relevant at the detailed design/proposed amending ESM Rules phase. • AEMO considers that incorporating flexibility to modify and adapt the connection standards over time would be beneficial given the pace at which the system is changing and technology is advancing.
Section 3.4 – SWIS System Strength Framework	
Proposal 13 – A future fleet outlook for use in fault level assessments AEMO, EPWA and the Network Operator to align on a forecasting approach, in consultation with interested stakeholders through public consultation. This approach should include the methodology, inputs, assumptions, and scenarios necessary for the determination of an expected 10-year generation and ESR capacity outlook on an annual basis. This fleet mix should reflect capacity (i.e. MW), technologies (e.g. gas/wind/solar) and broad locations (e.g. regions).	• AEMO strongly supports a future fleet outlook for use in fault assessments, and notes that it should interact and be aligned with the coordinated assumptions and inputs process outlined under Proposal 16. Coordinating the arrangements to support forecasting and modelling will facilitate the identification of system strength issues and enable early action on remediations with procurement and/or implementation timeframes (i.e. via procuring NCESS for system strength services). • A forecasting approach that includes consultation on the methodology, inputs, assumptions and scenarios necessary for determining a capacity outlook will ensure the outcomes are plausible and relevant and have support of industry. Publication of this information will also improve reproducibility by industry which will further build trust and confidence in the fault level forecasting activities. The recent joint exercise with Western Power for the system strength screening assessment in the 2025 WEM ESOO highlights the benefits of engagement and collaboration.

	• AEMO notes that determining the future fleet outlook requires more than just alignment on a common set of assumptions. Ideally, it should consider what the optimal mix of technologies is, and where plant should be located, under a particular scenario based on an agreed set of consistent input assumptions. It is recommended that roles and responsibilities for determining this optimal mix should be clearly defined at the detailed design phase. – Assumptions in respect of technologies could, in the case of IBR, include (where modelling capability supports this) assumptions on the likely mix of GFM and GFL resources as this will be critical to delivering the outputs under Proposals 14 and 15. • For prudency, AEMO recommends consideration should be given to separating the entity responsible for setting generation assumptions for the determination of system strength requirements from the entity responsible for providing the service.
Proposal 14 – Maintaining minimum fault levels required for network protection The Network Operator will be required to: • develop and publish a methodology for calculating minimum fault level requirements at each transmission node; • compare the minimum fault level requirements with the expected fault level at each node as part of the TSP each year, using the fleet outlook and the demand forecast, as part of the System Strength calculation; and • resolve any forecast shortfalls through network reinforcement or non-network solutions (e.g. competitive NCESS procurement), as necessary.	• AEMO supports the intent of this proposal but suggests clarification that the Network Operator will be required to publish the results of the minimum fault level requirements for each transmission node, as part of the Transmission System Plan. • AEMO also recommends that there are provisions in the detailed design to enable appropriate information sharing between AEMO and the Network Operator, to support operability of the framework. This could include: – Requiring the Network Operator to share the minimum fault level results with AEMO in advance or as soon as they are available, if the publication timelines are not aligned with AEMO's obligations under the PSSR framework. – Requiring the Network Operator to share the outcome of its decision-making process to procure system strength services with AEMO, to support AEMO's related actions under the PSSR framework. – AEMO notes the dependency between the outcomes associated with this proposal and (the yet to be finalised) detailed design of Proposals 15 and 16. This is because

	the calculation of system strength shortfalls and remediations is highly dependant on when issues are likely to arise and the implementation timeframes for relevant remediations. This means arrangements for coordinated forecasting and planning will need to: ○ Clearly identify the requisite inputs (in respect of the network and generation) required to inform modelling and analysis, including how generation outages will be treated; and ○ Be undertaken sufficiently far in advance to enable (or to not lock-out) investment in network, equipment and facilities that have longer implementation timeframes.
Proposal 15 – A centralised planning/investment function for system strength to facilitate new connections The Network Operator will be required to forecast shortfalls in system strength required to host the expected portfolio of inverter-based resources on the system, and to take steps to procure services that can address these shortfalls through competitive mechanisms (using the NCESS framework). Provisions will be incorporated into the ESM Rules to determine whether generator settings continue to meet a test for ongoing suitability and allow the Network Operator and/or AEMO to request that settings are retuned as appropriate through a streamlined process.	• AEMO supports the proposal for a centralised planning function for system strength – to incentivise new connections. As highlighted above, appropriate sharing of information between AEMO and the Network Operator will need to be enabled to facilitate these new processes. Importantly, where for network planning reasons, deviation from the future fleet outlook is required, this information should be shared with AEMO to inform its own analysis and planning processes. • AEMO's support of the PSSR Standards Working Group has leveraged insights from AEMO's role in formal system strength frameworks in the National Electricity Market. Additionally, AEMO and Western Power have collaborated in system strength screening assessments, the outcomes of which were reported in the 2025 WEM ESOO. This work could be leveraged to inform the detailed design of processes to forecast shortfalls in the system strength required to host the expected portfolio of IBR. • AEMO generally supports the second part of the proposal. AEMO suggests the relevant mechanism should also enable the provision of power system models from existing generators connected to areas experiencing system strength degradation, including any consideration of the costs to Market Participants for provision of this information. The ability to effectively model an increasing range of power system conditions accurately is key to mitigating operating risks that manifest in real-time, to avoid those risks that likely contributed to events in the Iberian Peninsula.

Section 3.5 – Coordinating assumptions and inputs for forecasting	
Proposal 16 To achieve a coordinated approach to forecasting inputs and assumptions, a collaborative process between the parties responsible for forecasting (EPWA, AEMO and the Network Operator) should be established, with general rules included in the ESM Rules to guide the parties towards effective collaboration.	• AEMO strongly supports the proposal to coordinate the approach to forecasting inputs and assumptions. This will utilise existing planning arrangements (WOSP, ESOO and the TSP) and improve the limited integration currently required by the ESM Rules and other instruments. • AEMO agrees that leveraging the Multi-Sector Modelling (MSM) and Inputs, Assumptions and Scenarios Report (IASR) could provide a useful starting point for aligning inputs and assumptions. These processes currently inform the analysis undertaken by AEMO in the NEM and WEM for the ESOOs and could potentially support Western Power's network planning processes. However, there will need to be flexibility in how uncertainty is treated in each process and in different time periods. For example, to ensure reliability outcomes, the ESOO will undertake forecasting of future generation on the basis of committed resources whereas ensuring suitable system strength outcomes will require a forecast of the likely future fleet. • In addition, AEMO suggests consideration could be given to uplifting the capabilities of the WOSP and its related processes. If it provided more frequent guidance the outputs (potentially including an Optimal Development Path) could inform the annual planning processes for the TSP, ESOO and relevant components of the GSOO, and facilitate requirements for the SWIS. The MSM and IASR processes could also be used to inform the timing and development of the WOSP. • AEMO notes that the collaborative process under this proposal will still need to result in some form of a data repository or public data set, as this will be fundamental to coordinating inputs and assumptions and promoting reproducibility. The design of the framework therefore needs to resolve existing concerns that some data required to enable effective integrated planning is likely to be confidential or not currently shared with AEMO. – The framework needs to ensure that confidentiality requirements around data do not prevent requisite analysis and modelling by AEMO. For example, access to specific data will be essential to determine the remedies for a system strength issue

	at a specific location, e.g. through changes to a Facility (re-tuning), during the connection process or post-connection, or through a constraint on the Facility. Access to data will also be essential to determine the extent to which these solutions offer longer-term remediations or are temporary fixes. To some degree, information could be aggregated to protect confidentiality without foregoing transparency, but this is not always possible.
Section 3.6 – Ride through requirements for network elements	
Proposal 17 Apply the facility ride through requirements, for the definitions relating to disturbances of the current ESM Rules Appendix 12.7-12.9, on network elements with appropriate supporting text to clarify that this standard does not apply to: • Faulted primary equipment disconnected under the requirements of the current Technical Rule section 2.9. • The operation of the Load Shedding requirements of the current Technical Rule clause 2.3.2 and section 2.4. Elements of the network that are designed to trip as part of a scheme (e.g. protection scheme or generation runback scheme).	• AEMO agrees that the inability of the network to remain connected and operational during system disturbances can potentially have a significant impact on system security. Rule Participants are best placed to comment on the specifics of this proposal.
Section 3.7 – Customers' ability to negotiate or change their level of reliability through non-reference services	
Proposal 18 The ESM Rules will provide clarity on which customer outcome standards can be modified as part of a non-reference service, and any agreed modifications will be published. Should conditions change such that the customer can be provided the reference level of reliability as per the customer outcome standards, the register will be adjusted to reflect this.	• AEMO supports the intent of this proposal to improve clarity and transparency within the rules of the arrangements for customers seeking non-reference services. AEMO considers that where outcome standards, and obligations and requirements on parties are clear, more choice can be afforded to customers on their value of customer reliability.

Section 3.8 – Governance of PSSR Standards	
Proposal 19 Governance arrangements that reflect the relevant recommendations in the Energy Transformation Taskforce PSSR Standards Framework Information Paper will be implemented.	• AEMO supports a single dispute resolution process, noting the detailed design (for proposed Amending Rules) are yet to be developed. While this detail will be required before AEMO can make further comment, AEMO considers the following principles should apply to the design for a single dispute resolution process, including: – The process should operate efficiently, with timings and costs minimised, where process costs (to the extent that they may apply to an individual party) and access to technical advice do not preclude a party's ability to participate in the process. – The process should sufficiently protect, to the extent necessary, the confidentiality of each relevant party while balancing the need for process transparency and reporting. – That suitable criteria are developed for the selection of arbitrators to ensure their impartiality and that they possess the requisite knowledge to perform their role. • While AEMO supports the principle of establishing the proposed Reliability and Security Advisory Panel (RSAP) arrangements, it notes there is insufficient detail in the Consultation Paper on the arrangements for AEMO to assess the implications of deleting clause 2.4.3B. • Careful consideration should be given to the membership of the RSAP, to ensure it has adequate technical expertise to be consulted on regarding PSSR and Technical standards, and to how the RSAP may also support the dispute resolution process.
Section 3.9 – Adopting Western Power September 2023 Proposal Technical Rules Amendments	
Proposal 20 Adopt the Western Power proposed solutions from the September 2023 Submission to the ERA for PSSR related matters not already considered under other proposals in this Review.	• AEMO generally supports this proposal, provided it is supported by Rule Participants.